Search for electroweak production of dark matter particles in compressed mass spectra with the ATLAS detector at LHC

> 14/09/2021 Second Year Seminair E. Ballabene

#### Introduction

- 2 analyses with 2 different analysis strategies
- Both targeting 2 leptons in the final state without associated hadronic radiation ("2LOJ")



- Focusing into compressed mass spectra:  $\Delta m(\tilde{\ell}, \chi_1^0), \Delta m(\chi_1^{\pm}, \chi_1^0) < 100 \text{ GeV}$
- Unblided very recently!

#### Preselection

• Preselection applied to both analyses

Variable	Cut
N <sub>OS leptons</sub>	= 2
$p_T^{\ell_1}$	> 27 GeV
$p_T^{\ell_2}$	> 9 GeV
$m_{\ell\ell}$	> 11 GeV
$n_{jet-20}$	< 2
$n_{bjet-20}$	= 0
$E_T^{\text{miss}}$ significance	> 3
$ m_{\ell\ell}-m_Z $	> 15 GeV(for SF only)

#### Slepton production



Charginos production





• Cut&count optimization of statistical significance  $p_T^{\ell_1}, p_T^{\ell_2}, E_T^{miss}$  significance,  $m_{\ell\ell}, p_{T,boost}^{\ell\ell}, \cos \theta_{\ell\ell}^*, \Delta \phi_{\ell_1, \ell_2}, \Delta \phi_{E_T^{miss}, \ell_1}$ 





• Cut&count optimization of statistical significance  $p_T^{\ell_1}, p_T^{\ell_2}, E_T^{miss}$  significance,  $m_{\ell\ell}, p_{T,boost}^{\ell\ell}, \cos \theta_{\ell\ell}^*, \Delta \phi_{\ell_1, \ell_2}, \Delta \phi_{E_T^{miss}, \ell_1}$ 



Variable	Cut
$n_{jet-20}$	= 0
$n_{bjet-20}$	= 0
Nos sF leptons	= 2
$p_T^{\ell_1}$	> 140 GeV
$p_T^{\ell_2}$	> 20 GeV
$E_T^{\text{miss}}$ significance	> 7
$m_{\ell\ell}$	> 11 GeV
$ m_{\ell\ell}-m_Z $	> 15 GeV
$p_{\mathrm{T,boost}}^{\ell\ell}$	< 5 GeV
$\cos \theta^*_{\ell\ell}$	< 0.2
$\Delta \phi_{\ell,\ell}$	> 2.2
$\Delta \phi_{E_{ au}^{ ext{miss}},\ell_1}$	> 2.2





• Cut&count optimization of statistical significance  $p_T^{\ell_1}, p_T^{\ell_2}, E_T^{miss}$  significance,  $m_{\ell\ell}, p_{T,boost}^{\ell\ell}, \cos \theta_{\ell\ell}^*, \Delta \phi_{\ell_1, \ell_2}, \Delta \phi_{E_T^{miss}, \ell_1}$ 



Events

N

Variable	Cut
$n_{jet-20}$	= 0
$n_{bjet-20}$	= 0
Nos SF leptons	= 2
$p_T^{\ell_1}$	> 140 GeV
$p_T^{\ell_2}$	> 20 GeV
$E_T^{\rm miss}$ significance	> 7
$m_{\ell\ell}$	> 11 GeV
$ m_{\ell\ell}-m_Z $	> 15 GeV
$p_{\mathrm{T,boost}}^{\ell\ell}$	< 5 GeV
$\cos  heta^*_{\ell\ell}$	< 0.2
$\Delta \phi_{\ell,\ell}$	> 2.2
$\Delta \phi_{E_{ ext{T}}^{ ext{miss}},\ell_{1}}$	> 2.2



• Cut&count optimization of statistical significance  $p_T^{\ell_1}, p_T^{\ell_2}, E_T^{miss}$  significance,  $m_{\ell\ell}, p_{T,boost}^{\ell\ell}, \cos \theta_{\ell\ell}^*, \Delta \phi_{\ell_1, \ell_2}, \Delta \phi_{E_T^{miss}, \ell_1}$ 





2LOJ 2<sup>nd</sup> Wave – Slepton analysis

• Cut&count optimization of statistical significance  $p_T^{\ell_1}, p_T^{\ell_2}, E_T^{miss}$  significance,  $m_{\ell\ell}, p_{T,boost}^{\ell\ell}, \cos \theta_{\ell\ell}^*, \Delta \phi_{\ell_1, \ell_2}, \Delta \phi_{E_T^{miss}, \ell_1}$ 





2LOJ 2<sup>nd</sup> Wave – Slepton analysis

# Slepton analysisp• Shape fit on $m_T^{100}$ Different binning choices have been studied, obtaining the<br/>best performance using 5 GeV for the first 6 bins:<br/> $m_{T2}^{100}$ = [100, 105, 110, 115, 120, 125, 130, 140, $\infty$ ).SR-0jetSR-1jet



• Background estimation strategy based on a data driven technique to estimate "flavour symmetric" (FS) backgrounds processes (e.g. processes like WW, tf, Wt and  $Z(\rightarrow \tau\tau)$ +jets producing SF and DF lepton pairs with equal probabilities).

Sleptons search
data driven
data driven
WW/WZ - data driven
ZZ - Monte Carlo
Monte Carlo
$Z(ee,\mu\mu)$ - Monte Carlo
$Z(\tau \tau)$ - data driven
Matrix method
Monte Carlo



 Slepton signal is only SF: data driven background estimation technique exploits data in the DF channel to predict the FS backgrounds in the SF channel.

- In principle, one could simply count the number of DF events in the SR (without the SF selection) to obtain the flavour symmetric background events in the SF channel. This, however, is only true at generator level.
- The particles are identified by a detector, and since electrons and muons have different identification, isolation, reconstruction and trigger efficiencies, these differences have to be accounted for. Therefore, in order to extrapolate the count of DF events to the estimate of SF background events, these efficiency differences between electrons and muons must be taken into account and used to correct the DF count.
- Two different methods: the efficiency correction method (used as default) and the transfer factor method (used as crosscheck)
- Before applying these methods, all the non FS backgrounds are subtracted from the DF data events which are used to obtain the FS background in the SF channel.



#### Efficiency correction method

This technique consists in reweighting, on an event-by-event basis, for the reconstruction, isolation, identification and trigger efficiencies.



Expected dieletron events

Expected dimuon events

Expected emu events

$$\begin{split} N_{ee} &= N \varepsilon_{e}^{reco} \varepsilon_{e}^{reco} \varepsilon_{ee}^{trig}, \\ N_{\mu\mu} &= N \varepsilon_{\mu}^{reco} \varepsilon_{\mu}^{reco} \varepsilon_{\mu\mu}^{trig}, \\ N_{e\mu} &= 2N \varepsilon_{e}^{reco} \varepsilon_{\mu}^{reco} \varepsilon_{e\mu}^{trig}, & \quad \text{Assuming DF production is twice the SF one} \end{split}$$

$$\kappa = \sqrt{\frac{N_{\mu\mu}}{N_{ee}}} = \frac{\varepsilon_{\mu}^{reco}}{\varepsilon_{e}^{reco}} \sqrt{\frac{\varepsilon_{\mu\mu}^{trig}}{\varepsilon_{ee}^{trig}}}. \qquad \alpha = \frac{\sqrt{\varepsilon_{ee}^{trig}}\varepsilon_{\mu\mu}^{trig}}{\varepsilon_{e\mu}^{trig}}. \qquad N_{\mu\mu} = \frac{1}{2}N_{e\mu}\kappa\alpha,$$

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2LOJ 2<sup>nd</sup> Wave – Slepton analysis

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#### Efficiency correction method

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$$\kappa = \sqrt{rac{N_{\mu^+\mu^-}}{N_{e^+e^-}}}$$
 reconstruction, isolation, identification efficiency

The correction factor  $\kappa$  is computed in a control region (CR $_{eff})$ 

Variable	Cut	Different reconstruction efficiencies
$n_{jet-20}$	< 2	observed for different backgrounds
N <sub>OS leptons</sub>	= 2	
$p_T^{\ell_1}$	> 30 GeV 🛶	— Tighter cuts than preselection: purities more
$p_T^{\ell_2}$	> 9 GeV	similar to SRs
$E_T^{\rm miss}$ significance	> 6	
$\cos  heta^*_{\ell\ell}$	> 0.2	Inverted to enrich VV events





Larger dimuon rec. eff for Zjets lep1pT [GeV]

#### Efficiency correction method

This technique consists in reweighting, on an event-by-event basis, for the reconstruction, isolation, identification and trigger efficiencies.

$$\kappa = \sqrt{rac{N_{\mu^+\mu^-}}{N_{e^+e^-}}}$$
reconstruction identificati

reconstruction, isolation, identification efficiency

Reconstruction efficiencies can depend on the pseudorapidity region where the leptons reach the detector

		MC (FS)	Data
Inclusive η	К	$1.1576 \pm 0.0014$	$1.1942 \pm 0.0043$
η  < 0.1	κ <sup>central</sup>	$0.8509 \pm 0.0042$	$0.852 \pm 0.013$
η  < 1.05	κ <sup>bar-bar</sup>	$1.0352 \pm 0.0029$	$1.0655 \pm 0.0089$
η  > 1.05	к <sup>end-end</sup>	$1.38526 \pm 0.0042$	$1.440 \pm 0.010$
	$\kappa^{bar-end}$	$1.1947 \pm 0.0020$	$1.2198 \pm 0.0061$





A fit performed in

 $\kappa(p_T^{\ell_1}) = b + \frac{a}{p_T^{\ell_1}}$ 

every  $|\eta|$  region

#### Efficiency correction method

 $arepsilon^{trig}$  -

This technique consists in reweighting, on an event-by-event b reconstruction, isolation, identification and trigger efficiencies

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$$\alpha = \frac{\sqrt{\varepsilon_{ee}^{trig} \varepsilon_{\mu\mu}^{trig}}}{\varepsilon_{e\mu}^{trig}}$$
 Trigger efficiency

 $N^{\rm METtrig}$  and singlepTrig

NMETtrig

t basis, for the  
es.  

$$\frac{Variable}{n_{jet-20}} \begin{cases} Cut \\ n_{jet-20} \\ p_T^{\ell} \\ p_T^{\ell} \\ p_T^{\ell} \\ E_T^{miss} \\ m_{\ell\ell} \\ m_{\ell\ell} - m_Z \\ m_{\ell} \\ m_{\ell\ell} - m_Z \\ m_{\ell} \\ m_{\ell}$$

	MC	Data	Data SUSY16
$arepsilon_{ee}^{trig}$	0.9915 ± 0.0019	$0.9945 \pm 0.0039$	$0.9797 \pm 0.0041$
$arepsilon_{\mu\mu}^{trig}$	$0.9791 \pm 0.0027$	$0.9803 \pm 0.0080$	$0.9119 \pm 0.0086$
$\varepsilon_{e\mu}^{trig}$	$0.9879 \pm 0.0012$	$0.9865 \pm 0.0045$	$0.9571 \pm 0.0041$
$\alpha$	$0.9973 \pm 0.0021$	$1.0008^{+0.0062}_{-0.0093}$	$0.9876^{+0.0066}_{-0.0074}$
$\alpha^{bar-bar}$	$0.9968 \pm 0.0035$	$1.006^{+0.007}_{-0.016}$	$0.962^{+0.012}_{-0.013}$
$\alpha^{end-end}$	$0.9902 \pm 0.0048$	$1.010^{+0.018}_{-0.037}$	$1.01088^{+0.015}_{-0.020}$
$\alpha^{bar-end}$	$0.9996 \pm 0.0031$	$0.992^{+0.010}_{-0.018}$	$1.001^{+0.0096}_{-0.011}$

 $\varepsilon_{ee}^{trig} \varepsilon_{\mu\mu}^{trig}$ 

#### Efficiency correction method

This technique consists in reweighting, on an event-by-event basis, for the reconstruction, isolation, identification and trigger efficiencies.

Trigger efficiency







#### Efficiency correction method

This technique consists in reweighting, on an event-by-event basis, for the reconstruction, isolation, identification and trigger efficiencies.



Trigger efficiency correction  $\alpha$  calculated for data (black) and MC (purple). MC includes: tf, Wt,  $Z(\rightarrow \tau\tau)$ + jets, VV, VVV and fakes. The bottom frame shows the  $\alpha$  values normalised to data. The uncertainties are statistical only.

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#### Systematic uncertainties



- Uncertainty on κ. Difference between the global κ factors calculated in the different |η| regions to cover small data-MC deviations.
- SF backgrounds yields using  $p_T^{\ell_1}$  as the fitting variable gives differences below 1%. Therefore we consider an additional 1% uncertainty on the choice of  $p_T^{\ell_1}$  as the fitting variable.
- Uncertainty on the fit function  $\kappa(p_T^{\ell_1})$ . The fit parameters (a, b) are varied by their uncertainty keeping the other parameter fixed. After the variations, the background yield changes by  $\Delta_1$ ,  $\Delta_2$ . The variance is then given by  $(1 C_1) (\Lambda_1)$

$$\sigma = \mathbf{\Delta}^T C \mathbf{\Delta} = (\Delta_1 \Delta_2) \begin{pmatrix} 1 & C_{12} \\ C_{12} & 1 \end{pmatrix} \begin{pmatrix} \Delta_1 \\ \Delta_2 \end{pmatrix}$$

where C is the covariance matrix given by the fit, and  $C_{12}$  are the off-diagonal values of C. The uncertainty on the predicted yields is then the square root of the variance.

All these systematic uncertainties range from 1 to 2% in the final yield estimate, considering also data-MC agreement in the VRs, end up with a 10% overall uncertainty on the background estimate.

Pullplots





**Exclusion contours** 



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 $\tilde{\chi}_1^0$ 

p1) W  $\tilde{\xi}_1^0$ p $\nu$ 

- Analysis strategy based on machine learning techniques
  - BDT training with gradient boosting (LightGBM framework) based on full reconstructed background samples and AtlFast II signal samples with  $\Delta m(\chi_1^{\pm}, \chi_1^0) = 90$  or 100 GeV.
  - Input features:  $p_T^{\ell_1}$ ,  $p_T^{\ell_2}$ ,  $E_T^{miss}$ ,  $E_T^{miss}$  significance,  $m_{T2}$ ,  $m_{\ell\ell}$ ,  $\Delta \phi_{boost}$ ,  $\Delta \phi_{E_T^{miss}, \ell_1} \Delta \phi_{E_T^{miss}, \ell_2}$ ,  $\cos \theta_{\ell\ell}^*$
  - Multiclass classification with 4 output categories: BDT signal, BDT VV, BDT Top, BDT others, for DF and SF separately.





DF0J

- Background normalization strategy based on CRs
- 2 CRs (CR\_VV and CR\_Top)
- 2 normalization factors  $\mu_{VV}$ ,  $\mu_{top}$  estimated in CRs to control VV and Top (Top=ttbar+Wt) backgrounds
- Background estimation validated in VRs and propagated in the SRs through transfer factor approach.





observable 1

Interpretation using log-likelihood ratio

CRS CR\_Top If DF, 0.5 < Signal BDT score < 0.7 If SF, 0.7 < Signal BDT score < 0.75, BDT others < 0.01 Purity: 98% Signal contamination < 0.6% nbjet VR\_Top\_DF1J 1 CR\_Top VR\_Top\_SF1J VR\_VV\_DF0J VR\_VV\_SF0J SR CR\_VV VR\_Top\_DF0J VR\_Top\_SF0J 0 Signal BDT score CR\_VV 0.2 < Signal BDT score < 0.65 BDT top < 0.1, BDT VV > 0.2 and if SF: BDT others < 0.01 Purity: 78% Signal contamination < 7%

Estimated scale factors:  $\mu_{VV} = 1.387 \pm 0.083$  $\mu_{Top} = 1.058 \pm 0.026$ 



table.results.yields channel	CR_Dib	$CR_{-}Top$
Observed events	632	4468
Fitted bkg events	$632.00 \pm 25.13$	$4468.18 \pm 66.85$
Fitted FNP events	$0.01^{+1.35}_{-0.01}$	$0.01\substack{+11.43\\-0.01}$
Fitted Wt events	$39.31 \pm 4.99$	$1121.45 \pm 62.41$
Fitted Zjets events	$1.43^{+3.67}_{-1.43}$	$0.00\pm0.00$
Fitted Zttjets events	$0.00\pm0.00$	$0.00\pm0.00$
Fitted VV events	$521.69 \pm 27.37$	$69.66 \pm 12.28$
Fitted other events	$1.66\pm0.36$	$29.22\pm3.77$
Fitted VVV events	$0.14\pm0.01$	$0.06\pm0.01$
Fitted ttbar events	$67.77 \pm 8.07$	$3247.78 \pm 81.31$
MC exp. SM events	$480.61 \pm 15.70$	$4210.16 \pm 77.41$
MC exp. FNP events	$0.01^{+1.41}_{-0.01}$	$0.01^{+11.93}_{-0.01}$
MC exp. Wt events	$37.16\pm5.23$	$1060.21 \pm 75.92$
MC exp. Zjets events	$1.43^{+3.69}_{-1.43}$	$0.00\pm0.00$
MC exp. Zttjets events	$0.00\pm0.00$	$0.00\pm0.00$
MC exp. VV events	$376.15\pm9.28$	$50.23\pm7.42$
MC exp. other events	$1.66\pm0.36$	$29.22\pm3.79$
MC exp. VVV events	$0.14\pm0.01$	$0.06\pm0.02$
MC exp. ttbar events	$64.07 \pm 8.15$	$3070.44 \pm 14.17$



C1C1 WW analy	vsis			op VRs define 0.	d in the 1J chann VR_Top_DF1J: 7 < Signal BDT score	el as the CR_Top
VRs	nbjet 🛉				VR_Top_SF1J:	
VIO			VP Top DE11	0.75 < Signa	l BDT score < 1, BDT	others < 0.01
VV VRs defined between VV CR an VR_VV_DF0J: 0.65 < Signal BDT score < 0.81, Top BDT score < 0.1, VV BDT score > 0. VR_VV_SF0J: 0.65 < Signal BDT score < 0.77, Top BDT score < 0.1, VV BDT score > 0. BDT others < 0.01	nd SRs 1 2 0 2,	CR_Top VR_VV VR_VV VR_Top VR_Top	VR_TOP_DF13 VR_Top_SF13 DF03 SF03 SF03 SF03 SF03 Signal BDT score	Top VRs de the extrapt t 0.5 < Signa 0.5 BDT VV	fined in the OJ ch plation of the top a he SRs, where nje VR_Top_DFOJ: al BDT score < 0.81 B VR_Top_SFOJ: < Signal BDT score < / < 0.15 and BDT oth	annel to allow scale factor to et=0 OT VV < 0.15 < 0.77, ers < 0.01
table.results.yields channel	el VR_Dib_DF0J	VR_Dib_SF0J	VR_Top_DF1J	VR_Top_SF1J	VR_Top_DF0J	VR_Top_SF0J
Observed events	972	593	1910	95	810	17
Fitted bkg events	$938.50\pm59.54$	$662.15 \pm 77.65$	$1900.47 \pm 88.68$	$101.57\pm8.88$	$874.88\pm46.37$	$17.37\pm3.71$
Fitted FNP events Fitted Wt events Fitted Zjets events Fitted Ztjets events Fitted VV events Fitted other events Fitted other events Fitted VVV events Fitted ttbar events MC exp. SM events MC exp. FNP events MC exp. Wt events MC exp. Zjets events MC exp. Ztjets events MC exp. VV events	$\begin{array}{c} 0.01\substack{+2.10\\-0.01}\\ 91.65\pm13.56\\ 0.00\pm0.00\\ 0.00\pm0.00\\ 732.70\pm51.65\\ 0.99\pm0.26\\ 0.06\pm0.01\\ 113.09\pm14.23\\ \hline \\ \hline \\ \hline \\ 722.91\pm46.71\\ \hline \\ 0.01\substack{+2.27\\-0.01}\\ 86.65\pm14.05\\ 0.00\pm0.00\\ 0.00\pm0.00\\ 528.29\pm27.82\\ \end{array}$	$\begin{array}{c} 7.79 \pm 3.95 \\ 73.34 \pm 10.76 \\ 67.53 \pm 35.27 \\ 0.24 \pm 0.20 \\ 403.10 \pm 49.36 \\ 1.16 \pm 0.32 \\ 0.09 \pm 0.01 \\ 108.90 \pm 13.22 \\ \hline \\ \hline \\ 539.74 \pm 70.02 \\ \hline \\ \hline \\ 7.79 \pm 4.12 \\ 69.34 \pm 11.15 \\ 67.53 \pm 35.49 \\ 0.24 \pm 0.21 \\ 290.64 \pm 30.31 \\ \hline \end{array}$	$\begin{array}{c} 0.01\substack{+0.01\\-0.01}\\ 501.22\pm 45.95\\ 0.02\pm 0.00\\ 0.00\pm 0.00\\ 32.37\pm 12.87\\ 13.56\pm 1.91\\ 0.03\pm 0.01\\ 1353.26\pm 59.24\\ \hline \\ \hline 1790.17\pm 102.09\\ \hline \\ 0.01\substack{+5.01\\-0.01}\\ 473.85\pm 50.90\\ 0.02\pm 0.00\\ 0.00\pm 0.00\\ 23.34\pm 9.27\\ \end{array}$	$\begin{array}{c} 4.23 \pm 1.21 \\ 27.02 \pm 4.54 \\ 0.04 \substack{+0.10 \\ -0.04} \\ 0.00 \pm 0.00 \\ 2.23 \pm 1.84 \\ 0.75 \pm 0.22 \\ 0.00 \pm 0.00 \\ 67.31 \pm 7.66 \\ \hline \\ \hline 95.80 \pm 9.35 \\ \hline \\ 4.23 \pm 1.27 \\ 25.54 \pm 4.68 \\ 0.04 \substack{+0.10 \\ -0.04} \\ 0.00 \pm 0.00 \\ 1.61 \pm 1.31 \\ \hline \end{array}$	$20.47 \pm 8.19$ $163.90 \pm 16.26$ $0.00 \pm 0.00$ $0.50 \pm 0.35$ $431.18 \pm 32.22$ $3.53 \pm 0.75$ $0.16 \pm 0.01$ $255.15 \pm 21.71$ $731.70 \pm 43.97$ $20.47 \pm 8.56$ $154.95 \pm 17.65$ $0.00 \pm 0.00$ $0.50 \pm 0.36$ $310.88 \pm 15.17$	$\begin{array}{c} 0.05\substack{+0.13\\-0.05}\\ 3.40\pm0.48\\ 0.00\pm0.00\\ 0.00\pm0.00\\ 8.18\pm2.60\\ 0.05\pm0.01\\ 0.01\pm0.00\\ 5.70\pm1.47\\ \hline 14.59\pm2.92\\ \hline 0.05\substack{+0.14\\-0.05}\\ 3.21\pm0.46\\ 0.00\pm0.00\\ 0.00\pm0.00\\ 5.90\pm1.81\\ \end{array}$
MC exp. other events MC exp. VVV events MC exp. ttbar events	$egin{array}{c} 0.99 \pm 0.26 \\ 0.06 \pm 0.01 \\ 106.91 \pm 14.14 \end{array}$	$\begin{array}{c} 1.16 \pm 0.32 \\ 0.09 \pm 0.01 \\ 102.95 \pm 13.30 \end{array}$	$\begin{array}{c} 13.56 \pm 1.92 \\ 0.03 \pm 0.01 \\ 1279.36 \pm 60.82 \end{array}$	$\begin{array}{c} 0.75 \pm 0.22 \\ 0.00 \pm 0.00 \\ 63.63 \pm 7.29 \end{array}$	$\begin{array}{c} 3.53 \pm 0.75 \\ 0.16 \pm 0.01 \\ 241.21 \pm 22.41 \end{array}$	$egin{array}{c} 0.05\pm 0.01\ 0.01\pm 0.00\ 5.39\pm 1.42 \end{array}$

#### 2LOJ 2<sup>nd</sup> Wave – C1C1WW analysis





2LOJ 2<sup>nd</sup> Wave – C1C1WW analysis





Subleading lepton  $p_{T}$  [GeV]



VRs

Data/SM

300

 $E_{T}^{miss}$  [GeV]



• Shape fit to enhance sensitivity. SRs binned in BDT signal score.

table.results.yields channel	SR_DF0J_81_8125	SR_DF0J_8125_815	SR_DF0J_815_8175	SR_DF0J_8175_82	SR_DF0J_82_8225	SR_DF0J_8225_825	SR_DF0J_825_8275	SR_DF0J_8275_83
Observed events	29	41	32	35	27	31	30	30
Fitted bkg events	$31.55 \pm 4.81$	$38.54 \pm 12.49$	$27.50 \pm 8.59$	$28.31 \pm 7.60$	$36.40 \pm 7.19$	$24.37 \pm 6.01$	$29.20 \pm 5.90$	$27.80 \pm 5.94$
Fitted FNP events	$2.13\pm0.30$	$3.50 \pm 0.41$	$0.01^{+0.06}_{-0.01}$	$0.01^{+0.17}_{-0.01}$	$6.47 \pm 0.76$	$1.35\pm0.47$	$1.65 \pm 0.57$	$0.01^{+0.18}_{-0.01}$
Fitted Wt events	$5.10 \pm 1.23$	$7.06 \pm 1.76$	$2.42^{+2.88}_{-2.42}$	$6.52 \pm 1.18$	$4.36 \pm 1.29$	$3.82 \pm 1.97$	$4.53 \pm 0.93$	$3.76 \pm 1.15$
Fitted Zjets events	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$
Fitted Zttjets events	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$
Fitted VV events	$16.80 \pm 4.16$	$20.51 \pm 11.86$	$17.43 \pm 4.62$	$14.15 \pm 7.05$	$18.56 \pm 6.21$	$13.75 \pm 3.83$	$16.82 \pm 4.66$	$15.79 \pm 4.26$
Fitted other events	$0.04^{+0.05}_{-0.04}$	$0.05^{+0.05}_{-0.05}$	$0.05\substack{+0.09\\-0.05}$	$0.16 \pm 0.15$	$0.05^{+0.07}_{-0.05}$	$0.05^{+0.06}_{-0.05}$	$0.05 \pm 0.01$	$1.70 \pm 0.20$
Fitted VVV events	$0.01 \pm 0.00$	$0.00 \pm 0.00$	$0.01 \pm 0.01$	$0.01^{+0.01}_{-0.01}$	$0.00\substack{+0.00\\-0.00}$	$0.01 \pm 0.01$	$0.01 \pm 0.01$	$0.01\pm0.01$
Fitted ttbar events	$7.48 \pm 2.58$	$7.42\pm2.29$	$7.58 \pm 6.38$	$7.47 \pm 1.95$	$6.96 \pm 2.92$	$5.39 \pm 2.49$	$6.14 \pm 2.57$	$6.53 \pm 2.34$
MC exp. SM events	$26.18 \pm 3.96$	$32.02\pm9.42$	$22.09 \pm 7.67$	$23.60 \pm 5.91$	$30.61 \pm 5.70$	$20.03 \pm 5.05$	$23.92 \pm 4.76$	$22.84 \pm 4.86$
MC exp. FNP events	$2.13\pm0.31$	$3.50\pm0.42$	$0.01\substack{+0.07\\-0.01}$	$0.01\substack{+0.18\\-0.01}$	$6.47\pm0.79$	$1.35\pm0.49$	$1.65\pm0.60$	$0.01^{+0.19}_{-0.01}$
MC exp. Wt events	$4.82 \pm 1.19$	$6.67 \pm 1.74$	$2.29^{+2.75}_{-2.29}$	$6.17 \pm 1.16$	$4.12 \pm 1.28$	$3.61 \pm 1.90$	$4.28 \pm 0.92$	$3.55 \pm 1.11$
MC exp. Zjets events	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$
MC exp. Zttjets events	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$
MC exp. VV events	$12.11 \pm 2.87$	$14.79 \pm 8.63$	$12.57 \pm 3.22$	$10.20 \pm 5.17$	$13.38 \pm 4.39$	$9.91 \pm 2.76$	$12.12 \pm 3.29$	$11.39\pm3.04$
MC exp. other events	$0.04^{+0.05}_{-0.04}$	$0.05\substack{+0.05\\-0.05}$	$0.05\substack{+0.09\\-0.05}$	$0.16 \pm 0.16$	$0.05\substack{+0.07 \\ -0.05}$	$0.05\substack{+0.06\\-0.05}$	$0.05 \pm 0.01$	$1.70 \pm 0.20$
MC exp. VVV events	$0.01 \pm 0.00$	$0.00 \pm 0.00$	$0.01 \pm 0.01$	$0.01^{+0.01}_{-0.01}$	$0.00\substack{+0.00\\-0.00}$	$0.01 \pm 0.01$	$0.01 \pm 0.01$	$0.01\pm0.01$
MC exp. ttbar events	$7.07 \pm 2.48$	$7.01 \pm 2.21$	$7.16\pm6.07$	$7.06 \pm 1.87$	$6.58 \pm 2.79$	$5.10 \pm 2.37$	$5.81 \pm 2.46$	$6.17 \pm 2.24$
table.results.yields channel	SR_DF0J_83_8325	SR_DF0J_8325_835	SR_DF0J_835_8375	SR_DF0J_8375_84	SR_DF0J_84_845	SR_DF0J_845_85	SR_DF0J_85_86	SR_DF0J_86
Observed events	24	29	19	20	34	27	34	35
Fitted bkg events	$29.66 \pm 11.63$	$23.39 \pm 9.14$	$25.96 \pm 9.84$	$25.87\pm6.08$	$30.42\pm7.99$	$30.11 \pm 9.26$	$36.89 \pm 7.12$	$26.43 \pm 8.51$
Fitted FNP events	$2.32 \pm 1.21$	$0.43 \pm 0.43$	$4.26 \pm 1.19$	$6.05\pm0.60$	$0.93\pm0.72$	$4.59\pm0.65$	$2.15\pm0.56$	$0.09^{+0.31}_{-0.09}$
Fitted Wt events	$3.83 \pm 2.40$	$2.46^{+2.84}_{-2.46}$	$3.36 \pm 1.29$	$2.27 \pm 0.65$	$4.55 \pm 1.29$	$2.58 \pm 1.10$	$5.27 \pm 2.35$	$2.95 \pm 2.37$
Fitted Zjets events	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$
Fitted Zttjets events	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00\pm0.00$
Fitted VV events	$18.71 \pm 10.93$	$15.72 \pm 8.35$	$14.40 \pm 8.98$	$13.98 \pm 5.58$	$17.95 \pm 7.40$	$17.99 \pm 8.03$	$22.81 \pm 6.77$	$19.23 \pm 6.51$
Fitted other events	$0.06 \pm 0.06$	$0.19 \pm 0.10$	$0.03^{+0.05}_{-0.03}$	$0.01^{+0.02}_{-0.01}$	$0.12 \pm 0.08$	$0.00 \pm 0.00$	$0.11 \pm 0.04$	$0.12\pm0.02$
Fitted VVV events	$0.00 \pm 0.00$	$0.01 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	$0.01 \pm 0.00$	$0.01 \pm 0.00$
Fitted ttbar events	$4.73\pm2.10$	$4.58 \pm 1.09$	$3.90 \pm 1.16$	$3.56 \pm 1.24$	$6.86 \pm 2.13$	$4.94\pm2.12$	$6.55 \pm 2.17$	$4.02\pm2.16$
MC exp. SM events	$23.98 \pm 8.71$	$18.62 \pm 6.96$	$21.54 \pm 7.42$	$21.65 \pm 4.57$	$24.79 \pm 6.13$	$24.68 \pm 7.20$	$29.89 \pm 5.58$	$20.68 \pm 6.90$
MC exp. FNP events	$2.32 \pm 1.27$	$0.43^{+0.45}_{-0.43}$	$4.26 \pm 1.24$	$6.05\pm0.61$	$0.93\pm0.75$	$4.59\pm0.67$	$2.15\pm0.58$	$0.09^{+0.32}_{-0.09}$
MC exp. Wt events	$3.62 \pm 2.29$	$2.33^{+2.71}_{-2.33}$	$3.17 \pm 1.27$	$2.15 \pm 0.64$	$4.30 \pm 1.28$	$2.44 \pm 1.07$	$4.98 \pm 2.27$	$2.79 \pm 2.25$
MC exp. Zjets events	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$
MC exp. Zttjets events	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00\pm0.00$
MC exp. VV events	$13.49 \pm 7.84$	$11.33 \pm 5.99$	$10.38 \pm 6.46$	$10.08 \pm 4.02$	$12.94 \pm 5.29$	$12.97 \pm 5.89$	$16.44 \pm 4.80$	$13.87 \pm 4.81$
MC exp. other events	$0.06 \pm 0.06$	$0.19 \pm 0.10$	$0.03^{+0.05}_{-0.03}$	$0.01^{+0.02}_{-0.01}$	$0.12 \pm 0.08$	$0.00 \pm 0.00$	$0.11 \pm 0.04$	$0.12\pm0.02$
MC exp. VVV events	$0.00 \pm 0.00$	$0.01 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.00$	$0.01\pm0.00$	$0.01\pm0.00$
MC exp. ttbar events	$4.48\pm2.02$	$4.33 \pm 1.04$	$3.69 \pm 1.11$	$3.36 \pm 1.18$	$6.49 \pm 2.04$	$4.67\pm2.02$	$6.19 \pm 2.08$	$3.80\pm2.06$
MC exp. other events MC exp. VVV events MC exp. ttbar events	$\begin{array}{c} 0.06 \pm 0.06 \\ 0.00 \pm 0.00 \\ 4.48 \pm 2.02 \end{array}$	$0.19 \pm 0.10$ $0.01 \pm 0.00$ $4.33 \pm 1.04$	$0.03^{+0.05}_{-0.03} \ 0.01 \pm 0.00 \ 3.69 \pm 1.11$	$\begin{array}{c} 0.01\substack{+0.02\\-0.01}\\ 0.00\pm 0.00\\ 3.36\pm 1.18\end{array}$	$0.12 \pm 0.08$ $0.01 \pm 0.00$ $6.49 \pm 2.04$	$0.00 \pm 0.00 \\ 0.00 \pm 0.00 \\ 4.67 \pm 2.02$	$\begin{array}{c} 0.11 \pm 0.04 \\ 0.01 \pm 0.00 \\ 6.19 \pm 2.08 \end{array}$	$\begin{array}{c} 0.12 \pm 0.02 \\ 0.01 \pm 0.00 \\ 3.80 \pm 2.06 \end{array}$



• Shape fit to enhance sensitivity. SRs binned in BDT signal score.

table.results.yields channel	SR_SF0J_77_775	SR_SF0J_775_78	SR_SF0J_78_785	SR_SF0J_785_79	SR_SF0J_79_795	SR_SF0J_795_80	SR_SF0J_80_81	SR_SF0J_81
Observed events	34	23	20	19	15	10	15	7
Fitted bkg events	$31.47\pm5.04$	$28.73 \pm 5.60$	$28.80 \pm 9.41$	$20.42\pm7.18$	$16.38\pm6.13$	$15.19\pm3.92$	$15.05\pm5.16$	$12.05\pm4.13$
Fitted FNP events	$0.01^{+0.22}_{-0.01}$	$1.41\pm0.28$	$0.01^{+0.10}_{-0.01}$	$0.01^{+0.02}_{-0.01}$	$1.11\pm0.31$	$0.01^{+0.07}_{-0.01}$	$0.01^{+0.12}_{-0.01}$	$0.01^{+0.05}_{-0.01}$
Fitted Wt events	$3.23 \pm 1.17$	$3.20 \pm 1.25$	$4.18 \pm 1.54$	$1.91 \pm 1.10$	$1.73\pm0.78$	$2.13 \pm 0.88$	$0.96 \pm 0.63$	$0.93 \pm 0.32$
Fitted Zjets events	$1.57^{+1.88}_{-1.57}$	$0.56^{+1.02}_{-0.56}$	$3.66 \pm 2.47$	$1.18^{+2.43}_{-1.18}$	$2.77 \pm 1.66$	$1.35 \pm 0.30$	$1.09^{+1.36}_{-1.09}$	$2.70\pm2.48$
Fitted Zttjets events	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00\pm0.00$
Fitted VV events	$20.88 \pm 3.54$	$18.91 \pm 4.22$	$18.17\pm8.24$	$14.27\pm3.95$	$8.12 \pm 4.47$	$9.78 \pm 3.23$	$10.82 \pm 4.51$	$7.35 \pm 2.12$
Fitted other events	$0.01^{+0.03}_{-0.01}$	$0.11 \pm 0.01$	$0.08 \pm 0.04$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.02 \pm 0.00$	$0.00\pm0.00$
Fitted VVV events	$0.01 \pm 0.00$	$0.00^{+0.00}_{-0.00}$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00^{+0.00}_{-0.00}$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$
Fitted ttbar events	$5.76 \pm 2.05$	$4.54 \pm 1.70$	$2.69 \pm 1.72$	$3.04\substack{+5.06\\-3.04}$	$2.65 \pm 2.46$	$1.92 \pm 1.11$	$2.15\pm2.07$	$1.04\pm0.54$
MC exp. SM events	$25.15 \pm 4.43$	$23.03 \pm 4.59$	$23.35\pm7.43$	$16.17\pm6.46$	$13.87 \pm 5.14$	$12.24\pm3.17$	$11.86 \pm 4.02$	$9.89 \pm 3.72$
MC exp. FNP events	$0.01^{+0.23}_{-0.01}$	$1.41\pm0.29$	$0.01^{+0.11}_{-0.01}$	$0.01^{+0.02}_{-0.01}$	$1.11 \pm 0.31$	$0.01^{+0.07}_{-0.01}$	$0.01^{+0.13}_{-0.01}$	$0.01^{+0.05}_{-0.01}$
MC exp. Wt events	$3.05 \pm 1.14$	$3.02 \pm 1.20$	$3.95 \pm 1.50$	$1.81 \pm 1.05$	$1.64 \pm 0.75$	$2.01 \pm 0.85$	$0.91 \pm 0.60$	$0.88 \pm 0.32$
MC exp. Zjets events	$1.57^{+1.90}_{-1.57}$	$0.55^{+1.02}_{-0.55}$	$3.66 \pm 2.49$	$1.18^{+2.45}_{-1.18}$	$2.77 \pm 1.67$	$1.35\pm0.30$	$1.09^{+1.37}_{-1.09}$	$2.70\pm2.50$
MC exp. Zttjets events	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00\pm0.00$
MC exp. VV events	$15.05 \pm 2.50$	$13.64\pm3.15$	$13.10 \pm 5.84$	$10.29 \pm 2.87$	$5.85 \pm 3.22$	$7.05 \pm 2.42$	$7.80 \pm 3.24$	$5.30 \pm 1.50$
MC exp. other events	$0.01^{+0.03}_{-0.01}$	$0.11 \pm 0.01$	$0.08 \pm 0.04$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.02 \pm 0.00$	$0.00 \pm 0.00$
MC exp. VVV events	$0.01 \pm 0.00$	$0.00^{+0.00}_{-0.00}$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00^{+0.00}_{-0.00}$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.00 \pm 0.00$
MC exp. ttbar events	$5.45 \pm 1.95$	$4.30 \pm 1.62$	$2.54 \pm 1.64$	$2.87^{+4.81}_{-2.87}$	$2.50 \pm 2.34$	$1.81 \pm 1.05$	$2.03 \pm 1.97$	$0.99\pm0.51$

- Bkg-only fit pullplot (using ATLAS recommended formula for the significance).
- All pulls  $\lesssim$  1, the largest one occurs to be in a VR.





#### Correlations



2LOJ 2<sup>nd</sup> Wave – C1C1WW analysis

p

W

W

 $\tilde{\chi}_1^{\pm}$ 

 $\tilde{\chi}_1^+$ 

 $\tilde{\chi}_1^0$ 

 $\nu$ 

**Exclusion contours** 





- Fit parameters for exclusion chargino point 100\_10.
- Found some pulling and profiling, especially for the theorethical uncertainties



-1.5 -1 -0.5 0 0.5 1 1.5

-0.5 0 0.5 1 1.5 2 2.5

γ/ μ

#### Model independent signal fit

- An analysis searching for new physics phenomena typically sets model-independent upper limits on the number of events beyond the expected number of events in each SR. In this way, for any signal model of interest, anyone can estimate the number of signal events predicted in a particular signal region and check if the model has been excluded by current measurements or not.
- Setting the upper limit is accomplished by performing a model-independent signal fit. For this fit strategy, both the CRs and SRs are used, in the same manner as for the model-dependent signal fit. Signal contamination is not allowed in the CRs, but no other assumptions are made for the signal model, also called a "dummy signal" prediction. The SR in this fit configuration is constructed as a single-bin region, since having more bins requires assumptions on the signal spread over these bins. The number of signal events in the signal region is added as a parameter to the fit. Otherwise, the fit proceeds in the same way as the model-dependent signal fit.
- The model-independent signal fit strategy, fitting both the CRs and each SR, is also used to perform the backgroundonly hypothesis test, which quantifies the significance of any observed excess of events in a SR, again in a manner that is independent of any particular signal model. The background-only hypothesis test quantifies the significance of an excess of events in the signal region by the probability that a background- only experiment is more signal-like than observed, also called the discovery p-value. The probability of the SM background to fluctuate to the observed number of events or higher in each SR has been capped at 0.5.

- For the model independent limits, 10 inclusive regions have been defined.
- Each fit will only include a single inclusive bin. The inclusive regions are defined, using the  $m_{T2}^{100}$  variable, asking for:  $m_{T2}^{100} > 100$ ,  $m_{T2}^{100} > 110$ ,  $m_{T2}^{100} > 120$ ,  $m_{T2}^{100} > 130$ ,  $m_{T2}^{100} > 140$ .

Signal region	Observed	Expected	$\langle \epsilon \sigma  angle_{ m obs}^{95}$ [fb]	$S_{ m obs}^{95}$	$S_{ m exp}^{95}$	$CL_B$	$p(s=0)\left(Z\right)$
$\mathbf{SR}_{m^{100} \in [100,\infty)}^{0\text{-jet}}$	58	$77.52 \pm 13.31$	0.12	17.0	$25.7^{+10.0}_{-5.8}$	0.12	0.93 (-1.51)
$\mathbf{SR}_{m_{m}^{100} \in [110,\infty)}^{0-jet}$	39	$60.00\pm10.77$	0.09	13.0	$20.9^{+7.8}_{-6.0}$	0.05	0.98 (-2.07)
$\operatorname{SR}_{m_{\text{rec}}^{100} \in [120, \infty)}^{0-jet}$	30	$40.92 \pm 8.74$	0.10	13.3	$18.6^{+6.4}_{-5.5}$	0.17	0.94 (-1.53)
$\mathbf{SR}_{m_{TD}^{100} \in [130,\infty)}^{0-jet}$	23	$26.12\pm6.32$	0.10	13.9	$15.3^{+6.0}_{-3.9}$	0.38	0.80 (-0.84)
$\mathrm{SR}_{m_{\mathrm{T2}}^{100} \in [140,\infty)}^{12}$	7	$9.35 \pm 3.39$	0.06	7.7	$8.6^{+3.3}_{-2.5}$	0.36	0.82 (-0.92)
$SR^{1-jet}_{m^{100}_{TC} \in [100,\infty)}$	82	74.81 ± 13.44	0.27	37.0	$31.0^{+12.0}_{-8.1}$	0.69	0.28 (0.59)
$\mathbf{SR}_{m_{\infty}^{100} \in [110,\infty)}^{12}$	39	$49.35 \pm 16.99$	0.17	24.0	$27.4_{-6.4}^{+8.5}$	0.32	0.93 (-1.46)
$\operatorname{SR}^{1-\operatorname{jet}}_{m_{\operatorname{Tr}}^{100} \in [120,\infty)}$	12	$17.45 \pm 5.31$	0.07	9.2	$11.5^{+4.2}_{-3.1}$	0.24	0.98 (-2.09)
$\mathbf{SR}_{m_{TD}^{100} \in [130,\infty)}^{12}$	2	$6.83 \pm 2.71$	0.03	4.2	$6.0^{+2.6}_{-1.7}$	0.11	0.57 (-0.17)
$SR_{m_{T2}^{100} \in [140,\infty)}^{12}$	0	$2.36 \pm 1.52$	0.02	3.0	$3.5^{+1.6}_{-0.6}$	0.14	0.55 (-0.12)

Table 54: Left to right: observed yields, expected yields, 95% CL upper limits on the visible cross section ( $\langle \epsilon \sigma \rangle_{obs}^{95}$ ) and on the number of signal events ( $S_{obs}^{95}$ ). The third column ( $S_{exp}^{95}$ ) shows the 95% CL upper limit on the number of signal events, given the expected number (and  $\pm 1\sigma$  excursions on the expectation) of background events. The last column indicates the discovery *p*-value (p(s = 0)). The *p*-value is reported as 0.5 if the observed yield is smaller than the predicted.



- A looser region discovery (SRD\_DF0J\_81\_SF0J\_77) with higher statistics including all the bins for the binned exclusion fit.
- Tighter regions are defined by taking BDT signal > 0.81 for DF0J and > 0.77 for SF0J which correspond to the significance peaks.

Signal channel	$\langle\epsilon\sigma angle^{95}_{obs}[{\rm fb}]$	$S_{obs}^{95}$	$S_{exp}^{95}$	$CL_B$	p(s=0) $(Z)$
SRD_DF0J_81_SF0J_77	1.09	150.8	$154.7^{+59.3}_{-46.0}$	0.47	0.50 (0.00)
SRD_DF0J_81	0.82	114.3	$108.7^{+44.1}_{-31.7}$	0.55	0.44(0.16)
SRD_DF0J_82	0.57	78.9	$82.3^{+33.3}_{-23.7}$	0.45	0.50(0.00)
SRD_DF0J_83	0.40	55.1	$59.3^{+23.3}_{-16.5}$	0.41	0.50(0.00)
SRD_DF0J_84	0.30	42.0	$38.5^{+14.5}_{-10.1}$	0.61	0.37(0.32)
SRD_DF0J_85	0.23	32.0	$28.5^{+11.5}_{-7.8}$	0.65	0.33(0.43)
$SRD_SF0J_77$	0.57	79.5	$106.2^{+13.1}_{-42.5}$	0.25	0.50(0.00)
SRD_SF0J_78	0.45	62.6	$75.2^{+6.1}_{-16.5}$	0.22	0.50(0.00)
SRD_SF0J_79	0.24	33.6	$36.7^{+8.6}_{-5.8}$	0.26	0.50(0.00)
SRD_SF0J_80	0.14	19.9	$20.4\substack{+3.1\\-0.9}$	0.30	0.50(0.00)

Table 1: Left to right: 95% CL upper limits on the visible cross section  $(\langle \epsilon \sigma \rangle_{obs}^{95})$  and on the number of signal events  $(S_{obs}^{95})$ . The third column  $(S_{exp}^{95})$  shows the 95% CL upper limit on the number of signal events, given the expected number (and  $\pm 1\sigma$  excursions on the expectation) of background events. The last two columns indicate the  $CL_B$  value, i.e. the confidence level observed for the background-only hypothesis, and the discovery *p*-value (p(s=0)).

#### Summary & outlook

- Slepton & C1C1 analyses
  - Both analyses unblinded and fit results presented to the SUSY WG
  - Data compatible with SM expectations
    - No significant data excess in the slepton analysis
    - No significant data excess in the C1C1 analysis (with all pulls ≤ 1, the largest one occurs to be in a VR).
  - Observed exclusion limits slightly extending the previous ones.
- Both analyses are still wip and targeting SUSY WG Approval:
  - theory uncertainty for signal to be implemented
  - preparation of paper draft
  - recast workflow
  - provide material for combination
  - provide material for HEP-data

#### Backup

#### Definition of analysis variables

- $p_T^{\ell_1}$ : the transverse momentum of the leading lepton
- $p_T^{\ell_2}$ : the transverse momentum of the subleading lepton
- $m_{\ell\ell}$ : the invariant mass of the two leptons
- $\Delta \phi_{\ell_1,\ell_2}$ : the azimuthal angular separation between the two leptons
- $\Delta \phi_{E_T^{miss},\ell_1}$ : the azimuthal angular separation between  $E_T^{miss}$  and the leading lepton
- $p_{T,boost}^{\ell\ell}$ : the module of the vectorial sum of the  $p_T$  of the two leptons and the  $E_T^{miss}$
- $m_{T2}^{m_{\chi}}$ , the stransverse mass as defined in [1, 2] with  $m_{\chi}$  the mass of the invisible particles
- $\cos \theta_{\ell\ell}^* = \cos(2 \tan^{-1}(e^{\Delta \eta_{\ell\ell}/2})) = \tanh(e^{\Delta \eta_{\ell\ell}/2})$ , sensitive to the spin of the particles [3]
- $\Delta \phi_{boost}$ : the azimuthal angular separation between  $E_T^{miss}$  and the vectorial sum of the two leptons  $p_T$  and the  $E_T^{miss}$

## Systematic pulling and profiling

- The fits that we do don't only change normalizations
- They also "profile uncertainties"
  - They change the prediction within its uncertainties to better match the data (pulling)
  - They test the uncertainties for (in)consistency with the data and automatically reduce uncertainties that are demonstrably "too large" to be allowed (profiling)



 In simple cases, it's clear what happens



 But there are some cases where the outcome is the opposite of what one would expect. Particularly when the signal doesn't evenly populate bins and some signal region is constraining the background.



#### Efficiency correction method

lη

This technique consists in reweighting, on an event-by-event basis, for the reconstruction, isolation, identification and trigger efficiencies.

efficiency

$$\kappa = \sqrt{rac{N_{\mu^+\mu^-}}{N_{e^+e^-}}}$$
 reconstruction, isolation, identification efficiency

Reconstruction efficiencies can depend on the pseudorapidity region where the leptons reach the detector

		MC (FS)	Data
Inclusive η	К	$1.1576 \pm 0.0014$	$1.1942 \pm 0.0043$
η  < 0.1 region	κ <sup>central</sup>	$0.8509 \pm 0.0042$	$0.852 \pm 0.013$
η  < 1.05	к <sup>bar-bar</sup>	$1.0352 \pm 0.0029$	$1.0655 \pm 0.0089$
η  > 1.05	к <sup>end-end</sup>	$1.38526 \pm 0.0042$	$1.440 \pm 0.010$
	$\kappa^{bar-end}$	$1.1947 \pm 0.0020$	$1.2198 \pm 0.0061$

A fit performed in every  $|\eta|$  region

p

p

$$\kappa(p_T^{\ell_1}) = b + \frac{a}{p_T^{\ell_1}}$$

a Central = 16.238	a BarEnd= 25.8058
b Central = 0.600167	b BarEnd= 0.819979
a BarBar= 19.2825	a EndEnd= 34.9074
b BarBar = 0.764995	a EndEnd= 0.871159

#### Sleptons: Yield Tables

$m_{\mathrm{T2}}^{100} \in$	[100, 105]	[105, 110]	[110, 115]	[115, 120]	[120, 125]	[125, 130]	[130, 140]	[140,∞)
Observed events	13	6	6	3	6	1	16	7
MC exp. SM events	$16.33 \pm 7.77$	$3.02^{+3.14}_{-3.02}$	$9.47 \pm 4.16$	11.60 ± 3.93	8.53 ± 4.83	8.57 ± 3.11	$15.87 \pm 4.63$	9.35 ± 3.39
MC exp. other events	$0.03^{+0.08}_{-0.03}$	$0.00 \pm 0.00$	$0.03 \pm 0.01$	$0.00 \pm 0.00$	$0.00 \pm 0.00$	$0.01^{+0.01}_{-0.01}$	$0.05 \pm 0.03$	$0.00 \pm 0.00$
MC exp. VVV events	$0.01 \pm 0.00$	$0.00\pm0.00$	$0.00\pm0.00$	$0.00\pm0.00$	$0.00\pm0.00$	$0.00^{+0.00}_{-0.00}$	$0.00\pm0.00$	$0.00\pm0.00$
MC exp. ZZ events	$0.64\pm0.32$	$0.01^{+0.01}_{-0.01}$	$0.01\pm0.00$	$1.59\pm0.73$	$0.01\pm0.01$	$0.01 \pm 0.00$	$0.01 \pm 0.00$	$2.98 \pm 1.39$
MC exp. Zjets events	$0.01^{+0.03}_{-0.01}$	$0.01_{-0.01}^{+0.03}$	$1.10^{+1.80}_{-1.10}$	$0.01^{+0.03}_{-0.01}$	$0.01^{+0.03}_{-0.01}$	$0.07\pm0.04$	$0.03^{+0.16}_{-0.03}$	$0.01^{+0.03}_{-0.01}$
MC exp. flavSym events	$6.52 \pm 2.75$	$2.99^{+3.11}_{-2.99}$	$7.56 \pm 3.00$	$8.61 \pm 2.95$	$8.50 \pm 4.81$	$8.47 \pm 3.07$	$15.78 \pm 4.61$	$6.35 \pm 2.26$
MC exp. FNP events	$9.12 \pm 5.67$	$0.01_{-0.01}^{+0.02}$	$0.76 \pm 0.75$	$1.38 \pm 0.52$	$0.01\substack{+0.01 \\ -0.01}$	$0.01\substack{+0.02 \\ -0.01}$	$0.00 \pm 0.00$	$0.01 \pm 0.01$
$m_{T2}^{100} \in$	[100, 105]	[105, 110]	[110, 115]	[115, 120]	[120, 125]	[125, 130]	[130, 140]	[140 <b>,</b> ∞
Observed events	27	16	24	3	5	5	2	0
MC exp. SM events	$12.55\pm5.94$	$17.55\pm5.63$	$14.32\pm6.62$	$20.64\pm5.04$	$4.40\pm2.69$	$6.88 \pm 3.43$	$4.42 \pm 2.17$	$2.36 \pm 1.52$
MC exp. other events	$0.00 \pm 0.00$	$0.02^{+0.02}_{-0.02}$	$0.14 \pm 0.11$	$0.23 \pm 0.13$	$0.01^{+0.02}_{-0.01}$	0.03+0.05	$0.05 \pm 0.02$	$0.00 \pm 0.00$
MC exp. VVV events	$0.01 \pm 0.00$	$0.00 \pm 0.02$	$0.00\pm0.00$	$0.01 \pm 0.00$	$0.00 \pm 0.01$	$0.00 \pm 0.00$	$0.00\pm0.00$	$0.00 \pm 0.00$
MC exp. ZZ events	$2.02\pm0.89$	$0.05\pm0.02$	$0.01 \pm 0.00$	$0.01\pm0.00$	$0.98 \pm 0.61$	$0.01 \pm 0.01$	$0.24 \pm 0.12$	$0.22 \pm 0.14$
MC exp. Zjets events	$1.65^{+2.33}_{-1.65}$	$0.53 \pm 0.26$	$2.28^{+3.29}_{-2.28}$	$0.01^{+0.46}_{-0.01}$	$0.18\pm0.12$	$0.01^{+0.03}_{-0.01}$	$0.09^{+0.50}_{-0.09}$	$0.02^{+0.32}_{-0.02}$
MC exp. flavSym events	$5.93 \pm 3.00$	$16.95 \pm 5.46$	$11.87 \pm 4.87$	$18.00 \pm 4.46$	$3.22 \pm 1.98$	$6.82 \pm 3.40$	$4.02 \pm 1.93$	$2.11 \pm 1.33$
MC exp. FNP events	$2.94 \pm 1.46$	$0.01^{+0.27}_{-0.01}$	$0.01^{+0.09}_{-0.01}$	$2.39\pm0.60$	$0.01\substack{+0.02\\-0.01}$	$0.01 \pm 0.01$	$0.01\pm0.01$	$0.01 \pm 0.01$

#### Sleptons: Syst Tables

Uncertainty of channel	SR_MT2_100_105_cut	sSR_MT2_105_110_cuts	SR_MT2_110_115_cuts	sSR_MT2_115_120_cuts	SR_MT2_120_125_cuts	SR_MT2_125_130_cut	sSR_MT2_130_140_cuts	SR_MT2_140_infty_cuts
Total background expectation	16.33	3.02	9.47	11.60	8.53	8.57	15.87	9.35
Total statistical $(\sqrt{Nexp})$	±4.04	±1.74	±3.08	±3.41	±2.92	±2.93	±3.98	±3.06
Total background systematic	±7.77 [47.61%]	±3.14 [104.08%]	±4.16 [43.88%]	±3.93 [33.88%]	±4.83 [56.57%]	±3.11 [36.26%]	±4.63 [29.19%]	±3.39 [36.27%]
somme stat SP MT2 100 105 outs his 0	+6 25 [29 20.]	+0.00.10.00%1	+0.00 [0.00%]	+0.0010.0051	+0.00.10.00%1	+0.00.10.005-1	+0.00.00.005.1	+0.00.01.0000-1
alpha_FAKE_xsec	±3.51 [21.5%]	±0.00 [0.37%]	±0.69 [7.3%]	±0.10 [0.83%]	±0.00 [0.04%]	±0.00 [0.04%]	±0.00 [0.00%]	±0.00 [0.03%]
alpha_FAKE_weightsys	±2.35 [14.4%]	±0.01 [0.39%]	±0.02 [0.16%]	±0.21 [1.8%]	±0.01 [0.11%]	±0.01 [0.16%]	±0.00 [0.00%]	±0.00 [0.03%]
alpha_rARE_weight alpha_fakeSysSubtract_100_105	±0.97 [5.9%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.01 [0.07%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_FAKE_stat	±0.72 [4.4%]	±0.00 [0.00%]	±0.05 [0.48%]	±0.10 [0.88%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.01%]
alpha_PSsyst alpha_VVckkw	±0.65 [4.0%] ±0.15 [0.92%]	±0.00 [0.08%]	±0.00 [0.02%]	±0.37 [3.2%]	±0.85 [10.0%] ±0.00 [0.03%]	±0.85 [9.9%] ±0.00 [0.03%]	±0.00 [0.01%]	±0.64 [0.8%] ±0.69 [7.4%]
alpha_MET_SoftTrk_ResoPara	±0.08 [0.46%]	±0.01 [0.29%]	±1.10 [11.6%]	±0.20 [1.7%]	±0.01 [0.10%]	±0.03 [0.35%]	±0.14 [0.87%]	±0.38 [4.1%]
alpha_ME1_Soffirk_ResoFerp	±0.05 [0.34%]	±0.00 [0.03%]	±0.00 [0.01%]	±0.13 [1.1%]	±0.00 [0.01%]	±0.03 [0.35%] ±0.00 [0.01%]	±0.00 [0.01%]	±0.28 [3.0%] ±0.24 [2.6%]
alpha_VVpdf	±0.03 [0.20%]	±0.00 [0.02%]	±0.00 [0.01%]	±0.08 [0.71%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.15 [1.7%]
alpha_MET_SoftTrk_Scale alpha_JER3	±0.03 [0.18%] ±0.03 [0.17%]	±0.00 [0.01%] ±0.01 [0.32%]	±0.55 [5.8%] ±0.00 [0.00%]	±0.07 [0.62%] ±0.03 [0.23%]	±0.00 [0.01%] ±0.01 [0.11%]	±0.01 [0.16%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.02 [0.15%]	±0.13 [1.4%] ±0.06 [0.63%]
alpha_JER2	±0.02 [0.14%]	±0.01 [0.32%]	±0.00 [0.02%]	±0.04 [0.37%]	±0.01 [0.11%]	±0.00 [0.00%]	±0.01 [0.07%]	±0.09 [0.95%]
alpha_JET_Flavor_Composition alpha_JER1	±0.02 [0.13%] ±0.02 [0.13%]	±0.00 [0.01%] ±0.01 [0.32%]	±0.00 [0.00%] ±0.00 [0.02%]	±0.05 [0.47%] ±0.04 [0.39%]	$\pm 0.00 [0.00\%]$ $\pm 0.01 [0.11\%]$	±0.00 [0.00%] ±0.00 [0.00%]	±0.01 [0.04%] ±0.02 [0.15%]	±0.10 [1.1%] ±0.09 [0.99%]
alpha_JER7	±0.02 [0.13%]	±0.01 [0.32%]	±0.00 [0.00%]	±0.05 [0.40%]	±0.01 [0.11%]	±0.00 [0.00%]	±0.01 [0.07%]	±0.09 [1.0%]
alpha_JER4 alpha_VVren	±0.02 [0.13%] +0.01 [0.09%]	±0.01 [0.32%] +0.00 [0.01%]	±0.00 [0.00%] +0.00 [0.00%]	±0.05 [0.40%] +0.03 [0.30%]	±0.01 [0.11%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.01 [0.07%] +0.00 [0.00%]	±0.10 [1.0%] +0.06 [0.69%]
alpha_EL_EFF_ID	±0.01 [0.08%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.03 [0.28%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.06 [0.64%]
alpha_MUON_MS alpha_VVrenfac	±0.01 [0.07%] ±0.01 [0.06%]	±0.00 [0.01%] ±0.00 [0.00%]	±0.55 [5.8%] ±0.00 [0.00%]	±0.03 [0.23%] ±0.02 [0.21%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.05 [0.54%] ±0.04 [0.48%]
alpha_MUON_ID	±0.01 [0.06%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.02 [0.19%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.04 [0.45%]
alpha_FAKE_eff alpha_EG_SCALE	±0.01 [0.05%] +0.01 [0.04%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.01%] +0.00 [0.00%]	±0.00 [0.02%] +0.02 [0.13%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.06%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.03 [0.31%]
alpha_JET_Flavor_Response	±0.01 [0.03%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.01 [0.12%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.03 [0.27%]
alpha_JER5 alpha_VVfac	±0.00 [0.03%] ±0.00 [0.03%]	±0.01 [0.32%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.03 [0.22%] +0.01 [0.09%]	±0.01 [0.11%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.02 [0.15%] ±0.00 [0.00%]	±0.06 [0.60%] ±0.02 [0.21%]
alpha_JER6	±0.00 [0.02%]	±0.01 [0.32%]	±0.00 [0.00%]	±0.02 [0.21%]	±0.01 [0.11%]	±0.00 [0.00%]	±0.03 [0.22%]	±0.05 [0.59%]
alpha_FAKE_eff_trig alpha_IER	±0.00 [0.01%] +0.00 [0.00%]	±0.00 [0.00%] +0.01 [0.33%]	±0.00 [0.02%] +0.00 [0.00%]	±0.00 [0.01%] +0.02 [0.14%]	±0.00 [0.00%] +0.01 [0.12%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.03 [0.22%]	±0.00 [0.00%] +0.04 [0.43%]
alpha_JVT	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.01 [0.04%]	±0.00 [0.00%]
alpha_EL_EFF_Reco alpha_Zietsren	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.01 [0.09%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.01%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]
alpha_Zjetsqsf	±0.00 [0.00%]	±0.00 [0.00%]	±0.01 [0.07%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_Zjetsckkw alpha_EL_EFF_Iso	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.03%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]
alpha_Zjetsfac	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_JET_EtaIntercalibration_negEta gamma stat SR 1J MT2 125 130 cuts bin 0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]				
gamma_stat_SR_1J_MT2_120_125_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_IJ_M12_I30_I40_cuts_bin_0 alpha_FT_EFF_B	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
alpha_EG_RES	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.05%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_1J_MT2_105_110_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_FT_EFF_C	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_1J_MT2_100_105_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_1J_125_130 alpha_IET_EtaIntercalibration_posEta	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]				
mu_Arbitrary	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_VVpdf1J alpha_IET_EtaIntercalibration_TotalStat	±0.00 0.00% +0.00 0.0%	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]
gamma_stat_SR_1J_MT2_115_120_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_VVrenfac1J alpha_VVren1J	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]				
alpha_MUON_EFF_ISO_SYS	±0.00 [0.00%]	±0.00 [0.00%]	±0.01 [0.06%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_IJ_M12_140_infty_cuts_bin_0 alpha_fakeSvsSubtract_105_110	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.15 [5.1%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
gamma_stat_SR_1J_MT2_110_115_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_MT2_130_140_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±4.35 [27.4%]	±0.00 [0.00%]
alpha_fakeSysSubtract_1J_130_140	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_Takesyssubtace_15_120_125 alpha_Zjetsren1J	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_MT2_140_infty_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±3.20 [34.2%]
alpha_fakeSysSubtract_110_120	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.19 [1.6%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_MT2_120_125_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±4.66 [54.6%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_Zjetsqsf1J	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_VVckkw1J alpha_fakeSysSubtract_140_infty	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.09 [1.0%]
gamma_stat_SR_MT2_105_110_cuts_bin_0	±0.00 [0.00%]	±3.12 [103.5%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_FT_EFF_Light alpha_MUON_SAGITTA_RHO	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]				
alpha_fakeSysSubtract_110_115	±0.00 [0.00%]	±0.00 [0.00%]	±0.20 [2.1%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_120_125 alpha_MUON_EFF_RECO_SYS	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.02 [0.20%1	±0.00 [0.00%] ±0.00 [0.00%]	±0.94 [11.0%] ±0.00 [0.00%1	±0.00 [0.00%] ±0.00 [0.01%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
alpha_fakeSysSubtract_1J_110_115	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
aipna_zjetsSys alpha_MUON_SCALE	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]				
gamma_stat_SR_MT2_110_115_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±3.63 [38.3%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
aipna_MUON_SAGITTA_RESBIAS gamma_stat_SR_MT2_125_130_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±2.99 [34.9%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
alpha_fakeSysSubtract_1J_100_105	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_M12_115_120_cuts_bin_0 alpha_fakeSysSubtract_1J_140_infty	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
alpha_Zjetsfac1J	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_Zjetsckkw1J	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_125_130	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.10 [1.1%]	±0.00 [0.00%]	±0.00 [0.00%]

Uncertainty of channel	SR_1J_MT2_100_105_cuts	SR_1J_MT2_105_110_cuts	SR_1J_MT2_110_115_cuts	SR_1J_MT2_115_120_cuts	SR_1J_MT2_120_125_cutsSR	_1J_MT2_125_130_cuts	sSR_1J_MT2_130_140_cuts5	R_1J_MT2_140_infty
Total background expectation	12.55	17.55	14.32	20.64	4.40	6.88	4.42	2.36
Total statistical $(\sqrt{N_{exp}})$	±3.54	±4.19	±3.78	±4.54	±2.10	±2.62	±2.10	±1.53
Total background systematic	±5.94 [47.36%]	±5.63 [32.09%]	±6.62 [46.20%]	±5.04 [24.42%]	±2.69 [61.15%]	±3.43 [49.94%]	±2.17 [49.12%]	±1.52 [64.60%]
gamma_stat_SR_1J_MT2_100_105_cuts_bin_0	±5.13 [40.9%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_1J_100_105	±1.68 [13.4%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_JER4 alpha_IER2	±1.05 [8.5%] +1.02 [8.1%]	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.92 [6.4\%]$ $\pm 0.92 [6.4\%]$	±0.05 [0.25%] ±0.05 [0.26%]	+0.03 [0.75%]	±0.01 [0.13%] ±0.01 [0.13%]	±0.08 [1.8%] ±0.08 [1.7%]	±0.01 [0.32%] +0.00 [0.18%]
alpha_JER1	±1.00 [7.9%]	±0.00 [0.01%]	±0.55 [3.8%]	±0.05 [0.24%]	±0.00 [0.00%]	±0.01 [0.14%]	±0.07 [1.6%]	±0.00 [0.00%]
alpha_MET_SoftTrk_ResoPara	±0.93 [7.4%]	±0.00 [0.00%]	±1.15 [8.1%]	±0.46 [2.2%]	±0.02 [0.38%]	±0.01 [0.14%]	±0.02 [0.48%]	±0.00 [0.16%]
alpha_FAKE_xsec	±0.68 [5.4%]	±0.01 [0.08%]	±0.06 [0.39%]	±0.12 [0.59%] ±1.80 [8.7%]	±0.02 [0.45%]	±0.00 [0.04%]	±0.00 [0.06%]	±0.00 [0.00%]
alpha_IET_Flavor_Response	±0.50 [4.0%]	±0.00 [0.00%]	±0.52 [3.6%]	±0.02 [0.11%]	±0.00 [0.08%]	±0.02 [0.33%]	±0.03 [0.77%]	±0.18 [7.8%]
alpha_MET_SoftTrk_Scale	±0.48 [3.9%]	±0.00 [0.00%]	±0.90 [6.3%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_MUON_ID alpha_IET_Elawar_Composition	±0.48 [3.9%]	±0.00 [0.00%] ±0.02 [0.12%]	±0.00 [0.00%] ±1.12 [7.8%]	±0.00 [0.00%] ±0.02 [0.12%]	±0.00 [0.00%] ±0.02 [0.54%]	±0.00 [0.00%] ±0.02 [0.33%]	±0.03 [0.75%]	±0.00 [0.00%]
alpha_FAKE_weightsys	±0.44 [3.5%]	±0.15 [0.87%]	±0.06 [0.39%]	±0.22 [1.1%]	±0.01 [0.20%]	±0.00 [0.06%]	±0.00 [0.02%]	±0.00 [0.00%]
alpha_Zjetsren1J	±0.37 [2.9%]	±0.12 [0.67%]	±0.51 [3.6%]	±0.00 [0.01%]	±0.04 [0.93%]	±0.00 [0.03%]	±0.02 [0.46%]	±0.00 [0.20%]
alpha_V VpdI IJ alpha_EAKE_stat	±0.17 [1.4%]	+0.20 [1.2%]	+0.00 [0.01%]	+0.07 [0.32%]	±0.08 [1.9%]	±0.00 [0.01%]	±0.02 [0.47%]	±0.02 [0.79%]
alpha_Zjetsqsf1J	±0.15 [1.2%]	±0.05 [0.28%]	±0.21 [1.5%]	±0.00 [0.00%]	±0.02 [0.39%]	±0.00 [0.01%]	±0.01 [0.19%]	±0.00 [0.08%]
alpha_VVckkw1J	±0.15 [1.2%]	±0.00 [0.02%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.07 [1.7%]	±0.00 [0.01%]	±0.02 [0.41%]	±0.02 [0.69%]
alpha_VVqst1J alpha_IVT	±0.14 [1.1%] ±0.09 [0.70%]	±0.00 [0.02%]	±0.00 [0.00%] ±0.02 [0.11%]	±0.00 [0.00%] ±0.01 [0.07%]	±0.07 [1.6%] ±0.00 [0.03%]	±0.00 [0.01%] ±0.00 [0.05%]	±0.02 [0.39%]	±0.02 [0.66%]
alpha_VVren1J	±0.07 [0.57%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.03 [0.79%]	±0.00 [0.01%]	±0.01 [0.20%]	±0.01 [0.33%]
alpha_JER	±0.06 [0.49%]	±0.00 [0.00%]	±0.59 [4.2%]	±0.01 [0.04%]	±0.03 [0.67%]	±0.01 [0.14%]	±0.08 [1.8%]	±0.01 [0.28%]
alpha_FAKE_weight	±0.06 [0.47%]	±0.08 [0.47%] ±0.00 [0.00%]	±0.01 [0.06%]	±0.05 [0.23%]	±0.00 [0.03%] ±0.02 [0.54%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_VVrenfac1J	±0.05 [0.37%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.02 [0.51%]	±0.00 [0.00%]	±0.01 [0.13%]	±0.01 [0.22%]
alpha_JER6	±0.04 [0.35%]	±0.00 [0.00%]	±0.88 [6.1%]	±0.05 [0.26%]	±0.02 [0.49%]	±0.01 [0.13%]	±0.08 [1.7%]	±0.00 [0.20%]
alpha_Zjetsfac1J alpha_EL_EEE_ID	±0.04 [0.30%] ±0.04 [0.29%]	±0.01 [0.07%] ±0.00 [0.01%]	±0.05 [0.37%] +0.51 [3.5%]	±0.00 [0.00%] ±0.00 [0.01%]	±0.00 [0.10%] ±0.02 [0.40%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.05%] ±0.00 [0.11%]	±0.00 [0.02%] +0.00 [0.17%]
alpha_JER7	±0.04 [0.29%]	±0.00 [0.00%]	±0.88 [6.1%]	±0.05 [0.26%]	±0.02 [0.40%]	±0.01 [0.13%]	±0.08 [1.7%]	±0.00 [0.17%]
alpha_JER5	±0.03 [0.25%]	±0.00 [0.00%]	±0.88 [6.1%]	±0.05 [0.26%]	±0.02 [0.35%]	±0.01 [0.13%]	±0.07 [1.7%]	±0.00 [0.14%]
alpha_VVIacIJ alaba_MUON_EEE_ISO_SVS	±0.02 [0.20%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.01 [0.05%]	±0.00 [0.00%] ±0.00 [0.01%]	±0.01 [0.27%]	±0.00 [0.00%]	±0.00 [0.07%]	±0.00 [0.11%]
alpha_MUON_EFF_RECO_SYS	±0.01 [0.09%]	±0.00 [0.00%]	±0.00 [0.02%]	±0.00 [0.00%]	±0.00 [0.03%]	±0.00 [0.01%]	±0.00 [0.04%]	±0.00 [0.02%]
alpha_FAKE_eff	±0.01 [0.06%]	±0.00 [0.01%]	±0.00 [0.02%]	±0.01 [0.04%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_FT_EFF_Light	±0.01 [0.05%]	±0.00 [0.00%]	±0.00 [0.01%] ±0.10 [0.68%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.02%]	±0.00 00.00%]	±0.00 [0.01%]	±0.00 [0.00%]
alpha_Zjetsckkw1J	±0.00 [0.03%]	±0.00 [0.01%]	±0.00 [0.03%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_FAKE_eff_trig	±0.00 [0.02%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_JET_EtaIntercalibration_TotalStat	±0.00 0.00% ]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.18 [7.7%]
gamma stat SR 1J MT2 125 130 cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±3.36 [48.9%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_1J_MT2_120_125_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±2.66 [60.5%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_1J_MT2_130_140_cuts_bin_0	±0.00 0.00% ]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±2.07 [46.9%]	±0.00 [0.00%]
alpha EG RES	±0.00 [0.00%]	±0.00 [0.00%]	±0.74 [5.2%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_130_140	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_1J_MT2_105_110_cuts_bin_0	±0.00 [0.00%]	±5.19 [29.6%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_VVpdf	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_1J_105_110	±0.00 [0.00%]	±1.35 [7.7%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_1J_125_130	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.11 [1.6%]	±0.00 [0.00%]	±0.00 [0.00%]
mu_Arbitrary	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_1J_MT2_115_120_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±4.67 [22.6%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_EG_SCALE	±0.00 [0.00%]	±0.01 [0.03%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.07%]	±0.00 [0.04%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_vvckkw gamma_stat_SR_1J_MT2_140_infty_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±1.47 [62.6%]
alpha_fakeSysSubtract_105_110	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_1J_MT2_110_115_cuts_bin_0	±0.00 0.00% ]	±0.00 [0.00%]	±5.56 [38.8%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_Zjetsfac	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_VVrenfac	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_VVqsf sector SP_MT2_120_140 auto hin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_Zjetsren	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_1J_130_140	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.07 [1.6%]	±0.00 [0.00%]
alpha_fakeSysSubtract_1J_120_125	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.14 [3.1%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_1J_115_120	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.17 [0.83%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_110_120	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_MT2_120_125_cuts_bin_0	±0.00 0.00% J	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_MT2_105_110_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_MUON_SAGITTA_RHO	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_MET_SoftTrk_ResoPerp	±0.00 0.00% ]	±0.00 [0.00%]	±0.32 [2.3%]	±0.01 [0.05%]	±0.02 [0.51%]	±0.04 [0.59%]	±0.02 [0.39%]	±0.00 [0.00%]
alpha_fakeSysSubtract_120_125	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_1J_110_115	±0.00 [0.00%]	±0.00 [0.00%]	±1.01 [7.0%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_ZjetsSys	±0.00 [0.00%]	±0.16 [0.90%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_MUON_SCALE	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_MT2_110_115_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_MUON_MS	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]
gamma_stat_SR_MT2_125_130_cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_VVfac	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_MT2_115_120_cuts_bin_0 alpha_fakaSurSubtract_11_140_infty	±0.00 00.01 00.0±	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 00.01 00.0±	±0.00 [0.00%]	±0.00 [0.00%]
alpha_Zjetsckkw	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.02 [0.98%]
alpha_EL_EFF_Iso	±0.00 [0.00%]	±0.00 [0.00%]	±0.01 [0.09%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_MT2_100_105_cuts_bin_0 alpha_VVren	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	<pre>[%00.0] 00.0± %200.0] 00.0±</pre>	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]
alpha_fakeSysSubtract_125_130	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_fakeSysSubtract_100_105	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]

cuts

## Pullplots



SR-Ojet: the expected background overestimates the observed data in two  $m_{T2}$  bins, with a significance of about  $-2\sigma$ .

Fluctuations also observed when using pure MC for the FS estimate, suggesting that the observed disagreement is most likely arising from statistical under-fluctuations of the data.

SR-1jet: two bins with excesses of about  $1.5\sigma$  and one bin with a  $-3.5\sigma$  overestimation of the background are observed. Related to statistical fluctuations of data in SRDF-1jet (documented in Appendix **D**). Cross-checked with the 0-jet case where a similar behaviour with respect to the datadriven estimate was observed.

#### Pullplots





#### Fit parameters



α

-1.5 -1 -0.5 0 0.5 1 1.5

-1.5 -1 -0.5 0 0.5 1 1.5

α

- No systematic pulling/profiling for blinded SRs as pre-fit yields = post-fit yields.
- Some pulling/profiling for unblinded SRs due to statistical fluctuations of data which constrain systematics in unblinded SRs.
- Cross-checked with a fit using all the SRs as CRs: similar systematic pulling/profiling.

#### C1C1WW - Normalization strategy

• Fitted\_VV\_in\_CR\_VV =  $\mu_{VV}$  \* expected\_VV\_events\_in\_CR\_VV

 $\mu_{VV} = \frac{\text{Fitted}_VV_{in}CR_VV}{\text{expected}_VV_{events}in_CR_VV}$ 

• Fitted\_Top\_in\_CR\_Top =  $\mu_{top}$  \* expected\_Top\_events\_in\_CR\_Top

 $\mu_{top} = \frac{\text{Fitted\_Top\_in\_CR\_Top}}{\text{expected\_Top\_events\_in\_CR\_Top}}$ 

Normalization strategy (fitted\_evets = observed\_events)

Obs\_events\_in\_CR\_VV = ( $\mu_{VV}$  \* exp\_VV\_events\_in\_CR\_VV) + ( $\mu_{top}$  \* exp\_Top\_events\_in\_CR\_VV) + exp\_otherBkg\_events\_in\_CR\_VV Obs\_events\_in\_CR\_Top = ( $\mu_{VV}$  \* exp\_VV\_events\_in\_CR\_Top) + ( $\mu_{top}$  \* exp\_Top\_events\_in\_CR\_Top) + exp\_otherBkg\_events\_in\_CR\_Top

l		_ exp_Top_events_in_CR_VV (exp_otherBkg_events_in_CR_Top - Obs_events_in_CR_Top) + exp_Top_events_in_CR_Top (Obs_events_in_CR_VV - exp_otherBkg_events_in_CR_VV)
l	$\mu_{VV}$ .	
		_ exp_VV_events_in_CR_VV (Obs_events_in_CR_Top - exp_otherBkg_events_in_CR_Top) + exp_VV_events_in_CR_Top (exp_otherBkg_events_in_CR_VV - Obs_events_in_CR_VV)
l	$\mu_{top}$	



#### C1C1WW – Normalization strategy



#### C1C1WW - Pull values

- Bkg-only fit pulls using ATLAS recommended formula for the significance.
- All pulls  $\lesssim$  1, the largest one occurs to be in a VR.

CR\_Dib: 2.129606e-05 CR\_Top: -0.00189644 VR\_Dib\_DF0J: 0.4950505 VR\_Dib\_SF0J: -0.875072 VR\_Top\_DF1J: 0.096339 VR\_Top\_SF1J: -0.497158 VR\_Top\_DF0J: -1.20554 VR\_Top\_SF0J: -0.066893

SR DF0J 81 8125:-0.351801 SR DF0J 8125 815: 0.173406 SR DF0J 815 8175: 0.427902 SR DF0J 8175 82: 0.678427 SR DF0J 82 8225:-1.079950 SR DF0J 8225 825: 0.797560 SR\_DF0J\_825\_8275: 0.099505 SR DF0J 8275 83: 0.2709230 SR DF0J 83 8325:-0.469684 SR DF0J 8325 835: 0.508156 SR DF0J 835 8375:-0.68677 SR\_DF0J\_8375\_84:-0.790854 SR DF0J 84 845: 0.35726 SR DF0J 845 85:-0.297985 SR DF0J 85 86:-0.315978 SR DF0J 86: 0.7928845



SR\_SFOJ\_77\_775: 0.329666965 SR\_SFOJ\_775\_78:-0.77996 SR\_SFOJ\_78\_785:-0.898968 SR\_SFOJ\_785\_79:-0.170564 SR\_SFOJ\_79\_795:-0.192424 SR\_SFOJ\_795\_80:-1.035315 SR\_SFOJ\_80\_81:-0.00838 SR\_SFOJ\_81:-1.066876

#### ClClWW - Exclusion contours: CLs

Grid with expected CLs





## C1C1WW - Additional check

• The effect of unbling the SRs with the old FNP estimates.

The profile-likelihood based hypothesis tests use the backgroundlevel estimates obtained from a background-only fit to both the CRs and SRs (the best estimates available). For consistency, both the observed and expected upper limit (or p-value) determination use the same background-level estimates, such that the expected limit is the most compatible and predictive assessment for the observed limit. As a consequence, the expected upper limit depends indirectly on the observed data.





#### C1C1WW – Normalized type of systematics

up\_norm\_variation\_in\_channel

= up\_variation\_in\_channel \* ( nominal\_in\_CRs / up\_variation\_in\_CRs )

down\_norm\_variation\_in\_channel

= down\_variation\_in\_channel \* ( nominal\_in\_CRs / down\_variation\_in\_CRs )

Example

- Sample = VV, Systematic = JET\_FLAVOR\_COMPOSITION
  - Region = CR\_Dib,
  - Nominal = 376.1466581406824, Up 358.0475063185111, Down = 386.76777661911495
  - Region = CR\_Dib\_CR\_Top,
  - Nominal = 426.37399744088833, Up 406.3781023995014, Down = 439.5431148398273
  - JET\_FLAVOR\_COMPOSITION UP SCALING FACTOR = 426.37399744088833/406.3781023995014 = 1.04920514891
  - JET\_FLAVOR\_COMPOSITION DOWN SCALING FACTOR = 426.37399744088833/439.5431148398273 = 0.9700
  - Up\_VV\_Syst\_NORM in CR = 358.0475063185111 \* 1.04920514891=375.665287184 (lower than nominal yield)
  - Down\_VV\_Syst\_NORM in CR = 386.76777661911495 \* 0.9700=375.1647 (lower than nominal yield)

• Note: Being higher/lower than the nominal yield might change after systematic normalization!

Systematic scaling factor (one systematic scaling factor for each systematic, applied in every region)

Pre-fit

al background emectation	480.61	4210.16	722.91	539.74	1790.17	95.80	731.70	14.59
al statistical $(\sqrt{N_{}})$	+21.92	+64.89	+26.89	+23.23	+42.31	+9.79	+27.05	+3.82
al background systematic	±15.70 [3.27%]	±77.41 [1.84%]	±46.71 [6.46%]	±70.02 [12.97%]	±102.09 [5.70%]	±9.35 [9.76%]	±43.97 [6.01%]	±2.92 20.03
ma_stat_CR_Dib_cuts_bin_0	±8.50 [1.8%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 (0.00)
a JET Flavor Composition	$\pm 5.30$ [1.1%]	$\pm 44.85$ [1.1%]	$\pm 25.50$ [3.5%]	$\pm 25.22$ [4.7%]	$\pm 58.13$ [3.2%]	$\pm 3.73$ [3.9%]	$\pm 23.86$ [3.3%]	$\pm 0.24$ [1.6]
na_MET_SoftTrk_Scale	±4.32 [0.90%]	±8.79 [0.21%]	±3.60 [0.50%]	±31.19 [5.8%]	±31.17 [1.7%]	±3.32 [3.5%]	±9.25 [1.3%]	±0.09 (0.60
in JET Flaver Response	+3.31 [0.69%]	±34.19 [0.8376] +18.38 [0.44%]	+11.80 [1.6%]	+15.82 [2.9%]	+30.61 [1.7%]	+2.15 [2.2%]	+12.02 [1.6%]	+0.02 [0.14
as Renormalization VV	$\pm 3.13$ [0.65%]	±3.90 [0.09%]	$\pm 1.39$ [0.19%]	$\pm 0.53$ [0.10%]	±3.53 [0.20%]	$\pm 0.15$ [0.16%]	±2.13 [0.29%]	$\pm 0.25$ [1.7]
is_FT_EFF_Light	$\pm 2.91$ [0.60%]	$\pm 4.06$ [0.10%]	$\pm 4.11$ [0.57%]	$\pm 2.30 [0.43\%]$	$\pm 2.73$ [0.15%]	$\pm 0.21$ [0.22%]	$\pm 2.47$ [0.34%]	$\pm 0.05$ [0.33
18_JER1	$\pm 2.85$ [0.59%]	$\pm 2.85 [0.07\%]$	$\pm 6.90 [0.95\%]$	$\pm 0.99$ [0.18%]	$\pm 9.82 \ [0.55\%]$	$\pm 0.73 [0.77\%]$	$\pm 0.47$ [0.06%]	$\pm 1.03$ [7.1
IR_CKKW_VV	±2.84 [0.59%] ±2.56 [0.52%]	±3.53 [0.08%]	±4.81 [0.66%]	±9.92 [1.8%] +0.72 [0.129]	±3.59 [0.20%]	±0.15 [0.16%] ±1.27 [1.497]	$\pm 4.87 [0.67%]$ $\pm 1.20 [0.18%]$	±0.78 [5.4 ±0.40 [2.2
a.JET_Pileup_OffsetNPV	±2.39 [0.50%]	±13.49 [0.32%]	±7.00 [0.97%]	±11.73 [2.2%]	$\pm 13.17$ [0.74%]	±0.07 [0.07%]	$\pm 4.28$ [0.58%]	±0.00 (0.03
aa_JER3	$\pm 2.32 [0.48\%]$	$\pm 2.32 [0.05\%]$	±6.88 [0.95%]	$\pm 2.16$ [0.40%]	$\pm 10.00$ [0.56%]	$\pm 1.36$ [1.4%]	$\pm 3.05 [0.42\%]$	$\pm 0.75$ [5.1]
a.RenormalizationFactorization.VV	$\pm 2.29 [0.48\%]$	$\pm 2.85 [0.07\%]$	$\pm 1.01$ [0.14%]	$\pm 2.13$ [0.39%]	±2.21 [0.12%]	$\pm 0.12$ [0.13%]	$\pm 0.60 \ [0.08\%]$	$\pm 0.23$ [1.5]
na_JER_DataVsMC	$\pm 2.07$ [0.43%] $\pm 2.00$ [0.42%]	±2.07 0.05%	±2.70 0.37%	±0.38  0.07% ±4.42  0.82%	$\pm 14.12$ [0.79%] $\pm 11.14$ [0.62%]	$\pm 0.82 [0.85\%]$ $\pm 1.26 [1.29\%]$	$\pm 3.74$ [0.51%] $\pm 5.04$ [0.69%]	±0.81 [5.6]
a Shower ttbar	±1.98 [0.41%]	$\pm 1.24$ [0.03%]	$\pm 1.27$ [0.18%]	$\pm 3.03 [0.56\%]$	±0.33 [0.02%]	±0.24 [0.25%]	$\pm 5.22 [0.71\%]$	±0.33 [2.2]
m JER5	$\pm 1.89$ [0.39%]	$\pm 1.89 [0.04\%]$	$\pm 4.30 [0.60\%]$	$\pm 1.51$ [0.28%]	±9.21 [0.51%]	±2.26 [2.4%]	$\pm 1.55$ [0.21%]	$\pm 0.50$ [3.4
1a_JET_EffectiveNP_Modelling1_Mixed1	$\pm 1.88$ [0.39%]	$\pm 12.56$ [0.30%]	$\pm 5.98$ [0.83%]	$\pm 12.96$ [2.4%]	$\pm 17.09$ [0.95%]	$\pm 1.14$ [1.2%]	$\pm 7.44$ [1.0%]	$\pm 0.00$ [0.00
ia,JER7	±1.85 [0.38%]	$\pm 1.85 [0.04\%]$	±6.25 [0.86%]	±0.93 [0.17%]	$\pm 12.81 [0.72\%]$	±1.15 [1.2%]	±1.15 [0.16%]	±0.75 [5.1]
a.FT.EFF.B	±1.54 [0.32%]	$\pm 28.17$ [0.67%]	±2.67 [0.37%]	$\pm 2.44$ [0.45%]	±20.93 [1.2%]	±1.36 [1.4%]	$\pm 5.71$ [0.78%]	$\pm 0.14$ [0.93
a, FNP, TOTAL, SYS	$\pm 1.41$ [0.29%]	$\pm 11.93$ [0.28%]	±2.27 [0.31%]	$\pm 4.07$ [0.75%]	±5.01 [0.28%]	$\pm 1.25$ [1.3%]	$\pm 8.51$ [1.2%]	$\pm 0.14$ [0.93
a_FT_EFF_C	$\pm 1.30 \ [0.27\%]$	$\pm 1.75$ [0.04%]	$\pm 1.85 [0.26\%]$	$\pm 1.03$ [0.19%]	$\pm 0.80 [0.04\%]$	$\pm 0.09$ [0.09%]	$\pm 1.13$ [0.15%]	$\pm 0.02 [0.15]$
.Renormalization_tthar	±1.26 [0.26%]	±0.79 [0.02%]	±1.13 [0.16%]	±0.77 [0.14%]	±6.95 [0.39%]	±0.93 [0.97%]	±2.42 [0.33%]	±0.13 [0.89
a JERA	+1.10 [0.23%]	+0.46 [0.01%]	+1.09 [0.15%]	+7.32 [1.4%]	+2.56 [0.14%]	+0.15 [0.16%]	+3.30 [0.45%]	+0.04 (0.25
MET_SoftTrk_ResoPara	$\pm 1.10$ [0.23%]	$\pm 1.10$ [0.03%]	$\pm 9.53$ [1.3%]	$\pm 2.56 [0.47\%]$	±16.89 [0.94%]	±2.12 [2.2%]	$\pm 6.16$ [0.84%]	±0.16 [1.15
a_Generator_ttbar	$\pm 0.93$ [0.19%]	$\pm 0.58$ [0.01%]	$\pm 1.93$ [0.27%]	$\pm 2.81$ [0.52%]	±6.04 [0.34%]	$\pm 2.19$ [2.3%]	$\pm 4.28$ [0.59%]	$\pm 0.11$ [0.79
AMUON ID	±0.85 [0.18%]	±2.20 [0.05%] ±0.05 [0.02%]	±0.83 [0.12%]	±3.73 [0.69%] +2.75 [0.44%]	$\pm 4.17 [0.23\%]$ $\pm 1.24 [0.07\%]$	±0.14 [0.14%]	$\pm 1.23 [0.17\%]$ $\pm 0.58 [0.08\%]$	±0.07 [0.45
MET.SoftTrk.ResoPerp	±0.73 [0.15%] ±0.72 [0.15%]	±0.55 [0.02%]	±11.38 [1.6%]	±5.90 [1.1%]	±1.54 [0.0776] ±21.56 [1.2%]	±1.28 [1.3%]	±0.05 [0.05%] ±2.89 [0.39%]	±0.04 f0.25
a Factorization VV	$\pm 0.67$ [0.14%]	$\pm 0.84$ [0.02%]	±2.60 [0.36%]	$\pm 1.61$ [0.30%]	±5.32 [0.30%]	±0.02 [0.03%]	$\pm 2.36$ [0.32%]	$\pm 0.02 [0.12]$
*PDF_VV	$\pm 0.54$ [0.11%]	$\pm 0.67 [0.02\%]$	$\pm 8.57$ [1.2%]	$\pm 2.44$ [0.45%]	$\pm 0.30 \ [0.02\%]$	$\pm 0.04$ [0.04%]	$\pm 0.33$ [0.05%]	$\pm 0.65$ [4.59
LEG_SCALE	±0.53 [0.11%]	±8.26 [0.20%]	±0.18 [0.03%]	±4.93 [0.91%]	±11.97 [0.67%]	±0.93 [0.98%]	±7.02 [0.96%]	±0.26 [1.89
a JET EffectiveNP Statistical2 Mixed)	±0.50 [0.10%] ±0.46 [0.09%]	$\pm 17.36 [0.41\%]$ +2.05 [0.05%]	±3.57 [0.49%] +0.33 [0.05%]	±3.31 [0.61%] +1.24 [0.23%]	$\pm 4.97$ [0.28%] $\pm 2.01$ [0.11%]	+0.12 [0.23%]	$\pm 2.77 [0.38\%]$ +0.58 [0.08%]	+0.03 [0.22]
a JET Pileup PtTerm	±0.37 [0.08%]	±1.96 [0.05%]	±1.35 [0.19%]	±0.21 [0.04%]	±0.52 [0.03%]	±0.10 [0.11%]	±0.09 [0.01%]	±0.03 [0.19]
MUON EFF ISO STAT	$\pm 0.35$ [0.07%]	$\pm 12.14$ [0.29%]	$\pm 5.16$ [0.71%]	$\pm 2.85$ [0.53%]	$\pm 7.01$ [0.39%]	$\pm 0.68$ [0.71%]	$\pm 4.54$ [0.62%]	$\pm 0.85$ [5.8]
-MUON_MS	$\pm 0.34$ [0.07%]	$\pm 1.24$ [0.03%]	$\pm 1.97$ [0.27%]	$\pm 3.48 [0.64\%]$	$\pm 1.87$ [0.10%]	$\pm 0.01$ [0.01%]	$\pm 0.34$ [0.05%]	$\pm 0.02 [0.17]$
JET_EffectiveNP_Modelling2_Mixed1 JET_EffectiveNP_Mixed2	±0.32 0.07% +0.29 0.00%	$\pm 1.40$ [0.03%] $\pm 0.40$ [0.01%]	±0.23 [0.03%] +0.16 [0.02%]	$\pm 0.80$ [0.15%] $\pm 0.71$ [0.12%]	±0.42 [0.02%] +1.69 [0.00%]	$\pm 0.12 [0.13\%]$ $\pm 0.00 [0.0007]$	$\pm 0.38$ [0.05%] $\pm 0.48$ [0.07%]	±0.00 (0.00
DS Singletop	±0.29 [0.06%]	±0.40 [0.01 %] ±0.26 [0.01%]	±5.33 [0.74%]	±0.71 [0.1370] ±0.62 [0.11%]	$\pm 13.87$ [0.08%]	±1.58 [1.7%]	±0.48 [0.079] ±0.90 [0.12%]	±0.02 [0.12 ±0.02 [0.16
JET EffectiveNP Detector1	$\pm 0.24$ [0.05%]	$\pm 0.77$ [0.02%]	$\pm 0.15$ [0.02%]	$\pm 0.53$ [0.10%]	$\pm 1.04$ [0.06%]	$\pm 0.02 \ [0.02\%]$	$\pm 0.17$ [0.02%]	$\pm 0.03$ [0.23
Resummation_VV	$\pm 0.23$ [0.05%]	$\pm 0.29$ [0.01%]	$\pm 5.47 \ [0.76\%]$	$\pm 15.99$ [3.0%]	$\pm 2.88$ [0.16%]	$\pm 0.11$ [0.12%]	$\pm 10.82$ [1.5%]	$\pm 0.12$ [0.85
ARACIATION_Uber	±0.21 [0.04%] +0.20 [0.04%]	$\pm 0.13 [0.00\%]$ $\pm 0.67 [0.02\%]$	±3.48 [0.48%] +0.33 [0.05%]	$\pm 2.14 [0.40\%]$ +0.40 [0.07%]	±3.24 [0.18%] +0.65 [0.0493]	±2.51 [2.6%] +0.01 [0.01%]	±6.22 [0.85%] +0.24 [0.0291]	±0.18 [1.2]
IET EffectiveNP Modelling3 Mixed1	+0.17 [0.03%]	+1.29 [0.03%]	+0.25 [0.03%]	+0.58 [0.11%]	+0.41 [0.02%]	+0.02 [0.03%]	+0.13 [0.02%]	+0.02 (0.19
JET Pileup OffsetMu	$\pm 0.16$ [0.03%]	$\pm 11.72$ [0.28%]	$\pm 8.21$ [1.1%]	$\pm 17.88$ [3.3%]	±12.00 [0.67%]	±0.20 [0.21%]	$\pm 2.72$ [0.37%]	$\pm 0.15$ [1.09
JET_EtaIntercalibration_posEta	$\pm 0.15$ [0.03%]	$\pm 0.15$ [0.00%]	±0.28 [0.04%]	$\pm 0.26$ [0.05%]	±0.07 [0.00%]	±0.00 [0.00%]	$\pm 0.24$ [0.03%]	$\pm 0.04$ [0.26]
FT_EFF_extrFromCharm	$\pm 0.14$ [0.03%]	$\pm 0.18$ [0.00%]	$\pm 0.20$ [0.03%]	$\pm 0.11 [0.02\%]$	$\pm 0.02$ [0.00%]	$\pm 0.02 [0.02\%]$	$\pm 0.12 \ [0.02\%]$	$\pm 0.00 [0.02]$
MUON_EFF_RECO_SYS	±0.13 [0.03%] ±0.13 [0.02%]	$\pm 2.00 [0.05\%]$ $\pm 1.14 [0.02\%]$	±0.27 [0.04%]	±0.31 [0.06%] ±2.00 [0.55%]	$\pm 1.03$ [0.06%] $\pm 0.57$ [0.07%]	±0.08 [0.08%] ±0.20 [0.20%]	±0.34 [0.05%] ±0.96 [0.12%]	$\pm 0.02 [0.13$ $\pm 0.00 [0.07]$
JET_EtaIntercalibration_nerEta	±0.12 [0.02%]	±0.04 [0.00%]	±0.40 [0.06%]	$\pm 0.54$ [0.10%]	±0.09 [0.00%]	±0.02 [0.02%]	±0.50 [0.07%]	±0.00 (0.01
MUON_EFF_ISO_SYS	$\pm 0.10$ [0.02%]	$\pm 4.10$ [0.10%]	±0.96 [0.13%]	$\pm 0.94$ [0.18%]	$\pm 1.65$ [0.09%]	$\pm 0.01$ [0.01%]	$\pm 0.46$ [0.06%]	$\pm 0.01$ [0.06
Factorization_ttbar	$\pm 0.08$ [0.02%]	$\pm 0.05 [0.00\%]$	$\pm 0.22 [0.03\%]$	$\pm 0.26$ [0.05%]	$\pm 1.41$ [0.08%]	$\pm 0.62$ [0.65%]	$\pm 0.17$ [0.02%]	$\pm 0.05 [0.34$
a JET EffectiveNP Mixed1 IET EffectiveNP Mixed1	+0.08 [0.02%]	±0.06 [0.00%]	±0.20 [0.03%]	+0.16 [0.02%]	±0.50 [0.03%]	±0.05 [0.06%]	±0.02 [0.00%] ±0.09 [0.01%]	+0.02 [0.17
LELEFF.Reco	±0.07 [0.01%]	±3.53 [0.08%]	$\pm 1.09 [0.15\%]$	$\pm 1.14$ [0.21%]	±0.65 [0.04%]	±0.02 [0.02%]	$\pm 0.34$ [0.05%]	±0.01 [0.04
a JET EffectiveNP Statistical5 Mixed1	$\pm 0.07$ [0.01%]	$\pm 0.42$ [0.01%]	±0.21 [0.03%]	$\pm 0.08$ [0.02%]	±0.24 [0.01%]	±0.04 [0.04%]	$\pm 0.14$ [0.02%]	$\pm 0.02$ [0.11
MUON_EFF_RECO_STAT	$\pm 0.06$ [0.01%]	$\pm 0.60 [0.01\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.10 \ [0.02\%]$	$\pm 0.29$ [0.02%]	$\pm 0.01$ [0.01%]	$\pm 0.06$ [0.01%]	$\pm 0.00$ [0.00
a_JET_EffectiveNP_Statistical4_Mixed1	±0.05 [0.01%]	±0.24 [0.01%]	±0.09 [0.01%]	±0.03 [0.01%]	±0.08 [0.00%]	±0.03 [0.03%]	±0.27 [0.04%]	±0.01 [0.04
a JET EffectiveNP Statistical3 Mixed1	+0.04 [0.01%]	+0.11 [0.00%]	+0.09 [0.01%]	+0.04 [0.01%]	+0.05 [0.0056]	+0.00 [0.00%]	+0.04 [0.01%]	+0.00 (0.00
VV	$\pm 0.04$ [0.01%]	$\pm 0.01$ [0.00%]	±0.05 [0.01%]	$\pm 0.03$ [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.03$ [0.00%]	±0.00 0.00
JET_EffectiveNP_Statistical1_Mixed1	$\pm 0.02$ [0.00%]	$\pm 0.20 [0.00\%]$	$\pm 0.11$ [0.01%]	$\pm 0.02 [0.00\%]$	$\pm 0.24$ [0.01%]	$\pm 0.06$ [0.06%]	$\pm 0.05$ [0.01%]	$\pm 0.00$ [0.01
.JET_EffectiveNP_Detector2	±0.01  0.00% +0.01  0.00%	±0.02 0.00%	±0.10  0.01%	$\pm 0.04   0.01\%$ $\pm 0.02   0.00\%$	+0.18 0.01%	$\pm 0.01$   $0.01\%$ $\pm 0.01$   $0.01\%$	$\pm 0.09$ [0.01%] $\pm 0.04$ [0.01%]	+0.00 0.00
.FT.EFF.extrapolation	±0.01 [0.00%]	±0.01 [0.00%]	±0.01 [0.00%]	±0.01 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.01 [0.00\%]$	±0.00 (0.00
MUON EFF RECO SYS LOWPT	$\pm 0.01$ [0.00%]	$\pm 0.50$ [0.01%]	±0.21 [0.03%]	$\pm 0.13$ [0.02%]	±0.07 [0.00%]	±0.02 [0.02%]	$\pm 0.04$ [0.01%]	$\pm 0.00 [0.02$
MUON_EFF_TTVA_SYS	$\pm 0.01$ [0.00%]	$\pm 0.45$ [0.01%]	±0.00 [0.00%]	$\pm 0.11$ [0.02%]	±0.21 [0.01%]	$\pm 0.01$ [0.01%]	$\pm 0.10$ [0.01%]	$\pm 0.00 [0.02]$
MUON_EFF_TTVA_STAT	±0.00 [0.00%]	$\pm 0.62 [0.01\%]$	$\pm 0.13$ [0.02%]	$\pm 0.16$ [0.03%]	$\pm 0.16$ [0.01%]	$\pm 0.00 [0.00\%]$	$\pm 0.06$ [0.01%]	$\pm 0.00 [0.00]$
ALLON SACITTA DESDIAS	±0.00 [0.00%]	±0.83 [0.02%]	+0.02%	±0.20 [0.04%]	+0.01 [0.00%]	±0.02 [0.02%]	±0.11 [0.02%] ±0.00 [0.02%]	+0.00 [0.03]
JET.PunchThrough_MC16	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.03 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 (0.00)
MUON_EFF_RECO_STAT_LOWPT	$\pm 0.00 [0.00\%]$	$\pm 0.28$ [0.01%]	$\pm 0.14$ [0.02%]	$\pm 0.08$ [0.02%]	$\pm 0.02$ [0.00%]	$\pm 0.01$ [0.01%]	$\pm 0.01$ [0.00%]	$\pm 0.00$ [0.01
.EL.EFF.Triggereff	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00
maxim_SR_DF0J_845_85_cuts_bin_0 no stat_SR_DF01_8325_835_cuts_bin_0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00]
na.stat.SR.DF0J.8175.82.cuts.bin.0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 (0.00)
na_stat_SR_SF0J_79_795_cuts_bin_0	±0.00 0.00%	$\pm 0.00$ 0.00%	±0.00 0.00%	±0.00 0.00%	±0.00 [0.00%]	±0.00 0.00%	$\pm 0.00$ $[0.00\%]$	±0.00 0.00
na_stat_SR_DF0J_8375_84_cuts_bin_0	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00]
na_stat_SR_SF0J_795_80_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%] ±16 10 [0.28%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 (0.00)
na_stat_SR_SF0J_77_775_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 (0.00)
MUON EFF TrigStatUncertainty	±0.00 0.00%	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 (0.00
ia stat SR DF0J 835 8375 cuts bin 0	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00
na.stat.v.R.Top.DF0J.cuts.bin.0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±8.39 [1.1%] +0.00 [0.00%]	±0.00 [0.00
na stat SR DF0J 85.86 cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 (0.00
JET EtaIntercalibration highE	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.01$ [0.04
na.stat.VR.Top.SF1J.cuts.bin.0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±2.47 [2.6%]	±0.00 [0.00%]	±0.00 [0.00
na stat y n. Top SPUJ cuts bin 0 na stat SR DE01 8275 83 cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±1.12 [7.7] +0.00 (0.00
ia_stat_SR_DF0J_82_8225_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 (0.00
as stat SR SF0J 80 81 cuts bin 0	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00
stat_SR_DF0J_84_845_cuts_bin_0	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00
a.stat_VR_Top_DF1J_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±10.66 [0.60%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00
a.stat.SR.DF0J.8125.815 cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 (0.00
a.stat.SR.DF0J.81.8125.cuts.bin.0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 (0.00
MUON_SAGITTA_RHO	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00
MUON_EFF_TrigSystUncertainty	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00
ELEFF Charge Recommendation Zinte	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00
Renormalization_Zjets	±0.00 0.00%	±0.00 0.00%	±0.00 0.00%	±0.00 0.00%	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]	±0.00 0.00
EL EFF Trigger	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]	±0.00 (0.00
a_stat_SR_DF0J_86_cuts_bin_0	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00
a_stat_VR_Dib_SF0J_cuts_bin_0	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 34.82$ [6.5%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00
CKKW Zjets	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00
an stat SR SE01 785 79 cuts hin 0	±0.00 [0.00%]	±0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00 +0.00 [0.00
na stat.VR.Dib.DF0J.cuts.bin.0	±0.00 [0.00%]	±0.00 [0.00%]	±8.54 [1.2%]	+0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 (0.00
na stat SR SF0J 775 78 cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00
	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00
.Factorization_Zjets	a second for second 1	+0.00 [0.00%]	+0.00 (0.00%)	±0.00 [0.00%]	+0.00 (0.00%)	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 (0.00
a.Factorization_Zjets na.stat_SR_DF0J_815_8175_cuts_bin_0	±0.00 00.0%	a new fermadol	in an is said	the set is said.	in an in antid	and the second of	a man for model	
a.Factorization_Zjets ma.stat_SR.DF0J_815_8175_cuts_bin_0 un_stat_SR_DF0J_83_8325_cuts_bin_0 or_stat_SR_DF0J_83_8325_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00

# Post-fit

Total background expectation	632.00	4468.18	938.50	662.15	1900.47	101.57	874.88	17.37
Total statistical $(\sqrt{N_{max}})$	±25.14	$\pm 66.84$	$\pm 30.63$	±25.73	$\pm 43.59$	$\pm 10.08$	±29.58	±4.17
Total background systematic	±25.13 [3.98%]	±66.85 [1.50%]	±59.54 [6.34%]	±77.65 [11.73%]	±88.68 [4.67%]	±8.88 [8.74%]	±46.37 [5.30%]	$\pm 3.71$ [21.33%]
	1.01.00.0001	1.1.10 (0.0007)	14404 [470]		11.05 [0.1007]	10.13 [0.13][]		1.0.40 [0.017]
gamma stat. CR. Dib.cuts bin 0	±31.36 [5.0%] ±11.12 [1.8%]	±4.19 [0.09%] ±0.00 [0.00%]	±44.04 [4.7%] ±0.00 in nm%	±24.23 [3.7%] ±0.00 [0.00%]	±1.95 [0.10%] ±0.00 [0.00%]	±0.13 [0.13%] ±0.00 [0.00%]	±25.92 [3.0%] ±0.00 in n0%]	±0.49 [2.8%] ±0.00 in no <sup>121</sup>
alpha JET Flavor Composition	+5.60.00.89%]	+47 17 [1 1%]	+29.87 [3.2%]	+27.63 [4.2%]	+60.80 [3.2%]	+3.89 [3.8%]	+25.23 [2.9%]	+0.34 [2.0%]
alpha.MET.SoftTrk.Scale	±4.63 [0.73%]	±9.06 [0.20%]	±4.34 [0.46%]	±32.36 [4.9%]	$\pm 33.00 [1.7\%]$	$\pm 3.48$ [3.4%]	$\pm 11.15$ [1.3%]	$\pm 0.03 [0.17\%]$
alpha.Renormalization.VV	$\pm 4.31 [0.68\%]$	$\pm 5.37 [0.12\%]$	$\pm 1.92$ [0.20%]	$\pm 0.73$ [0.11%]	$\pm 4.87 [0.26\%]$	$\pm 0.21$ [0.20%]	±2.94 [0.34%]	$\pm 0.35 [2.0\%]$
alpha_JET_Pileup_RhoTopology	$\pm 4.28$ [0.68%]	±36.60 [0.82%]	$\pm 24.18$ [2.6%]	±25.21 [3.8%]	±39.88 [2.1%]	±3.17 [3.1%]	±21.92 [2.5%]	±0.01 [0.07%]
alpha_FT_EFF_Light	±3.99 [0.63%]	±5.21 [0.12%]	±5.64 [0.60%]	$\pm 3.14 [0.47\%]$	$\pm 3.38 [0.18\%]$	$\pm 0.26 [0.25\%]$	±3.36 [0.38%]	$\pm 0.07$ [0.38%]
alpha_CKKW_VV	±3.91 [0.62%]	$\pm 4.87 [0.11\%]$	$\pm 6.63$ [0.71%]	$\pm 13.68$ [2.1%]	$\pm 4.95 [0.26\%]$	$\pm 0.21 [0.20\%]$	±6.72 [0.77%]	$\pm 1.08 [6.2\%]$
alpha_JET_Flavor_Response	±3.61 [0.57%]	±19.16 [0.43%]	$\pm 13.91$ [1.5%]	±16.92 [2.6%]	$\pm 31.91$ [1.7%]	±2.24 [2.2%]	$\pm 12.70 [1.5\%]$	$\pm 0.05 \ [0.29\%]$
alpha_JER1	$\pm 3.46$ [0.55%]	$\pm 3.46 [0.08\%]$	$\pm 8.53$ [0.91%]	$\pm 1.82 [0.28\%]$	$\pm 10.72$ [0.56%]	$\pm 0.64$ [0.63%]	$\pm 0.23 \ [0.03\%]$	$\pm 1.28 [7.4\%]$
alpha_RenormalizationFactorization_VV	$\pm 3.15$ [0.50%]	$\pm 3.92 [0.09\%]$	$\pm 1.39$ [0.15%]	$\pm 2.93 [0.44\%]$	$\pm 3.05 [0.16\%]$	$\pm 0.17 [0.17\%]$	$\pm 0.83$ [0.09%]	$\pm 0.31$ [1.8%]
alpha_JER6	$\pm 3.05 [0.48\%]$	$\pm 3.05 [0.07\%]$	$\pm 8.23$ [0.88%]	$\pm 1.44$ [0.22%]	$\pm 13.18$ [0.69%]	$\pm 1.29$ [1.3%]	$\pm 0.96$ [0.11%]	$\pm 0.62$ [3.6%]
alpha_JER3	$\pm 2.84$ [0.45%]	$\pm 2.84$ [0.06%]	$\pm 8.25$ [0.88%]	$\pm 3.09 \ [0.47\%]$	$\pm 11.01$ [0.58%]	$\pm 1.27$ [1.3%]	$\pm 2.97 [0.34\%]$	$\pm 0.90$ [5.2%]
alpha.JET_Pileup_OffsetNPV	±2.68 [0.42%]	±13.98 [0.31%] ±105.71 [2.4%]	±8.47 [0.90%] ±4.05 [0.52%]	$\pm 12.02$ [1.8%] $\pm 4.41$ [0.67%]	±13.66 [0.72%]	±0.06 [0.05%]	+10.14 [1.2%]	+0.03 [0.17%]
alreba JER DataVeMC	+2.38 [0.38%]	+2.38 [0.05%]	+2.66 [0.28%]	+1.15 [0.17%]	+15 16 [0.8002]	+0.74 [0.72%]	+4.24 [0.48%]	+1.02 [5.9%]
alpha_JER2	±2.36 [0.37%]	$\pm 2.36 [0.05\%]$	±2.23 [0.24%]	±6.25 [0.94%]	$\pm 11.98$ [0.63%]	±1.18 [1.2%]	±5.60 [0.64%]	$\pm 1.05$ [6.1%]
alpha.Shower.ttbar	±2.08 [0.33%]	$\pm 1.30$ [0.03%]	$\pm 1.33 [0.14\%]$	$\pm 3.19$ [0.48%]	$\pm 0.35 [0.02\%]$	$\pm 0.25 [0.25\%]$	±5.49 [0.63%]	$\pm 0.34$ [2.0%]
alpha_JER5	±2.08 [0.33%]	$\pm 2.08$ [0.05%]	$\pm 4.80$ [0.51%]	±2.40 [0.36%]	±9.92 [0.52%]	±2.26 [2.2%]	$\pm 1.33$ [0.15%]	$\pm 0.62$ [3.6%]
alpha_JER7	±2.05 [0.32%]	±2.05 [0.05%]	$\pm 7.61$ [0.81%]	$\pm 1.62 [0.24\%]$	$\pm 13.86$ [0.73%]	$\pm 1.03 [1.0\%]$	$\pm 0.86 [0.10\%]$	$\pm 0.89$ [5.1%]
alpha_JET_EffectiveNP_Modelling1_Mixed1	±2.04 [0.32%]	±13.15 [0.29%]	$\pm 6.85$ [0.73%]	$\pm 13.68$ [2.1%]	$\pm 17.68$ [0.93%]	$\pm 1.17 [1.2\%]$	$\pm 7.49$ [0.86%]	±0.00 [0.02%]
alpha,EG,RES	$\pm 1.81$ [0.29%]	$\pm 2.89 [0.06\%]$	$\pm 4.28 [0.46\%]$	$\pm 1.29 [0.19\%]$	$\pm 1.68 \ [0.09\%]$	$\pm 0.93$ [0.91%]	$\pm 3.35 [0.38\%]$	$\pm 0.11$ [0.61%]
alpha_FT_EFF_C	$\pm 1.78$ [0.28%]	$\pm 2.25 [0.05\%]$	$\pm 2.54$ [0.27%]	$\pm 1.41 \ [0.21\%]$	$\pm 1.00 \ [0.05\%]$	$\pm 0.11 [0.11\%]$	$\pm 1.54$ [0.18%]	$\pm 0.03$ [0.17%]
alpha_FT_EFF_B	$\pm 1.65$ [0.26%]	±29.59 [0.66%]	$\pm 2.86$ [0.30%]	$\pm 2.59 [0.39\%]$	$\pm 21.99$ [1.2%]	$\pm 1.43$ [1.4%]	$\pm 6.03$ [0.69%]	$\pm 0.14$ [0.82%]
alpha.FNP.TOTAL.SYS	$\pm 1.35$ [0.21%]	$\pm 11.43$ [0.26%]	$\pm 2.18$ [0.23%]	$\pm 3.90 [0.59\%]$	$\pm 4.79 \ [0.25\%]$	$\pm 1.20 [1.2\%]$	$\pm 8.15$ [0.93%]	$\pm 0.13$ [0.74%]
alpha.Renormalization.ttbar	$\pm 1.33$ [0.21%]	$\pm 0.83 \ [0.02\%]$	$\pm 1.19$ [0.13%]	$\pm 0.80 \ [0.12\%]$	$\pm 7.30 [0.38\%]$	$\pm 0.97 [0.96\%]$	$\pm 2.54 [0.29\%]$	$\pm 0.14$ [0.78%]
alpha_JER4	±1.32 [0.21%]	±1.32 0.03%	±4.44 [0.47%]	±4.65 [0.70%]	±14.81 [0.78%]	±1.10 [1.1%]	±3.44 [0.39%]	±1.07 [6.1%]
alpha_JVI	±1.17 [0.19%]	±0.39 [0.01%]	±1.07 [0.11%]	±7.37 [1.1%]	±2.63 [0.14%]	±0.15 [0.15%]	±3.52 [0.40%]	±0.04 [0.21%]
alpha MET Soft Tre Pasor ara	±1.16 [0.18%]	+1.14 [0.03%]	+16.02 [1.4%]	±4.04 [0.01 %]	±17.63 [0.93.94]	±2.23 [2.2%] ±1.28 [1.4%]	±2.68 [0.20%]	±0.24 [1.4%]
alpha.Generator.ttbar	±0.97 [0.15%]	±0.61 [0.01%]	±2.03 [0.22%]	±2.95 [0.45%]	±6.35 [0.33%]	±2.30 [2.3%]	±4.50 [0.51%]	±0.12 [0.69%]
alpha,Factorization,VV	±0.93 [0.15%]	$\pm 1.15 [0.03\%]$	±3.59 [0.38%]	+2.22 [0.34%]	±7.33 [0.39%]	±0.03 [0.03%]	±3.25 [0.37%]	±0.02 [0.14%]
alpha, MUON, SCALE	±0.91 [0.14%]	±2.27 [0.05%]	±1.27 [0.14%]	±3.72 [0.56%]	±4.36 [0.23%]	$\pm 0.15$ [0.15%]	±1.29 [0.15%]	±0.09 [0.53%]
alpha, MUON, ID	±0.78 [0.12%]	$\pm 1.03$ [0.02%]	±5.65 [0.60%]	$\pm 2.10$ [0.32%]	$\pm 1.36$ [0.07%]	$\pm 0.37$ [0.36%]	±1.16 [0.13%]	±0.02 [0.09%]
alpha PDF VV	$\pm 0.74$ [0.12%]	$\pm 0.92$ [0.02%]	$\pm 11.81$ [1.3%]	$\pm 3.37 [0.51\%]$	$\pm 0.41$ [0.02%]	$\pm 0.06$ [0.06%]	±0.46 [0.05%]	$\pm 0.90$ [5.2%]
alpha_EG_SCALE	±0.65 [0.10%]	$\pm 8.55$ [0.19%]	$\pm 0.09$ [0.01%]	$\pm 5.36$ [0.81%]	$\pm 12.61$ [0.66%]	$\pm 0.99$ [0.97%]	$\pm 8.50$ [0.97%]	$\pm 0.28$ [1.6%]
alpha_EL_EFF_ID	$\pm 0.50 [0.08\%]$	$\pm 18.24$ [0.41%]	$\pm 4.24$ [0.45%]	$\pm 3.78 [0.57\%]$	±5.19 [0.27%]	$\pm 0.23$ [0.22%]	$\pm 3.01$ [0.34%]	±0.04 [0.22%]
alpha_JET_EffectiveNP_Statistical2_Mixed1	$\pm 0.47$ [0.08%]	$\pm 2.14$ [0.05%]	$\pm 0.34$ [0.04%]	$\pm 1.32$ [0.20%]	$\pm 2.09 [0.11\%]$	$\pm 0.11$ [0.10%]	$\pm 0.62 [0.07\%]$	$\pm 0.04$ [0.21%]
alpha_JET_Pileup_PtTerm	$\pm 0.45$ [0.07%]	$\pm 1.98$ [0.04%]	$\pm 1.89 \ [0.20\%]$	$\pm 0.05 \ [0.01\%]$	$\pm 0.54$ [0.03%]	$\pm 0.10 \ [0.10\%]$	$\pm 0.19 \ [0.02\%]$	$\pm 0.03 \ [0.17\%]$
alpha_MUON_MS	±0.39 [0.06%]	$\pm 1.28$ [0.03%]	$\pm 2.50 \ [0.27\%]$	$\pm 3.42 [0.52\%]$	$\pm 1.99$ [0.10%]	$\pm 0.01$ [0.01%]	$\pm 0.41$ [0.05%]	$\pm 0.04$ [0.24%]
alpha_JET_EffectiveNP_Modelling2_Mixed1	±0.37 [0.06%]	±1.44 [0.03%]	±0.22 [0.02%]	±0.87 [0.13%]	±0.43 [0.02%]	±0.13 [0.13%]	±0.40 [0.05%]	±0.00 [0.02%]
alpha_MUON_EFF_ISO_STAT	±0.34 [0.05%]	±12.78 [0.29%]	±7.05 [0.75%]	±3.32 [0.50%]	±7.36 [0.39%]	±0.71 [0.70%]	±4.85 [0.55%]	±1.06 [6.1%]
alpha_Resummation_VV	±0.32 [0.06%]	±0.40 [0.01%]	±7.53 [0.80%]	±22.03 [3.3%]	±3.96 [0.21%]	±0.16 [0.15%]	±14.91 [1.7%]	±0.17 [0.99%]
alpha IFT EffectionND Minod?	+0.30 [0.05%]	+0.42 [0.01%]	+0.15 [0.02%]	+0.77 [0.12%]	±14.08 [0.1776]	+0.00[0.00%]	+0.52 [0.0017]	+0.02 [0.1476]
alpha, JET EffectiveNP (Mixed)2	+0.27 [0.04%]	+0.50 [0.0293]	+0.16 [0.02%]	+0.61 [0.02%]	+1.10 [0.09%]	+0.02 [0.02%]	+0.12 [0.00%]	+0.02 [0.12%]
alpha Radiation tthar	+0.22 [0.03%]	+0.14 [0.00%]	+3 66 [0.39%]	+2.25 [0.34%]	+3.40 [0.18%]	+2.64 [2.6%]	+6.53 [0.75%]	+0.19 [1.1%]
alpha_JET_EffectiveNP_Mixed3	±0.22 [0.03%]	$\pm 0.70 [0.02\%]$	±0.43 [0.05%]	±0.45 [0.07%]	±0.69 [0.04%]	$\pm 0.01$ [0.01%]	$\pm 0.22$ [0.03%]	±0.03 [0.18%]
alpha_FT_EFF_extrFromCharm	±0.19 [0.03%]	$\pm 0.23$ [0.01%]	±0.28 0.03%	$\pm 0.16$ [0.02%]	±0.02 [0.00%]	±0.03 [0.03%]	±0.17 0.02%	±0.00 [0.02%]
alpha_JET_EffectiveNP_Modelling3_Mixed1	±0.18 [0.03%]	$\pm 1.35$ [0.03%]	$\pm 0.25$ [0.03%]	±0.59 [0.09%]	$\pm 0.44$ [0.02%]	±0.03 [0.03%]	$\pm 0.11$ [0.01%]	$\pm 0.02$ [0.13%]
alpha_JET_EtaIntercalibration_posEta	±0.16 [0.03%]	$\pm 0.16$ [0.00%]	$\pm 0.32$ [0.03%]	$\pm 0.30 [0.05\%]$	±0.08 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.31$ [0.03%]	$\pm 0.04$ [0.23%]
alpha_MUON_EFF_RECO_SYS	$\pm 0.14$ [0.02%]	$\pm 2.10 \ [0.05\%]$	$\pm 0.40$ [0.04%]	$\pm 0.30 [0.05\%]$	$\pm 1.08 [0.06\%]$	$\pm 0.08 [0.08\%]$	$\pm 0.34$ [0.04%]	$\pm 0.02 \ [0.12\%]$
Lumi	$\pm 0.13$ [0.02%]	$\pm 1.14$ [0.03%]	$\pm 0.04$ [0.00%]	$\pm 2.98 [0.45\%]$	$\pm 0.53$ [0.03%]	$\pm 0.19 [0.19\%]$	$\pm 0.96 [0.11\%]$	$\pm 0.00 \ [0.02\%]$
alpha_JET_EtaIntercalibration_negEta	$\pm 0.12$ [0.02%]	$\pm 0.04$ [0.00%]	$\pm 0.51$ [0.05%]	$\pm 0.65 [0.10\%]$	$\pm 0.10$ [0.01%]	$\pm 0.02 [0.02\%]$	$\pm 0.57 [0.07\%]$	$\pm 0.00 [0.01\%]$
alpha MUON EFF ISO SYS	±0.09 [0.01%]	±4.31 [0.10%]	±1.17 [0.13%]	±1.06 [0.16%]	±1.73 [0.09%]	±0.01 [0.01%]	±0.48 [0.06%]	±0.01 [0.07%]
alpha, JET_EllectiveNP_Statistical6_Mixed1	±0.09 [0.01%]	±0.04 [0.00%]	±0.27 [0.03%]	±0.07 [0.01%]	±0.53 [0.03%]	±0.06 [0.06%]	±0.01 [0.00%]	±0.03 [0.15%]
alpha, Pactorization_Ithar	±0.08 [0.01%]	±0.06 [0.00%]	±0.24 [0.03%]	±0.27 [0.04%]	$\pm 1.49$ [0.08%]	±0.66 [0.65%]	±0.18 [0.02%]	±0.05 [0.30%]
alpha JET EffectionND Statistical: Miscall	+0.07 [0.01%]	+0.44 [0.01%]	+0.25 [0.0215]	+0.00 [0.01%]	+0.25 [0.01%]	+0.04 [0.04%]	+0.20 [0.02]5]	+0.02 [0.00[7]
alpha MUON EFF RECO STAT	+0.07 [0.01%]	+0.63 [0.01%]	+0.02 [0.00%]	+0.10 [0.01%]	+0.31 [0.02%]	+0.01 [0.01%]	+0.05 [0.01%]	+0.00 [0.00%]
alpha.EL.EFF.Reco	±0.07 [0.01%]	$\pm 3.72 [0.08\%]$	±1.35 [0.14%]	$\pm 1.35$ [0.20%]	±0.69 [0.04%]	$\pm 0.02 [0.02\%]$	±0.38 [0.04%]	±0.01 [0.04%]
alpha_JET_EffectiveNP_Statistical4_Mixed1	±0.07 [0.01%]	$\pm 0.26$ [0.01%]	±0.07 0.01%	±0.06 [0.01%]	±0.10 [0.01%]	±0.03 [0.03%]	±0.36 0.04%	±0.01 [0.04%]
alpha_JET_EffectiveNP_Modelling4_Mixed1	±0.05 [0.01%]	±0.03 [0.00%]	$\pm 0.35$ [0.04%]	$\pm 0.11$ [0.02%]	$\pm 0.54$ [0.03%]	±0.06 [0.06%]	$\pm 0.08$ [0.01%]	±0.00 [0.01%]
alpha_JET_EffectiveNP_Statistical3_Mixed1	±0.06 [0.01%]	$\pm 0.13$ [0.00%]	±0.12 [0.01%]	±0.06 [0.01%]	$\pm 0.05 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.05$ [0.01%]	±0.00 [0.00%]
alpha_JET_Pileup_OffsetMu	±0.05 [0.01%]	$\pm 12.29$ [0.27%]	$\pm 10.18$ [1.1%]	$\pm 18.37$ [2.8%]	$\pm 12.54$ [0.66%]	$\pm 0.19 [0.19\%]$	±2.76 [0.32%]	$\pm 0.19 [1.1\%]$
alpha_JET_EffectiveNP_Statistical1_Mixed1	$\pm 0.02$ [0.00%]	$\pm 0.21 [0.00\%]$	$\pm 0.14$ [0.01%]	$\pm 0.02 [0.00\%]$	$\pm 0.25$ [0.01%]	$\pm 0.06 [0.06\%]$	$\pm 0.02 [0.00\%]$	$\pm 0.00 [0.01\%]$
alpha_JET_EffectiveNP_Detector2	±0.02 [0.00%]	$\pm 0.02 [0.00\%]$	$\pm 0.13$ [0.01%]	$\pm 0.05 [0.01\%]$	$\pm 0.08 [0.00\%]$	$\pm 0.01 [0.01\%]$	$\pm 0.11$ [0.01%]	$\pm 0.00 [0.00\%]$
alpha_FT_EFF_extrapolation	±0.01 [0.00%]	$\pm 0.01$ [0.00%]	$\pm 0.02 [0.00\%]$	$\pm 0.01$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.01$ [0.00%]	$\pm 0.00 [0.00\%]$
alpha_MUON_EFF_RECO_SYS_LOWPT	±0.01 [0.00%]	$\pm 0.52 [0.01\%]$	$\pm 0.27 [0.03\%]$	$\pm 0.16$ [0.02%]	$\pm 0.07$ [0.00%]	$\pm 0.02 [0.02\%]$	$\pm 0.05 [0.01\%]$	$\pm 0.00 [0.02\%]$
alpha,MUON,EFF,TTVA,SYS	±0.01 [0.00%]	$\pm 0.48$ [0.01%]	$\pm 0.01$ [0.00%]	$\pm 0.13$ [0.02%]	$\pm 0.22 [0.01\%]$	$\pm 0.01 [0.01\%]$	$\pm 0.11$ [0.01%]	$\pm 0.00 [0.02\%]$
alpha,MUON,EFF,TTVA,STAT	±0.00 [0.00%]	±0.66 [0.01%]	±0.15 [0.02%]	±0.19 [0.03%]	±0.17 [0.01%]	±0.00 [0.00%]	±0.07 [0.01%]	±0.00 [0.00%]
aparatoon, sagar na anas	±0.00 [0.00%]	10.00 [0.00%]	±0.00 [0.000]	20.00 [0.00%]	10.01 [0.00%]	±0.00 [0.00%]	10.10 [0.00%]	20.00 [0.00%]
alpha JET PunchThrough MC16	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.00%]	+0.03 [0.00%]	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.00%]
alpha MUON EFF RECO STAT LOWPT	+0.00 [0.00%]	+0.30 [0.01%]	+0.18 [0.02%]	+0.10 [0.02%]	+0.02 [0.00%]	+0.01 [0.01%]	+0.01 [0.00%]	+0.00 [0.01%]
alpha MUON SAGITTA RHO	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_Resummation_Zjets	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]
alpha Renormalization Zjets	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 0.00%	±0.00 [0.00%]
alpha_CKKW_Zjets	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 0.00%	±0.00 [0.00%]
alpha Factorization Zjets	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$
atpna_JET_EtaIntercalibration_highE	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.01$ [0.05%]
alpha_EL_EFF_Triggereff	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_EL_EFF_Charge	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
aspana, dd., EFF, 1118897 common stat SP DE01.845.85 sats h'- 0	20.00 [0.00%]	AND DESCRIPTION OF A DESCRIPTION OF	THE OWNER AND ADDRESS.	and a second little difference	±0.00 [0.000/1	many server 1878 CONTROLS	2000 [0.00%]	±0.00 [0.00%]
namma and 2D J/193 040 20 CHS DBJ	+0.00 (0.00%)	±0.00 [0.00%]	+0.00 (0.00%)	+0.00 [0.00%]	±0.00 [0.00%]	+0.00[0.00%]	the second se	10.00 10.0001
mamma stat SP DE01 \$225 825 outs https://	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_8325_835_cuts_bin_0 gamma_stat_SR_DF0J_8175_82_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.000] ±0.00 [0.000] ±0.00 [0.000]	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]
gamma_stat_SR_DF0J_8325_835_cuts_bin_0 gamma_stat_SR_DF0J_8175_82_cuts_bin_0 gamma_stat_SR_SF0J_79_795_cuts_bin_0	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]
gamma_stat_SR_DF0J_8325_835_cuts_bin_0 gamma_stat_SR_DF0J_8175_82_cuts_bin_0 gamma_stat_SR_SF0J_79.595_cuts_bin_0 gamma_stat_SR_DF0J_8375_84_cuts_bin_0	$\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$ $\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]
gamma.stat.SR.DF0J.8325.835.cuts.bin.0 gamma.stat.SR.DF0J.8175.82.cuts.bin.0 gamma.stat.SR.SF0J.79.795.cuts.bin.0 gamma.stat.SR.DF0J.8375.84.cuts.bin.0 gamma.stat.SR.SF0J.795.80.cuts.bin.0	$\pm 0.00 \ [0.00\%]$ $\pm 0.00 \ [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 \ [0.00\%]$ $\pm 0.00 \ [0.00\%]$	$\pm 0.00 \ [0.00\%]$ $\pm 0.00 \ [0.00\%]$	$\pm 0.00 \ [0.00\%]$ $\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$ $\pm 0.00 \ [0.00\%]$
gamma, stat. SR. DF0.J. 8325,835, euts, bin. 0 gamma, stat. SR. DF0.J. 8175, 822, euts, bin. 0 gamma, stat. SR. SF0.7,97,954, euts, bin. 0 gamma, stat. SR. SF0.7,97,954, euts, bin. 0 gamma, stat. SR. SF0.707,864, euts, bin. 0 gamma, stat. CR. Top, euts, bin. 0	$\pm 0.00 \ [0.00\%]$ $\pm 0.00 \ [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±17.09 [0.38%]	$\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%]	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 \ [0.00\%]$ $\pm 0.00 \ [0.00\%]$	$\pm 0.00 \ [0.00\%]$ $\pm 0.00 \ [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00   0.00\%  $ $\pm 0.00   0.00\%  $
gamma_stat_SR_DF01_S825_S83_setts_bin_0 gamma_stat_SR_DF01_S875_S82_setts_bin_0 gamma_stat_SR_SF01_79, 795_setts_bin_0 gamma_stat_SR_DF01_S875_S4_setts_bin_0 gamma_stat_SR_SF01_776_setts_bin_0 gamma_stat_SR_SF01_776_setts_bin_0 gamma_stat_SR_SF01_77, 757_setts_bin_0	$\pm 0.00 \ [0.00\%]$ $\pm 0.00 \ [0.00\%]$	$\begin{array}{c} \pm 0.00 \  0.00\%  \\ \pm 17.09 \  0.38\%  \\ \pm 0.00 \  0.00\%  \end{array}$	$\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%]	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$
gamma, stat., SR, DPD ASSES, SSE, setts, Man, O gamma, stat., SR, DPD ASSES, SSE, setts, Man, O gamma, stat., SR, SP0 DASSES, SSE, SSE, Man, O gamma, stat., SR, SP0 DASSES, SSE, Astentis John gamma, stat., SR, SP0 DASSES, SSE, Man, O gamma, stat., SR, SP0 DASSES, SSE, Man, O gamma, stat., SR, SP0 DASSES, SSE, Man, O gamma, stat., SR, SF0 DASSES, SSE, Man, O gamma, stat., SR, SF0 DASSES, SSE, Man, O gamma, stat., SR, SF0 DASSES, SSE, SSE, SSE, SSE, SSE, SSE, SSE	$\pm 0.00$ [0.00%] $\pm 0.00$ [0.00%]	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 17.09 & [0.38\%] \\ \pm 10.00 & [0.00\%] \\ \pm 10.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\pm 0.00 \  0.00\% $ $\pm 0.00 \  0.00\% $	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$
gamma, stat. SR. DP0J. S205, 263, 243, 246, 246, 0 gamma, stat. SR. DP0J. S175, 527, 247, 248, 249, 0 gamma, stat. SR. SP0J. 729, 729, 2416, 246, 0 gamma, stat. SR. SP0J. 729, 729, 2416, 246, 0 gamma, stat. SR. SP0J. 729, 729, 729, 729, 729, 729, 729, 729,	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 \left[ 0.00\% \right] \\ \pm 17.00 \left[ 0.00\% \right] \\ \pm 0.00 \left[ 0.00\% \right] \\ \pm 0.00 \left[ 0.00\% \right] \\ \pm 0.00 \left[ 0.00\% \right] \end{array}$	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ (0.00\%) \\ \pm 0.00 \\ 0.00\% \\ \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.10\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$
yamma zitai SR.DPU J.2325,245 zerits, Jin J. gamma zitai SR.DPU J.3752,425 zerits, Jin J. gamma zitai SR.SPU J.7755 zerits Jin J. gamma zitai SR.SPU J.7555 zerits Jin J.	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 \left[ 0.00\% \right] \\ \pm 0.00 \left[ 0.00\% \right] \end{array}$	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%] ±0.00 [0.00%]	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \end{array}$	$\begin{array}{c} \pm 0.00 \left[ 0.00\% \right] \\ \pm 0.00 \left[ 0.00\% \right] \end{array}$	$\begin{array}{c} \pm 0.00 \left[ 0.00\% \right] \\ \pm 0.00 \left[ 0.00\% \right] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$
$\begin{array}{l} p_{0}mm_{2}atta (SU,DFU)(SUS)(SS,cuts,lab,d)\\ p_{0}mm_{2}atta (SU,PU)(ST)(SS,cuts,lab,d)\\ p_{0}mm_{2}atta (SU,PU)(ST)(SS,cuts,lab,d)\\ p_{0}mm_{2}atta (SU,PU)(ST)(SS,cuts,lab,d)\\ p_{0}mm_{2}atta (SU,PU)(ST)(SS,cuts,lab,d)\\ p_{0}mm_{2}atta (SU,PU)(ST)(SS,cuts,lab,d)\\ alph_{2}MUON(SFF,Fitz)(SS,UT)(cuts,lab,d)\\ p_{0}mm_{2}atta (SU,PU)(SS,SS)(T)(cuts,lab,d)\\ p_{0}mm_{2}mt(SU,PU)(SS,SS)(T)(cuts,lab,d)\\ p_{0}mt(SU,PU)(SS,SS)(T)(cuts,lab,d)\\ p_{0}mt(SU,PU)(SS,SS)(T)(cuts,lab,d)\\ p_{0}mt(SU,PU)(SS,SS)(T)(cuts,lab,d)\\ p_{0}mt(SU,PU)(SS,SS)(T)(cuts,lab,d)\\ p_{0}mt(SU,PU)(SS,SS)(T)(cuts,lab,d)\\ p_{0}mt(SU,PU)(SS,SS)(T)(cuts,lab,d)\\ p_{0}mt(SU,PU)(SS,SS)(T)(cuts,lab,d)\\ p_{0}mt(SU,PU)(SS,SS)(T)(cuts,lab,d)\\ p_{0}$	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ \pm 0.00 \\ 0.00\% \\ \end{array}$	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ (0.00\%) \\ \pm 17.00 \\ (0.00\%) \\ \pm 17.00 \\ (0.00\%) \\ \pm 0.00 \\ (0.00$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ 0.0076 \\ \pm 0.000 \\ 0.0000 \\ \pm 0.000$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \end{array}$	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ (0.00\%] \\ \pm 0.00 \\ (0.00\%] \\ \pm 0.00 \\ (0.00\%] \\ \pm 0.00 \\ 0.00\%] \\ \pm 0.00 \\ (0.00\%] \\ \pm 0.00 \\ (0.00\%) \\ \end{array}$	$\begin{array}{c} \pm 0.00 \left[ 0.00\% \right] \\ \pm 0.00 \left[ 0.00\% \right] \end{array}$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00 & [0.00\%] \end{array}$
$\begin{array}{llllllllllllllllllllllllllllllllllll$	$\begin{array}{c} 0.000\% \\ \pm 0.000 \\ 0.000\% \\ \pm $	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ (0.00\%] \\ \pm 0.00 \\ (0.00\%) \\ \end{array}$	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ \pm 0.00 \\ 0.00\% \\ \end{array}$	$\begin{array}{c} 0.000 \\ 0.0007$	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \end{array}$	$\begin{array}{c} \pm 0.00 \ [0.007] \\ \pm 0.00$	$\begin{array}{c} \pm 0.00 \left[ 0.00\% \right] \\ \pm 0.00 \left[ 0.00\% \right] \end{array}$	$\begin{array}{c} \pm 0.00 \ [0.00\%] \\ \pm 0.00 \ [0.00\%] \end{array}$
pamma tati SRI, DPUJ SESS SKS, ents Jain, J gamma tati SRI, SPUJ JY, SKS, ents Jain, J gamma tati SRI, SPUJ JY, SKS, ents Jain, J gamma tati SRI, SPUJ SKS, SKS, ents Jain, J gamma tati SRI, SPUJ SKS, SKS, ents Jain, J gamma tati SRI, SPUJ SKS, SKS, ents Jain, J alpha, MUON, JEFF, Tig SKM, Smith, Jain, J gamma tati, SRI, Phys. J SKS, SKS, ents Jain, J gamma tati, SRI, Phys. J SKS, SKS, ents Jain, J gamma tati, SRI, Phys. J SKS, SKS, ents Jain, J gamma tati, SRI, Phys. J SKS, SKS, ents Jain, J gamma tati, SRI, Phys. J SKS, SKS, ents Jain, J	$\begin{array}{c} \pm 0.00 & 0.00\% \\ \pm 0.00 & 0.00\% \\$	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ (0.00\%) \\ \pm 0.00 \\ (0.00\%)$	$\begin{array}{c} \pm 0.00 \\ 0.00\% \\ \pm 0.00\% \\ \pm 0.00 \\ 0.00\% \\ \pm 0.$	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ 0.007[1] \\ \pm 0.000 \\ 0.007[1] \\ \pm 0.000 \\ 0.007[1] \\ \pm 0.000 $	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00$	$\begin{array}{c} \pm 0.00 \ [0.007] \\ \pm 0.00$	$\begin{array}{c} \pm 0.00 \\ \pm 0.00\% \\ \pm 0.00 \\ 0.00\% \\ \pm 0.00\% \\$	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ 0.00\% \\ \pm 0.00\% \\ \pm 0.00 \\ 0.00\% \\ \pm 0.$
panma, et al. SELPUA (2025), SEL2, strain, Jaino gamma, et al. SELPUA (2025), SEL2, strain, Jaino alpha, MUON (2027), Trilig Stal User et aliny gamma, et al. SELPUA (2025), SEL2, strain, Jaino gamma, et al. NULL, SEL2, SEL2, strain, strain, SEL2, strain, strain, SEL2, SEL2, strain, stra	$\begin{array}{c} \pm 0.00 \\ \pm 0.005 \\ \pm 0.00 \\ \pm 0.$	±0.00 (0.09%) ±0.00 (0.09%)	0.000 0.00% 0.0	±0.00 (0.00)     ±0.00 (0.0)     ±0.00 (0.0)     ±0.00 (0.0)     ±0.00 (0.0)     ±0.0	±0.00         [0.000]           ±0.00         [0.005]	(2000) (2	$\begin{array}{c} \pm 0.00 \left[ 0.00\% \right] \\ \pm $	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 1.34 & [7.7\%] \end{array}$
pinnaista S.R.DPUA2525/SE2, and also pinnaista S.R.DPUA2525/SE2, and also pinnaista S.R.SPUA7572, and also pinnaista S.R.SPUA7572, and also pinnaista S.R.SPUA7572, and also pinnaista S.R.SPUA7572, and also pinnaista S.R.DPUA7572, and also pinnaista S.R.DPUA555, and also pinnaista S.R.DPUA555, pinnaista pinnaista S.R.DPUA5755, pinnaista pi	+0.000 [0.00%] +0.000 [0.00%]	±0.00 (0.00%) ±0.00 (0.00%)	100.00         [0.00.0]           0.000         [0.00%]	10.00 [0.007] 10.00	+0.00 [0.0075] +0.00 [0.0075] +0.00 [0.0075] +0.00 [0.0076] +0.00 [0.0076] +0.00 [0.0076] +0.00 [0.0076] +0.00 [0.0076] +0.00 [0.0076] +0.00 [0.0076] +0.00 [0.0076] +0.00 [0.0075] +0.00 [0.0075]	±0.000 [0.0076] ±0.000 [0.0076]	$\begin{array}{c} 0.000 & [0.000] \\ 0.000 & 0.0000 \\ 0.000 $	$\begin{array}{c} \pm 0.00 & [0.00\%] \\ \pm 0.00$
pmma, at. 211, DFU, 2525, 252, 2014, 2015, 2017, 2014,	+0.000 [0.00%] +0.000 [0.00%]	±0.00 (0.00%) ±0.00 (0.00%) ±0.00 (0.00%) ±0.00 (0.00%) ±0.00 (0.00%) ±0.00 (0.00%) ±177.00 (0.00%) ±177.00 (0.00%) ±0.00 (0.00%)	1900.01         00.00           0.000         00.00% <td>1.000 [0.007] 1.000 [0.007] 1.000</td> <td>+0.00 [0.0075] +0.00 [0.0076] +0.00 [0.0076]</td> <td>±0.000 [0.0076]     ±</td> <td>#0.00 0.00% #0.00 0.00%</td> <td><math display="block">\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ 0.00\% \\ \pm 0.00\% \\ \pm 0.00 \\ 0.00\% \\ \pm 0.00\% </math></td>	1.000 [0.007] 1.000	+0.00 [0.0075] +0.00 [0.0076] +0.00 [0.0076]	±0.000 [0.0076]     ±	#0.00 0.00% #0.00 0.00%	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ 0.00\% \\ \pm 0.00\% \\ \pm 0.00 \\ 0.00\% \\ \pm 0.00\% $
pmmm_att. 2011; DFU3.2525; JASS, 2014; Jabob Simmark et al. 2011; DFU3.2525; JASS, 2014; Jabob Simmark et al. 2011; DFU3.2517; JAS and JAB pmmm_atk. 2011; DFU3.2517; JAS and JAB pmm_atk. 2011; DFU3.2	+0.000 [0.00%] +0.000 [0.00%]	±0.00 (0.00%) ±0.00 (0.00%)	1900.0         [0.00.1]           0.000         0.0076	1.000 [0.007] 1.000	+0.00 [0.0076] +0.00 [0.0076] +0.000	±0.00 [0.00/6]     ±0.00 [	±0.00         [0.007]           ±0.00         [0.007]	$\begin{array}{c} 0.000 \\ 0.0007$
memoria da SEL 2011, SEL SATE, serio dun di memoria da SEL 2011, SEL SATE, serio dun di memoria da SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 2011, SEL 201	+0.00 [0.00%] +0.00 [0.00%]	±0.00         [1,00%]           ±0.00         [0,00%]	1900.0         [0.00.1           0.000         0.00%		+0.00 [0.0075] +0.00 [0.0076] +0.00 [0.0076]	±0.000 [0.0076]     ±	#0.00 0.00% #0.00 0.00%	$\begin{array}{c} \pm 0.00 \\ \pm 0.00 \\ 0.007 \\ \pm 0.000 \\ 0.000 \\ $
mumataki SH21971,2475,875,mrshanji jemmataki SH21971,247,243,354 jemmataki SH21971,247,243,354 jemmataki SH21971,247,243,354 jemmataki SH21971,2477,144 jemmataki SH21971,2477,144 jemmataki SH21971,277,144 jemmataki SH21971,277,144 jemmataki SH21971,277,144 jemmataki SH21971,277,144 jemmataki SH21971,277,144 jemmataki SH21971,277,278,278,278,278 jemmataki SH21971,277,278,278,278,278,278 jemmataki SH21971,277,278,278,278,278,278 jemmataki SH21971,277,278,278,278,278,278 jemmataki SH21971,277,278,278,278,278,278,278 jemmataki SH21971,277,278,278,278,278,278,278,278,278,278	+0.000 [0.00%] +0.000 [0.00%] +0.0000[0.00%] +0.000	= ±0.00 (LMON) ±0.00 (LMON) ±0.00 (LMON) ±0.00 (LMON) ±0.00 (LMON) ±0.00 (LMON) ±1.17.00 (LMON) ±1.17.00 (LMON) ±1.00 (LMON) ±0.00 (L	1900.00         [0.00.0]           0.000         [0.00.0]	- ±0.00 [0.0071] ±0.00 [0.0071]	+0.00 [0.0075] +0.00 [0.0075]	±0.000 [0.0076]     ±	±0.00         [0.007]           ±0.00         [0.007]	±0.00         0.007           ±0.00         0.007
monical as SUCTIVA SUCS NR constrainty of monical as SUCTIVA SUCS NR constrainty of the SUCS NR sucs and successful as the successful as successful as the successful as the monical as SUCS NR successful as the monical as SUCS NR successful as the successful as the successful as the successful as the successful as the successful as the successful as the monical as SUCS NR successful as the successful as the successful as the successful as the successful as the successful as	+0.00 [0.00%] +0.00 [0.00%]	= ±0.00 (0.00%) ±0.00 (0.00%) ±0.00 (0.00%) ±0.00 (0.00%) ±0.00 (0.00%) ±1.00 (0.00%) ±1.170 (0.00%) ±1.170 (0.00%) ±0.00 (0.00%) ±0	1900.00         00.001           1000.00         00.001           0000         00.001		+0.00 [0.007] ±0.00 [0.007]	±0.000 [0.00%]     ±0.000	±1000         0.000%           ±0000         0.000%	$\begin{array}{c} \pm 0.00 & 0.007 \\ \pm 0.00 & 0.007 \\$
memoria de SECTION (2015) Alte construite a memoria de SECTION (2015) Alte construite a memoria de SECTION (2017) Alte construite a memoria de SECTION (20	+0.00 [0.00%] +0.00	1 + 1000 (0.00%) + 0.000 (0.00%) + 0.0	1900.00         00.00:           1900.00         00.00:           1000.00         000:		+0.00 [0.007] +0.00	Electric and a second grand gra	±1000         0.0076[           ±0000         0.0076[	+0.00 0.007 +0.00 0.007 +0.0000 +0.00000 +0.0000 +0.
municata SELUPID, 2023, SNL products and semicata SELUPID, 2023, SNL products and semicata SELUPID, 2024, SNL products and sNL products and sNL products and sNL	+0.00         0.0076           +0.00         0.0076	10.00 (0.007) 10.00	±0.00         0.0075           ±0.00         0.0076		10.00 [0.007]; 10.00 [0.007]; 11.00 [0.007];	1.000 [0.007] 1.000	1900.00         1000.00           1000.00         00.00%           00000         00.00%	+0.00 0.0075 +0.00 0.0075 +0.00000000000000000000000000000000000
memora das SEGUEDA (2015), Alto constanta ( presentar das SEGUEDA (2015), Alto constanta (2015), Alto Carlos (2015), Alto Carlos (2015), alto Carlos (2015), alto C	+0.00         0.0074           +0.00         0.0074	14.00 (0.007) 14.00	±0.00         0.0075           ±0.00         0.0076		0.007, 0.	1.000 [0.007] 1.000 [0.07] 1.000 [0.07] 1	1 4.00 [0.007] 1 4.00 [0.077] 1 4.00 [0.077]	$\begin{array}{c} \pm 0.00 & 0.0076\\ \pm 0.000 & 0.0000\\ \pm 0.000 & 0.000\\ \pm 0.000 & 0.000\\ \pm 0.000 & 0.000\\ \pm 0.000 & 0.000\\ \pm 0$
memoda ta SE (2014). A SE (2014) and a second and generated as SE (2014). A SE (2014) and a S	10.00 [0.05]] 10.00 [0.05]] 10.00 [0.05] 10.	14.000 (0.007) 14.000 (0.007)	- 10.00 [0.075] + 0.00 [0.075	±0.00 (0.007)     ±0.00 (	$\begin{array}{c} 160.00 \\ 0.0075(\\ 0.0076(\\ 0.007$	1.000 [0.007] 1.000 [0.07] 1.000 [0.07] 1	1.1.0.0 [0.007] 1.0.00 [0.077] 1.0.00 [0.077	$\begin{array}{c} \pm 0.00 & 0.0076\\ \pm 0.00 & 0.0076\\$
memora das RELETIVA JUST, SAR Joneshang memora das RELETIVA JUST, Justi Justi Reletational das Autores and Autores and memoral das RELETIVA JUST das Justi Justi Reletation and antibal das Reletations and memoral das RELETIVA JUST das Justi Justi Reletation and antibal das Reletations and memoral das RELETIVA JUST das Justi Justi Reletation and antibal das Reletations and memoral das RELETIVA JUST das Justi Justi Reletation and antibal das Reletations and memoral das RELETIVA JUST das Justi Justi Reletation and antibal das Reletations and memoral das RELETIVA JUST das Justi Justi Reletation and Reletation and Reletation and memoral das RELETIVA JUST das Justi Justi Reletation and Reletation and Reletation and memoral das RELETIVA JUST das Justi Justi Justi Reletation and Reletation and Reletation and memoral das RELETIVA JUST das Justi Justi Justi Reletation and Reletation and Reletation and memoral das RELETIVA JUST das Justi Justi Justi Justi Justi Reletation and Reletation and Reletation and memoral das RELETIVA JUST das Justi Justi Justi Justi Ju	10.00 [0.007] 10.00	14.000 (10.007) 14.000	±0.00         0.0075           ±0.00         0.0076 <td>Example 1.000 (2007)     Example 1.000 (2</td> <td>0.000 0.0007</td> <td>14000 (0007) 14000 (0007) 14</td> <td>1.10.0 (0.007) 1.000 (0.07) 1.000 (0.07)</td> <td><math display="block">\begin{array}{c} \pm 0.00 &amp; 0.0076\\ \pm 0.000 &amp; 0.000 &amp; 0.0076\\ \pm 0.000 &amp; 0.000 &amp; 0.000\\ \pm 0.000 &amp; 0.000 &amp; 0.000\\ \pm 0.000 &amp; 0.000\\ \pm 0.000 &amp; 0.00</math></td>	Example 1.000 (2007)     Example 1.000 (2	0.000 0.0007	14000 (0007) 14000 (0007) 14	1.10.0 (0.007) 1.000 (0.07) 1.000 (0.07)	$\begin{array}{c} \pm 0.00 & 0.0076\\ \pm 0.000 & 0.000 & 0.0076\\ \pm 0.000 & 0.000 & 0.000\\ \pm 0.000 & 0.000 & 0.000\\ \pm 0.000 & 0.000\\ \pm 0.000 & 0.00$
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memoda SEL (2014). SEL SATE, sociality of memoda SEL (2014). SEL SATE, sociality of memoda SEL 2014. SEL SATE, sociality of memoda SEL SATE, sociality of sociality of memoda sociality of memoda SEL SATE, sociality of shade LEUT NEW Second Second shade LEUT NEW Second Second sociality of memoda SEL SATE, sociality of shade LEUT NEW Second Second shade LEUT NEW Second Second second Second Second Second Second second Second Second Second Second second Second Second Second Second second Second Second Second Second Second second Second Second Second S	10.00 Res (1) 10.00	1.000 (0.000) 1.000	- 10.00 [0.007] - 0.00 [0.007] - 0	4.000 (0.007) 4.000 (0.007)	2000 (6)     2000 (6)	14.000 [0.007] 14.000 [0.007]	1.10.0 (0.007) 1.000 (0.077) 1.000	±0.00         0.001           ±0.01         0.001           ±0.00
memoda SELUTIVA 2023, SNL sensibility memoda SELUTIVA 2024, SNL SNL sensibility memoda SELUTIVA 2024, SNL	<ul> <li>Di 200, Si 200, S</li></ul>	10.000 (0.000)	- 10.00 \$ 0.005; - 0.00 \$ 0.005;\\- 0.005;\\- 0.005;\\- 0.005;\\- 0.005;\\- 0.005;\\- 0.005;\\- 0.005;\\- 0.005;\\-	Control (Control (Contro) (Control (Control (Contro) (Control (Contro) (Contro) (Contro)	0.000 (0.000)	14000 (0007) 14000	1.10.0 (0.007) 1.000 (0.07) 1.000 (0.07)	$\begin{array}{c} \pm 0.00 & 0.007[\\ \pm 0.00 & 0.007[\\$
memoda ABL (2017). J 2015; ASL (2016). A secondary of promodal ASL (2017). J 2015; ASL (2016). J J J J J J J J J J J J J J J J J J J	<ul> <li>b) 300, 61, 60, 61, 64, 64, 64, 64, 64, 64, 64, 64, 64, 64</li></ul>	14000 (0) 15000 (0)	- 10.00 \$ 0.005; 10.00 \$ 0.005;\\ 10.00 \$ 0.005;\\ 10.00 \$ 0.	Long bandfig     Long     Long bandfig     Long bandfig     Long bandfig     Long band	10.00         0.000           10.000         0.000	1.4000 (0007) 1.	1.10.0 (0.007) 1.000 (0.07) 1.000 (0.07)	10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           11.14         77.771           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071           10.00         0.0071
memoda SELEPTIVA 2023, SNR sensibility memoda SELEPTIVA 2024, solidari memoda SELEPTIVA 2024, sol	10.00 (0.007) 10.007 (0.007) 10.000 (0.000 (0.000) 10.000 (0.000) 10.0000 (0.000) 10.0000 (0.000) 10.0000 (0.000) 10.00	1.000 (0.000) 1.000		±0.00 (0.007)     ±0.00 (	1.0.00 (0.007) 1.0.007 (0.007) 1.0.00 (0.007) 1.0.00 (0.007) 1.0.007 (0.007) 1.0.007 (0.007) 1.0.00 (0.0	1.000 (0007) 1.000 (0007) 1.	1.10.0 0.0071 1.000 0.0071 1	iii.00         0.0071           iii.00
mema ata SEUTU JATA Marana hang mema ata SEUTU JATA Ana Jahan Jamma ata SEUTU JATA Ana Jahan Jata Jata Jata Jata Jata Jata Jata Jata	0.000 (0.000)	BANDER (0)     B		Control (Control (Contro) (Control (Contro) (Control (Contro) (Contro) (Contro) (Contro)	0.1000 (0.1000) 0.1000	Lood (0.007)     L	$\begin{array}{c} 1.0.0 & 0.007 \\ 1.0.0 &$	1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1000         0.001           1100         0.001           1100         0.001           1100         0.001           1100         0.001           1100         0.001           1100         0.001           1100         0.001           1100         0.001           1100         0.001           11000         0.001           11000         0.001           11000         0.001           11000         0.001           11000         0.001           11000         0.001

Table 9: Breakdown of the dominant systematic uncertainties on hardgeound estimates in the various signal regions. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The preventages above the size of the uncertainty relative to the total expected background.

ncertainty of channel	SR_DF0J_81_8125	SR_DF0J_8125_815	SR_DF0J_815_8175	SR_DF0J_8175_82	SR_DF0J_82_8225	SR_DF0J_8225_825	SR_DF0J_825_8275	SR_DF0J_8275_83
tal background expectation	26.18	32.02	22.09	23.60	30.61	20.03	23.92	22.84
tal statistical $(\sqrt{N_{exc}})$	±5.12	±5.66	$\pm 4.70$	$\pm 4.86$	±5.53	$\pm 4.48$	±4.89	$\pm 4.78$
tal background systematic	$\pm 3.96$ [15.13%]	$\pm 9.42$ [29.43%]	±7.67 [34.73%]	$\pm 5.91$ [25.06%]	$\pm 5.70$ [18.61%]	$\pm 5.05$ [25.21%]	$\pm 4.76$ [19.91%]	$\pm 4.86$ [21.30%]
ha,MET_SoftTrk_ResoPerp	$\pm 1.93$ [7.4%]	$\pm 3.64$ [11.4%]	$\pm 0.20$ [0.91%]	$\pm 0.38 [1.6\%]$	$\pm 1.08$ [3.5%]	$\pm 1.69$ [8.4%]	$\pm 1.64$ [6.8%]	$\pm 0.73$ [3.2%]
mma_stat_SR_DF00_81.8125_ruts_bm20 sha_JET_Flavor_Composition	$\pm 1.56$ [5.9%] $\pm 1.16$ [4.4%]	$\pm 0.00 [0.00\%]$ $\pm 1.21 [3.8\%]$	$\pm 0.64$ [2.9%]	$\pm 0.00$ [0.00%] $\pm 1.62$ [6.9%]	$\pm 0.00 [0.00\%]$ $\pm 1.17 [3.8\%]$	$\pm 0.00 [0.00\%]$ $\pm 1.46 [7.3\%]$	$\pm 0.00 [0.00\%]$ $\pm 1.28 [5.4\%]$	±0.00 [0.00%] ±0.66 [2.9%]
ha_MET_SoftTrk_Scale	$\pm 1.08$ [4.1%]	$\pm 0.02 \ [0.05\%]$	$\pm 2.37$ [10.7%]	$\pm 0.63$ [2.7%]	$\pm 0.96$ [3.1%]	$\pm 2.09$ [10.5%]	$\pm 1.03$ [4.3%]	$\pm 2.58$ [11.3%]
sha_JE I_Pileup_RhoTopology sha_DS_Singletop	$\pm 1.06$ [4.1%] $\pm 0.91$ [3.5%]	$\pm 0.57 [1.8%]$ $\pm 1.09 [3.4%]$	$\pm 0.23$ [1.1%] $\pm 2.36$ [10.7%]	$\pm 1.13$ [4.8%] $\pm 0.51$ [2.2%]	$\pm 0.94$ [3.1%] $\pm 0.24$ [0.79%]	$\pm 0.51$ [2.6%] $\pm 1.47$ [7.3%]	±0.88 [3.7%] ±0.62 [2.6%]	$\pm 0.17 [0.73%]$ $\pm 0.62 [2.7%]$
sha_JER2	$\pm 0.85$ [3.3%]	$\pm 0.14$ [0.44%]	$\pm 0.57$ [2.6%]	$\pm 0.36$ [1.5%]	$\pm 0.31$ [1.0%]	±0.85 [4.2%]	$\pm 0.05$ [0.22%]	$\pm 0.33$ [1.4%]
sha_Resummation_VV	±0.76 [2.9%] ±0.70 [2.7%]	$\pm 5.62 [17.6\%]$ $\pm 1.04 [2.2\%]$	±2.28 [10.3%] ±4.02 [18.2%]	±2.76 [11.7%]	$\pm 1.23$ [4.0%] $\pm 1.50$ [4.0%]	±1.41 [7.0%] ±1.20 [6.0%]	±1.36 [5.7%] ±0.07 [4.0%]	$\pm 1.58$ [6.9%] $\pm 0.75$ [2.2%]
sha_JER_DataVsMC	±0.62 [2.4%]	±0.33 [1.0%]	±1.16 [5.3%]	±0.13 [0.54%]	±0.08 [0.25%]	$\pm 0.43$ [2.1%]	±0.77 [3.2%]	±0.49 [2.2%]
sha_JET_Flavor_Response	$\pm 0.62$ [2.4%]	$\pm 0.56$ [1.7%]	$\pm 0.01$ [0.03%]	$\pm 0.99$ [4.2%]	±0.83 [2.7%]	±0.39 [2.0%]	$\pm 0.60 [2.5\%]$	$\pm 0.16$ [0.72%]
sha_JER4 sha_IET Pileon OffsetMu	$\pm 0.55$ [2.1%] $\pm 0.54$ [2.0%]	$\pm 0.07 [0.20\%]$ $\pm 0.15 [0.48\%]$	$\pm 0.43$ [1.9%] $\pm 0.23$ [1.0%]	±0.58 [2.5%] +0.55 [2.3%]	$\pm 0.27 [0.88\%]$ $\pm 0.27 [0.89\%]$	±0.77 [3.8%] +0.21 [1.1%]	$\pm 0.57$ [2.4%] $\pm 0.31$ [1.3%]	$\pm 0.64$ [2.8%] $\pm 0.55$ [2.4%]
sha_MUON_ID	$\pm 0.52$ [2.0%]	$\pm 0.35$ [1.1%]	±0.66 [3.0%]	$\pm 1.21$ [5.1%]	±0.88 [2.9%]	±0.78 [3.9%]	$\pm 0.25$ [1.1%]	$\pm 0.13$ [0.59%]
sha_CKKW_VV	$\pm 0.44$ [1.7%] $\pm 0.41$ [1.6%]	±5.33 [16.7%] ±0.08 [0.24%]	±0.22 [0.98%] ±0.22 [1.4%]	±1.90 [8.0%] ±1.00 [4.2%]	$\pm 3.42$ [11.2%] $\pm 0.29$ [0.06%]	±0.18 [0.89%]	$\pm 1.26$ [5.3%] $\pm 0.02$ [0.11%]	$\pm 1.54$ [6.7%] $\pm 0.66$ [2.0%]
ha_JET_EffectiveNP_Modelling1_Mixed1	±0.39 [1.5%]	±0.45 [1.4%]	±0.13 [0.57%]	±0.54 [2.3%]	±0.78 [2.6%]	±0.26 [1.3%]	±0.51 [2.1%]	±0.08 [0.37%]
sha_JER3	$\pm 0.36$ [1.4%]	±0.66 [2.1%]	$\pm 0.26$ [1.2%]	$\pm 0.51$ [2.2%]	$\pm 0.23 [0.76\%]$	$\pm 0.15 \ [0.77\%]$	$\pm 0.44$ [1.8%]	$\pm 0.27 [1.2\%]$
sha_EG_SCALE sha_JER5	$\pm 0.34$ [1.3%] $\pm 0.31$ [1.2%]	$\pm 1.08$ [3.4%] $\pm 0.21$ [0.65%]	$\pm 0.57$ [2.6%] $\pm 0.78$ [3.5%]	±0.55 [2.3%] ±0.06 [0.26%]	$\pm 0.36 [1.2\%]$ $\pm 0.06 [0.19\%]$	$\pm 0.84$ [4.2%] $\pm 0.47$ [2.4%]	$\pm 0.72$ [3.0%] $\pm 0.67$ [2.8%]	$\pm 0.05 [0.20%]$ $\pm 0.23 [1.0%]$
ha,MUON,SCALE	$\pm 0.31$ [1.2%]	$\pm 0.05 [0.17\%]$	$\pm 0.22$ [1.0%]	$\pm 0.30 [1.3\%]$	$\pm 0.25$ [0.82%]	±0.55 [2.8%]	$\pm 0.38$ [1.6%]	$\pm 0.13$ [0.57%]
sha_MET_SoftTrk_ResoPara	±0.30 [1.2%]	±2.03 [6.3%]	±1.81 [8.2%]	±2.46 [10.4%]	±1.05 [3.4%]	±1.25 [6.2%]	±0.79 [3.3%]	±1.23 [5.4%]
sha_FNP_TOTAL_SYS	±0.30 [1.1%] ±0.27 [1.0%]	$\pm 0.35$ [1.0%] $\pm 0.35$ [1.1%]	±0.06 [0.29%]	±0.81 [3.4%] ±0.17 [0.74%]	±0.67 [2.2%]	±0.48 [2.4%]	±0.59 [2.4%]	$\pm 0.39$ [1.7%] $\pm 0.19$ [0.83%]
sha_JER7	$\pm 0.24$ [0.93%]	$\pm 0.29$ [0.91%]	$\pm 0.48$ [2.2%]	$\pm 0.34$ [1.4%]	$\pm 0.14$ [0.47%]	$\pm 0.56$ [2.8%]	$\pm 0.34$ [1.4%]	$\pm 0.59$ [2.6%]
sha_Benormalization_VV	$\pm 0.22 [0.85\%]$ $\pm 0.21 [0.81\%]$	$\pm 0.18$ [0.57%] $\pm 0.19$ [0.60%]	$\pm 0.07$ [0.32%] $\pm 0.15$ [0.66%]	±0.66 [2.8%] ±0.13 [0.56%]	$\pm 0.39$ [1.3%] $\pm 0.37$ [1.2%]	$\pm 0.22$ [1.1%] $\pm 0.09$ [0.47%]	±0.19 [0.79%] ±0.45 [1.9%]	$\pm 0.03 [0.15\%]$ $\pm 0.18 [0.78\%]$
sha_PDF_VV	$\pm 0.20$ [0.75%]	$\pm 0.34$ [1.1%]	$\pm 0.15$ [0.66%]	$\pm 0.23$ [0.96%]	$\pm 0.31$ [1.0%]	$\pm 0.17$ [0.82%]	$\pm 0.20$ [0.82%]	$\pm 0.21$ [0.91%]
sha_FT_EFF_B	±0.18 [0.68%]	±0.16 [0.50%]	±0.19 [0.85%]	±0.20 [0.84%]	±0.15 [0.47%]	±0.13 [0.65%]	±0.12 [0.50%]	$\pm 0.15$ [0.67%]
sha_JER6	±0.17 [0.65%]	±0.62 [1.9%]	±0.35 [1.6%]	$\pm 0.39 [1.6\%]$	±0.20 [0.66%]	±0.50 [2.5%]	±0.34 [1.4%]	$\pm 0.07 [0.32\%]$
ha_JVT	$\pm 0.14$ [0.55%]	$\pm 0.24$ [0.75%]	±0.05 [0.22%]	$\pm 0.24$ [1.00%]	$\pm 0.14$ [0.44%]	$\pm 0.11$ [0.56%]	$\pm 0.20$ [0.83%]	$\pm 0.15$ [0.65%]
sha_Shower_ttbar sha_Radiation_ttbar	±0.14 [0.54%] ±0.14 [0.54%]	$\pm 0.56$ [1.8%] $\pm 0.75$ [2.3%]	$\pm 1.36$ [6.1%] $\pm 3.79$ [17.2%]	$\pm 0.15$ [0.65%] $\pm 0.52$ [2.2%]	$\pm 1.00$ [3.3%] $\pm 1.94$ [6.4%]	$\pm 0.68$ [3.4%] $\pm 0.51$ [2.6%]	±0.14 [0.59%] ±2.04 [8.5%]	$\pm 0.00 [0.00\%]$ $\pm 1.11 [4.8\%]$
ha_MUON_EFF_ISO_STAT	$\pm 0.13$ 0.51%	$\pm 0.14$ [0.43%]	$\pm 0.22$ [1.0%]	±0.01 [0.03%]	$\pm 0.09$ [0.28%]	±0.06 [0.29%]	±0.06 [0.27%]	$\pm 0.15$ [0.66%]
sha_Factorization_tthar sha_IET_EffectiveNP_Modelline? Miss **	±0.13 [0.49%] +0.11 [0.42%]	$\pm 0.14 [0.43\%]$ $\pm 0.04 [0.12\%]$	±0.31 [1.4%] +0.01 [0.0590]	±0.03 [0.12%] +0.03 [0.12%]	$\pm 0.08 [0.26\%]$ $\pm 0.04 [0.12\%]$	±0.16 [0.78%] +0.03 [0.15%]	±0.08 [0.35%] +0.03 [0.12%]	$\pm 0.05 [0.23\%]$ $\pm 0.03 [0.12\%]$
sha_JET_EffectiveNP_Statistical6_Mixed1	±0.10 [0.38%]	±0.04 [0.1236] ±0.00 [0.01%]	±0.03 [0.13%]	±0.05 [0.23%]	±0.04 [0.13%] ±0.07 [0.23%]	±0.00 [0.02%]	±0.02 [0.07%]	$\pm 0.05 [0.129]$ $\pm 0.07 [0.31\%]$
sha_FT_EFF_Light	$\pm 0.10$ [0.37%]	$\pm 0.11$ [0.35%]	$\pm 0.10$ [0.44%]	$\pm 0.09$ [0.36%]	$\pm 0.11$ [0.35%]	$\pm 0.08$ [0.40%]	$\pm 0.10$ [0.41%]	$\pm 0.09$ [0.39%]
ma sha_JET_EtaIntercalibration_nerEt+	±0.08 [0.32%] ±0.08 [0.29%]	$\pm 0.14$ [0.43%] $\pm 0.04$ [0.13%]	±0.00 [0.01%] ±0.04 [0.20%]	$\pm 0.01 [0.03\%]$ $\pm 0.07 [0.30\%]$	$\pm 0.25$ [0.83%] $\pm 0.05$ [0.17%]	±0.05 [0.27%] ±0.05 [0.25%]	±0.07 [0.28%] ±0.05 [0.22%]	$\pm 0.07 [0.29\%]$ $\pm 0.05 [0.21\%]$
sha_JET_EffectiveNP_Mixed1	±0.08 [0.29%]	±0.02 [0.06%]	±0.00 [0.00%]	±0.03 [0.12%]	±0.07 [0.23%]	±0.00 [0.02%]	±0.02 [0.08%]	$\pm 0.07$ [0.32%]
oha.Renormalization.ttbar	$\pm 0.07$ [0.28%]	$\pm 0.12$ [0.37%]	$\pm 0.19$ [0.87%]	$\pm 0.02 \ [0.07\%]$	$\pm 0.04$ [0.12%]	±0.18 [0.89%]	$\pm 0.01$ [0.03%]	$\pm 0.10$ [0.46%]
sha_JET_EffectiveNP_Statistical2_Mixed1 sha_JET_EffectiveNP_Mixed3	±0.05 0.21% ±0.05 0.20%	$\pm 0.00$ [0.01%] $\pm 0.01$ [0.05%]	$\pm 0.10$   $0.45\%$ $\pm 0.04$   $0.19\%$	$\pm 0.08$   0.32% $\pm 0.06$   0.25%	$\pm 0.08$ [0.27%] $\pm 0.09$ [0.30%]	$\pm 0.02$   0.10% $\pm 0.01$   0.04%	$\pm 0.06$   0.24% $\pm 0.01$   0.03%	$\pm 0.14$ [0.62%] $\pm 0.16$ [0.69%]
sha_FT_EFF_C	$\pm 0.04$ [0.17%]	$\pm 0.05 [0.16\%]$	$\pm 0.04$ [0.19%]	$\pm 0.03$ [0.15%]	$\pm 0.05 [0.15\%]$	$\pm 0.03$ [0.17%]	$\pm 0.04$ [0.18%]	$\pm 0.04$ [0.18%]
sha_JET_EffectiveNP_Modelling4_Mixed1 sha_IET_EffectiveNP_Statistical1_Mixed1	±0.04 [0.15%]	$\pm 0.01 [0.02\%]$ $\pm 0.07 [0.08\%]$	±0.03 [0.15%]	$\pm 0.05 [0.21\%]$ $\pm 0.07 [0.14\%]$	±0.05 [0.15%] ±0.07 [0.06%]	±0.00 [0.01%]	±0.01 [0.06%]	$\pm 0.07 [0.30\%]$ $\pm 0.02 [0.14\%]$
sha,Factorization,VV	±0.04 [0.14%]	±0.10 [0.32%]	±0.07 [0.33%]	±0.09 [0.36%]	$\pm 0.10 [0.32\%]$	±0.07 [0.35%]	±0.48 [2.0%]	±0.02 [0.07%]
ha_JET_EffectiveNP_Mixed2	$\pm 0.04$ [0.14%]	$\pm 0.04$ [0.13%]	$\pm 0.04$ [0.20%]	$\pm 0.03$ [0.13%]	$\pm 0.05 [0.15\%]$	±0.00 [0.00%]	$\pm 0.00 [0.01\%]$	$\pm 0.15$ [0.65%]
sha_JET_EffectiveNP_Detector1 sha_MUON_EFF_ISO_SYS	$\pm 0.03$ [0.10%] $\pm 0.03$ [0.10%]	$\pm 0.01 [0.03%]$ $\pm 0.03 [0.09\%]$	$\pm 0.06 [0.25\%]$ $\pm 0.02 [0.07\%]$	$\pm 0.04$ [0.16%] $\pm 0.03$ [0.11%]	$\pm 0.07 [0.21\%]$ $\pm 0.02 [0.06\%]$	$\pm 0.01 [0.06\%]$ $\pm 0.01 [0.04\%]$	$\pm 0.02 [0.09\%]$ $\pm 0.03 [0.11\%]$	$\pm 0.16 [0.71\%]$ $\pm 0.02 [0.08\%]$
ha_JET_EffectiveNP_Modelling2_Mixed1	$\pm 0.02$ [0.08%]	$\pm 0.02$ [0.06%]	$\pm 0.02$ [0.08%]	$\pm 0.02 \ [0.07\%]$	$\pm 0.11$ [0.36%]	$\pm 0.03$ [0.15%]	$\pm 0.01$ [0.05%]	$\pm 0.10$ [0.45%]
sha_JET_EtaIntercalibration_posEta sha_JET_EffectiveNP_Statistical4_Mixed1	±0.01 0.05%	$\pm 0.03$ [0.09%] $\pm 0.02$ [0.07%]	±0.00 0.01% +0.03 0.12%	$\pm 0.14$ [0.58%] $\pm 0.01$ [0.03%]	$\pm 0.08$ [0.25%] $\pm 0.04$ [0.14%]	$\pm 0.09$ [0.44%] $\pm 0.01$ [0.04%]	$\pm 0.03$ [0.11%] $\pm 0.00$ [0.01%]	$\pm 0.02 [0.11\%]$ $\pm 0.02 [0.09\%]$
ha JET EffectiveNP Statistical5 Mixed1	$\pm 0.01$ [0.04%]	$\pm 0.02$ [0.07%]	±0.03 [0.12%]	$\pm 0.01$ [0.05%]	$\pm 0.02 [0.07\%]$	±0.01 [0.04%]	±0.00 [0.01%]	±0.06 [0.26%]
sha_MUON_MS	±0.01 [0.04%]	±0.04 [0.12%]	±0.02 [0.11%]	±0.33 [1.4%]	±0.34 [1.1%]	±0.58 [2.9%]	±0.66 [2.7%]	±0.15 [0.68%]
sha_EL_EFF_ID sha_EL_EFF_Reco	$\pm 0.01$ [0.03%] $\pm 0.01$ [0.03%]	$\pm 0.02 [0.075]$ $\pm 0.00 [0.01\%]$	$\pm 0.02 [0.11\%]$ $\pm 0.01 [0.04\%]$	$\pm 0.06 [0.26\%]$ $\pm 0.01 [0.03\%]$	$\pm 0.04 [0.14\%]$ $\pm 0.01 [0.02\%]$	$\pm 0.01 [0.04\%]$ $\pm 0.00 [0.01\%]$	$\pm 0.03 [0.14\%]$ $\pm 0.01 [0.06\%]$	$\pm 0.08 [0.33\%]$ $\pm 0.01 [0.05\%]$
sha_FT_EFF_extrFromCharm	$\pm 0.01$ [0.02%]	$\pm 0.01$ [0.02%]	±0.00 [0.02%]	$\pm 0.00 \ [0.02\%]$	$\pm 0.01$ [0.02%]	$\pm 0.00$ [0.01%]	$\pm 0.00 [0.02\%]$	$\pm 0.00 \ [0.02\%]$
sha_JET_Pileup_PtTerm	±0.01 [0.02%]	$\pm 0.18$ [0.57%] $\pm 0.01$ [0.02%]	$\pm 0.11 [0.52\%]$ $\pm 0.00 [0.01\%]$	±0.18 [0.78%]	$\pm 0.31 [1.0\%]$ $\pm 0.00 [0.00\%]$	$\pm 0.16 [0.78\%]$ $\pm 0.00 [0.01\%]$	±0.05 [0.21%]	±0.02 [0.08%]
sha.MUON_EFF_RECO_SYS_LOWPT	±0.00 [0.02%]	±0.01 [0.02%]	±0.01 [0.02%]	±0.00 [0.02%]	±0.01 [0.02%]	±0.00 [0.01%]	±0.00 [0.02%]	±0.00 [0.02%]
sha_MUON_EFF_RECO_STAT	±0.00 0.01%	±0.00 [0.01%]	±0.00 0.00%	±0.00 [0.02%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.01%]
sha.EL.EFF.Iso	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.02%]	±0.00 [0.00%]	±0.01 [0.02%]	±0.00 [0.01%] ±0.00 [0.02%]	±0.00 [0.01%]	±0.00 [0.01%] ±0.00 [0.01%]
ha MUON EFF TTVA SYS	$\pm 0.00$ [0.01%]	$\pm 0.00 [0.01\%]$	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00$ [0.01%]	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 [0.00\%]$
1.VV	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.00%] ±0.00 [0.00%]
ha_MUON_EFF_TTVA_STAT	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.01%]
ha_JET_EffectiveNP_Statistical3_Mixed1	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$
sha_JET_EffectiveNP_Detector2 sha_FT_EFF_extranelation	+0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
sha_JET_PunchThrough_MC16	±0.00 0.00%	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	$\pm 0.02$ [0.08%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	$\pm 0.02$ [0.09%]
ma_MUON_SAGITTA_RESBIAS sha_EL_EFF_Triggereff	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
mma_stat_SR_DF0J_845_85_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
mma_stat_SR_DF0J_8325_835_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
mma_stat_SR_DF0_8175_82_cuts_bin_0 mma_stat_SR_SF0J_79_795_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 2.31$ [9.8%] $\pm 0.00$ [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
mma_stat_SR_DF0J_8375_84_cuts_bin_0	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$
mma stat SR SF0J 795 80 cuts bin 0 mma stat CB Ton cuts bin 0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 in 00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]
mma_stat_SR_SF0J_77_775_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
sha_MUON_EFF_TrigStatUncertainty	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
mma_stat_VR_Top_DF0J_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
mma_stat_SR_DF0J_8225_825_cuts_bin_0	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 1.37$ [6.8%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]
mma_stat_SR_DF0J_85_86_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
mma_stat_VR_Top_SF1J_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
mma stat VR Top SF0J cuts bin 0	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$
mma_stat_SR_DF0J_8275_83_cuts_bin_0 mma_stat_SR_DF0J_82_8225_cuts_bin_0	±0.00  0.00% ±0.00  0.00%	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 0.00% ±0.00 0.00%	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 \ [0.00\%]$ $\pm 1.52 \ [5.0\%]$	±0.00  0.00%] ±0.00  0.00%]	±0.00  0.00% ±0.00  0.00%	$\pm 2.21 [9.7\%]$ $\pm 0.00 [0.00\%]$
mma stat SR SF0J 80 81 cuts bin 0	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$
mma_stat_SR_DF0J_84_845_cuts_bin_0 mma_stat_VR_Ton_DF1.L cuts_bin_0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
mma_stat_SR_DF0J_825_8275_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±1.48 [6.2%]	±0.00 [0.00%]
mma_stat_SR_DF0J_8125_815_cuts_bin_0	±0.00 [0.00%]	±1.70 [5.3%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
ma_MUON_SAGITTA_RHO ma_MUON_EFF_TrigSystUncertaietv	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$
sha.EL.EFF Charge	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
sha_Resummation_Zjets sha_Resummation_Ziets	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
mma_stat_CR_Dib_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
sha_EL_EFF_Trigger	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00%]
mma_stat_SR_DF0J_86_cuts_bin_0 mma_stat_VR_Dib_SF0J_cuts_bin_0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]
sha_CKKW_Zjets	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
sha_PILEUP	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
mma_stat_SR_SF0J_785_79_cuts_bin_0 mma_stat_VR_Dib_DF0J_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
mma_stat_SR_SF0J 775.78 cuts_bin_0	±0.00 0.00%	$\pm 0.00 [0.00\%]$	±0.00 0.00%	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 0.00%	$\pm 0.00 [0.00\%]$
ma ractorization Zjets mma stat SR DF01 815 8175 cuts him 0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +1.42 [6.4%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
mma_stat_SR_DF0J_83_8325_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
mma_stat_SR_SF0J_78_785_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
لل Buts, 16, 1915, 19, 2015, 18, 18, 18, 18, 18, 18, 18, 18, 18, 18	20.00 [0.00%]	<b>Ξ0.00</b> [0.00%]	zeron [000.%]	πα.00 [0.00%]	±0.00 [0.00%]	T0.00 [0.00%]	zorno [0700%]	±0.00 [0.00%]

Table 6: Breakdown of the dominant systematic uncertainties on background estimates in the various signal regions. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_DF0J_81_8125	SR,DF0J,8125,815	SR_DF0J_815_8175	SR_DF0J_8175_82	SR,DF0J,82,8225	SR_DF0J_8225_825	SR_DF0J_825_8275	SR_DF0J_8275_83
Total background expectation	31.55	38.54	27.50	28.31	36.40	24.37	29.20	27.80
Total statistical $(\sqrt{N_{exp}})$ Total background systematic	$\pm 5.62$ $\pm 4.81$ [15.24%]	$\pm 6.21$ $\pm 12.49$ [32.41%]	±5.24 ±8.59 [31.25%]	±5.32 ±7.60 [26.84%]	±6.03 ±7.19 [19.76%]	$\pm 4.94$ $\pm 6.01$ [24.67%]	±5.40 ±5.90 [20.19%]	±5.27 ±5.94 [21.38%]
alpha_MET_SoftTrk_ResoPerp	±2.67 [8.5%]	±4.89 [12.7%]	±0.21 [0.76%]	±0.15 [0.52%]	±1.50 [4.1%]	±2.01 [8.3%]	±2.18 [7.5%]	±0.69 [2.5%]
gamma_stat_SR_DF0J_81_8125_cuts_bin_0	$\pm 1.87$ [5.9%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$
alpha_MET_SoftTrk_Scale alpha_IET_Flavor_Composition	$\pm 1.48$ [4.7%] $\pm 1.31$ [4.2%]	±0.08 [0.22%] +1.12 [2.9%]	±2.69 [9.8%] +0.71 [2.6%]	±0.68 [2.4%] +1.97 [6.9%]	$\pm 1.10$ [3.0%] $\pm 1.24$ [3.4%]	$\pm 2.59$ [10.6%] $\pm 1.77$ [7.2%]	$\pm 1.33$ [4.6%] $\pm 1.50$ [5.1%]	$\pm 3.07 [11.1\%]$ $\pm 0.72 [2.6\%]$
alpha_JET_Pileup_RhoTopology	±1.19 [3.8%]	$\pm 0.50$ [1.3%]	$\pm 0.29$ [1.1%]	±1.39 4.9%	$\pm 1.04$ [2.9%]	$\pm 0.52$ [2.2%]	$\pm 1.05$ [3.6%]	$\pm 0.31$ [1.1%]
alpha_Resummation_VV	$\pm 1.05$ [3.3%] $\pm 1.01$ [2.2%]	±7.75 [20.1%] ±1.22 [2.2%]	±3.13 [11.4%]	±3.80 [13.4%]	±1.69 [4.7%] ±1.12 [2.1%]	$\pm 1.94$ [8.0%] $\pm 0.82$ [2.4%]	$\pm 1.88$ [6.4%] $\pm 1.01$ [2.5%]	±2.18 [7.8%] ±0.05 [2.4%]
alpha,DS,Singletop	±0.96 [3.0%]	±1.15 [3.0%]	±2.48 [9.0%]	±0.54 [1.9%]	±0.25 [0.70%]	$\pm 1.55$ [6.3%]	$\pm 0.65$ [2.2%]	±0.65 [2.4%]
alpha_JER2	$\pm 0.83$ [2.6%]	$\pm 0.21$ [0.55%]	$\pm 0.88$ [3.2%]	$\pm 0.53$ [1.9%]	$\pm 0.46$ [1.3%]	$\pm 0.96$ [4.0%]	$\pm 0.09 \ [0.32\%]$	$\pm 0.47$ [1.7%]
alpha,Generator,ttbar alpha MUON ID	±0.74 [2.3%] +0.69 [2.2%]	$\pm 1.09$ [2.8%] $\pm 0.52$ [1.4%]	$\pm 4.23$ [15.4%] $\pm 0.99$ [3.6%]	±0.72 [2.5%] +1.60 [5.7%]	$\pm 1.57$ [4.3%] $\pm 1.23$ [3.4%]	$\pm 1.26$ [5.2%] $\pm 1.00$ [4.1%]	$\pm 1.02$ [3.5%] $\pm 0.45$ [1.5%]	$\pm 0.78$ [2.8%] $\pm 0.19$ [0.68%]
alpha_JER_DataVsMC	±0.68 [2.2%]	$\pm 0.52$ [1.4%]	$\pm 1.38$ [5.0%]	$\pm 0.24$ [0.85%]	$\pm 0.07$ [0.19%]	$\pm 0.51$ [2.1%]	$\pm 1.02$ [3.5%]	$\pm 0.60$ [2.1%]
alpha_JET_Flavor_Response	±0.66 [2.1%]	±0.51 [1.3%]	±0.05 [0.17%]	±1.20 [4.2%]	±0.94 [2.6%]	$\pm 0.41$ [1.7%]	±0.74 [2.5%]	±0.24 [0.88%]
alpha_CKKW_VV	±0.61 1.9%	±7.35 19.1%	±0.30 1.1%	$\pm 2.61$ 9.2%	$\pm 4.72$ [13.0%]	$\pm 0.37$ 2.3% $\pm 0.25$ 1.0%	±1.74 [5.9%]	±2.12 7.6%
alpha JET Pileup OffsetMu	$\pm 0.57$ [1.8%]	$\pm 0.18$ [0.46%]	$\pm 0.29$ [1.0%]	$\pm 0.83$ [2.9%]	$\pm 0.35$ [0.96%]	$\pm 0.22$ [0.92%]	$\pm 0.36$ [1.2%]	$\pm 0.67$ [2.4%]
alpha_JER4 alpha EG RES	$\pm 0.47 [1.5\%]$ +0.47 [1.5%]	±0.06 [0.16%] +0.51 [1.3%]	±0.45 [1.6%] ±0.14 [0.51%]	±0.80 [2.8%] +1.05 [3.7%]	±0.34 [0.93%] ±0.67 [1.8%]	$\pm 0.92$ [3.8%] $\pm 1.26$ [5.2%]	$\pm 0.78$ [2.7%] $\pm 0.42$ [1.4%]	$\pm 0.81$ [2.9%] $\pm 0.49$ [1.8%]
alpha MUON SCALE	$\pm 0.41$ [1.3%]	$\pm 0.04$ [0.10%]	$\pm 0.34$ [1.3%]	$\pm 0.37$ [1.3%]	±0.36 [1.00%]	$\pm 0.68$ [2.8%]	$\pm 0.53$ [1.8%]	$\pm 0.18$ [0.65%]
alpha,EG,SCALE	$\pm 0.41$ [1.3%]	±1.26 [3.3%]	±0.73 [2.6%]	±0.57 [2.0%]	±0.59 [1.6%]	±0.92 [3.8%]	±1.04 [3.6%]	±0.01 [0.03%]
mu_lop	±0.30 [0.96%]	±0.35 [0.91%]	±0.17 [0.86%]	±0.34 [1.2%]	±0.35 [2.6%] ±0.27 [0.75%]	±0.22 [0.91%]	±0.26 [0.88%]	±0.25 [0.90%]
alpha_JER5	$\pm 0.30$ [0.94%]	$\pm 0.22$ [0.58%]	±0.83 [3.0%]	$\pm 0.16$ [0.55%]	$\pm 0.07 \ [0.19\%]$	$\pm 0.58$ [2.4%]	$\pm 0.87$ [3.0%]	$\pm 0.29 \ [1.0\%]$
alpha.Renormalization.VV alpha_IER3	±0.29  0.93% +0.29  0.91%	$\pm 0.26$ [0.69%] $\pm 0.81$ [2.1%]	$\pm 0.20 \ [0.73\%]$ $\pm 0.46 \ [1.7\%]$	±0.18 [0.65%] +0.68 [2.4%]	$\pm 0.51 [1.4\%]$ +0.33 [0.90%]	$\pm 0.13$ [0.53%] $\pm 0.10$ [0.41%]	$\pm 0.62$ [2.1%] $\pm 0.59$ [2.0%]	$\pm 0.24 [0.88\%]$ $\pm 0.33 [1.2\%]$
alpha PDF VV	$\pm 0.27$ [0.86%]	$\pm 0.47$ [1.2%]	$\pm 0.20$ [0.73%]	±0.31 [1.1%]	$\pm 0.43$ [1.2%]	$\pm 0.23$ [0.93%]	$\pm 0.27$ [0.93%]	$\pm 0.29$ [1.0%]
alpha_FNP_TOTAL_SYS	±0.26 [0.82%]	±0.34 [0.88%]	±0.05 [0.23%]	±0.17 [0.59%]	±0.64 [1.8%]	±0.45 [1.9%]	±0.56 [1.9%]	±0.18 [0.65%]
alpha,RenormalizationFactorization.VV	±0.23 [0.78%]	±0.18 [0.47 %] ±0.11 [0.28%]	±0.30 [0.2876]	±0.31 [2.9%]	±0.36 [1.00%]	±0.03 [0.11%]	±0.10 [0.33%]	±0.08 [0.29%] ±0.22 [0.81%]
alpha_MET_SoftTrk_ResoPara	$\pm 0.23$ [0.73%]	$\pm 2.50$ [6.5%]	±2.16 [7.8%]	$\pm 3.51$ [12.4%]	$\pm 1.53$ [4.2%]	$\pm 1.62$ [6.7%]	$\pm 0.95$ [3.2%]	$\pm 1.39$ [5.0%]
apha, FT, EFF, B aloba MUON EFF ISO STAT	±0.19 [0.59%] ±0.18 [0.57%]	±0.17 [0.44%] +0.20 [0.51%]	±0.20 [0.72%] +0.28 [1.0%]	$\pm 0.21 [0.74\%]$ +0.04 [0.14\%]	$\pm 0.15 [0.42\%]$ +0.12 [0.33\%]	±0.14 [0.57%] +0.07 [0.30%]	$\pm 0.13 [0.44\%]$ +0.09 [0.32\%]	$\pm 0.16 [0.58\%]$ +0.20 [0.71%]
alpha_JET_EffectiveNP_Modelling3_Mixed1	±0.16 [0.51%]	±0.03 [0.08%]	±0.01 [0.02%]	±0.02 [0.08%]	±0.06 [0.16%]	±0.04 [0.17%]	±0.04 [0.15%]	±0.03 [0.12%]
alpha_JVT alpha Shower thes	±0.16 0.50%	±0.26 [0.68%]	±0.04 [0.16%]	±0.26 0.92%	±0.16 [0.44%]	$\pm 0.12 [0.49\%]$ $\pm 0.72 [2.0\%]$	±0.22 [0.76%]	±0.17 [0.62%]
alpha_Radiation_ttbar	±0.15 [0.47%]	±0.78 [2.0%]	$\pm 3.98$ [14.5%]	±0.55 [1.9%]	±2.04 [5.6%]	±0.12 [3.0%] ±0.54 [2.2%]	±2.15 [7.4%]	±1.16 [4.2%]
alpha_Factorization_tthar	$\pm 0.14$ [0.43%]	$\pm 0.14$ [0.37%]	$\pm 0.32$ [1.2%]	$\pm 0.03$ [0.10%]	$\pm 0.08$ [0.23%]	$\pm 0.16$ [0.67%]	$\pm 0.09$ [0.30%]	$\pm 0.05 \ [0.20\%]$
alpha_JET_EffectiveNP_Statistical6_Mixed1 alpha_FT_EFF_Light	±0.13 [0.41%] +0.13 [0.41%]	±0.00 [0.01%] +0.15 [0.39%]	$\pm 0.03 [0.11\%]$ $\pm 0.13 [0.49\%]$	$\pm 0.07 [0.23\%]$ $\pm 0.12 [0.41\%]$	$\pm 0.09 [0.25\%]$ $\pm 0.15 [0.40\%]$	$\pm 0.00 [0.02\%]$ $\pm 0.11 [0.44\%]$	$\pm 0.02 [0.08\%]$ $\pm 0.13 [0.46\%]$	$\pm 0.10 [0.35\%]$ +0.12 [0.44%]
alpha_JET_EffectiveNP_Mixed1	±0.11 [0.34%]	±0.02 [0.05%]	±0.00 [0.00%]	±0.04 [0.14%]	±0.09 [0.26%]	±0.01 [0.03%]	±0.02 [0.08%]	±0.10 [0.36%]
alpha_JER7	±0.11 [0.34%]	±0.36 [0.93%]	±0.52 [1.9%]	±0.54 [1.9%]	±0.21 [0.57%]	±0.62 [2.5%]	±0.42 [1.4%]	±0.73 [2.6%]
alpha_JET_EtaIntercalibration_negEta Lumi	+0.08 [0.32%]	±0.04 [0.11%] +0.14 [0.36%]	±0.05 [0.18%] ±0.00 [0.01%]	+0.01 [0.02%]	+0.07 [0.19%]	$\pm 0.07 [0.28%]$ $\pm 0.05 [0.22\%]$	±0.07 [0.25%] ±0.07 [0.23%]	$\pm 0.06 [0.22\%]$ $\pm 0.07 [0.24\%]$
alpha_JER6	$\pm 0.08$ [0.25%]	$\pm 0.77$ [2.0%]	$\pm 0.25$ [0.91%]	±0.56 [2.0%]	$\pm 0.25$ [0.70%]	$\pm 0.62$ [2.5%]	$\pm 0.45$ [1.5%]	$\pm 0.11$ [0.39%]
alpha Renormalization tthar alpha IET EffectiveND Mirrod?	±0.08 [0.24%]	$\pm 0.12 [0.32\%]$ $\pm 0.01 [0.02\%]$	$\pm 0.20$ [0.74%] $\pm 0.04$ [0.15%]	±0.02 [0.06%]	±0.04 [0.11%]	$\pm 0.19 [0.77\%]$ $\pm 0.01 [0.05\%]$	±0.01 [0.02%] ±0.02 [0.06%]	$\pm 0.11 [0.39\%]$ $\pm 0.22 [0.78\%]$
alpha,FT,EFF,C	±0.06 [0.19%]	±0.07 [0.19%]	±0.05 [0.21%]	±0.05 [0.16%]	±0.06 [0.17%]	±0.05 [0.19%]	±0.06 [0.20%]	±0.06 [0.20%]
alpha_JET_EffectiveNP_Modelling4_Mixed1	$\pm 0.06$ [0.18%]	$\pm 0.01$ [0.02%]	$\pm 0.03$ [0.13%]	$\pm 0.06$ [0.22%]	$\pm 0.06$ [0.16%]	$\pm 0.00 [0.00\%]$	$\pm 0.02$ [0.06%]	$\pm 0.09 \ [0.34\%]$
alpha_JET_EffectiveNP_Statistical1_Mixed1 alpha_IET_EffectiveNP_Mixed2	±0.05 [0.17%] ±0.05 [0.17%]	±0.03 [0.07%] +0.04 [0.10%]	$\pm 0.01 [0.05\%]$ $\pm 0.04 [0.15\%]$	±0.04 [0.15%] +0.04 [0.14%]	±0.04 [0.10%] +0.07 [0.20%]	$\pm 0.00 [0.01\%]$ $\pm 0.01 [0.04\%]$	$\pm 0.02 [0.07\%]$ $\pm 0.00 [0.01\%]$	$\pm 0.04 [0.16\%]$ $\pm 0.22 [0.77\%]$
alpha Factorization VV	±0.05 [0.16%]	±0.14 [0.36%]	±0.10 [0.36%]	±0.12 [0.42%]	±0.13 [0.37%]	$\pm 0.10 [0.39\%]$	±0.67 [2.3%]	±0.02 [0.08%]
alpha_JET_Pileup_PtTerm	$\pm 0.05$ [0.16%]	$\pm 0.19$ [0.48%]	$\pm 0.13$ [0.46%]	$\pm 0.20$ [0.70%]	$\pm 0.39$ [1.1%]	$\pm 0.17 [0.68\%]$	$\pm 0.06$ [0.19%]	$\pm 0.01 [0.04\%]$
alpha_JET_EffectiveNP_Statistical2_Mixed1 alpha_JET_EffectiveNP_Modelling2_Mixed1	$\pm 0.04 [0.13\%]$ $\pm 0.04 [0.13\%]$	$\pm 0.01 [0.02\%]$ $\pm 0.01 [0.04\%]$	$\pm 0.10$ [0.35%] $\pm 0.01$ [0.05%]	±0.09 [0.33%] ±0.03 [0.11%]	$\pm 0.11$ [0.29%] $\pm 0.15$ [0.41%]	$\pm 0.01 [0.04\%]$ $\pm 0.04 [0.17\%]$	$\pm 0.07 [0.25\%]$ $\pm 0.01 [0.02\%]$	$\pm 0.20 [0.70\%]$ $\pm 0.15 [0.52\%]$
alpha_JET_EffectiveNP_Detector1	$\pm 0.03$ 0.10%	$\pm 0.00$ 0.01%	±0.06 0.20%	$\pm 0.05$ $[0.17\%]$	$\pm 0.09$ 0.24%	$\pm 0.02$ [0.07%]	$\pm 0.02$ [0.08%]	$\pm 0.22$ [0.80%]
alpha MUON EFF ISO SYS alpha IFT EffortineNP Statisticald Mined)	±0.03 [0.09%]	±0.03 [0.08%] ±0.02 [0.05%]	±0.02 [0.07%] ±0.02 [0.00%]	$\pm 0.03$ [0.11%] $\pm 0.01$ [0.04%]	±0.02 [0.06%]	$\pm 0.01 [0.04\%]$ $\pm 0.01 [0.04\%]$	±0.03 [0.10%] ±0.01 [0.02%]	$\pm 0.02 [0.07\%]$ $\pm 0.02 [0.11\%]$
alpha_JET_EffectiveNP_Statistical5_Mixed1	±0.01 [0.03%]	±0.02 [0.05%]	±0.02 [0.09%]	±0.01 [0.04%]	±0.03 [0.09%]	±0.01 [0.04%]	±0.01 [0.02%]	±0.08 [0.29%]
alpha_EL_EFF_Reco	$\pm 0.01$ [0.03%]	$\pm 0.00 \ [0.01\%]$	$\pm 0.01$ [0.04%]	$\pm 0.01$ [0.02%]	$\pm 0.01$ [0.02%]	$\pm 0.00 \ [0.01\%]$	$\pm 0.02$ [0.06%]	$\pm 0.01$ [0.04%]
alpha, FT, EFF extrFromUnarm alpha, IET, EtaIntercalibration posEta	+0.01 [0.03%]	±0.01 [0.02%] ±0.02 [0.06%]	±0.01 [0.02%] ±0.00 [0.01%]	+0.14 [0.50%]	±0.01 [0.02%] ±0.09 [0.25%]	±0.00 [0.02%] ±0.10 [0.42%]	±0.01 [0.02%] ±0.02 [0.07%]	$\pm 0.01 [0.02\%]$ $\pm 0.03 [0.12\%]$
alpha_EL_EFF_ID	$\pm 0.01$ [0.02%]	$\pm 0.01$ [0.03%]	$\pm 0.04$ [0.14%]	$\pm 0.06$ [0.23%]	$\pm 0.04$ [0.11%]	$\pm 0.01$ [0.06%]	$\pm 0.06$ [0.19%]	$\pm 0.06$ [0.22%]
alpha_MUON_EFF_RECO_SYS_LOWPT	±0.01 [0.02%]	±0.01 [0.02%]	±0.01 [0.02%]	±0.00 [0.02%]	±0.01 [0.02%]	±0.00 [0.01%]	±0.00 [0.02%]	±0.01 [0.02%]
alpha_EL_EFF_lso	±0.00 0.01%	±0.00 0.01%	±0.01 0.02%	±0.00 0.00%	±0.00 0.01%	±0.00 [0.02%]	±0.01 0.02%	±0.00 0.01%
alpha_MUON_EFF_RECO_STAT	$\pm 0.00 [0.01\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.02\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 \ [0.01\%]$
alpha,MUON,EFF,RECO,STAT,LOWPT alpha MUON EFF TTVA SVS	+0.00 [0.01%]	±0.00 [0.01%] ±0.00 [0.00%]	±0.00 [0.01%] ±0.00 [0.00%]	+0.00 [0.01%]	+0.00 [0.01%]	±0.00 [0.01%] ±0.00 [0.01%]	+0.00 [0.01%]	±0.00 [0.01%] ±0.00 [0.00%]
alpha, MUON, EFF, TTVA, STAT	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 \ [0.01\%]$	$\pm 0.00$ [0.01%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.01%]	$\pm 0.00 [0.01\%]$
alpha_JET_EffectiveNP_Statistical3_Mixed1	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.01%]
alpha_MUON_MS	±0.00 [0.00%]	±0.00 [0.00%] ±0.01 [0.02%]	±0.10 [0.39%]	±0.38 [1.3%]	±0.44 [1.2%]	±0.74 [3.0%]	±0.92 [3.2%]	±0.12 [0.42%]
alpha_FT_EFF_extrapolation	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$
alpha_JET_PunchThrough_MC16 alpha_MUON_SAGITTA_RESPIAS	±0.00 0.00% ±0.00 0.00%	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 in 00%]	±0.02 [0.07%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.02 [0.07%] ±0.00 [0.00%]
alpha MUON SAGITTA RHO	±0.00 0.00%	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_JET_EtaIntercalibration_highE	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
apma_r.iEFF_Iriggereff aloba_EL_EFF_Charge	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
alpha, EL, EFF, Trigger	±0.00 0.00%	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_845_85_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_8175.82_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±2.77 [9.8%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_SF0J.79.795_cuts_bin_0	±0.00 0.00%	±0.00 0.00%	±0.00 0.00%	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]
gamma_stat_SR_SF0J_795_80_cuts_bin_0 gamma_stat_SR_SF0J_795_80_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_CR_Top_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_SF0J_77_775_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
apma_stot.OON_EFF_TrigStatUncertainty gamma_stat_SR_DF0J_835_8375_cuts.bin_0	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 00.0%	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
gamma_stat_VR_Top_DF0J_cuts_bin_0	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$
gamma_stat_SR_DF0J_8225.825_cuts_bin_0 ramma_stat_SR_DF01.85.86_cuts_bin_0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	$\pm 1.66$ [6.8%] $\pm 0.00$ [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]
gamma stat_VR_Top_SF1J_cuts_bin_0	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]
gamma stat. VR Top SF0J cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$
gamma_stat_SR_DF0J_8275_83_cuts_bin_0 ramma_stat_SR_DF0J_82_8225_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	+0.00 [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 1.81 [5.0\%]$	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±2.69 [9.7%] ±0.00 [0.00%]
gamma_stat_SR_SF0J_80_81_cuts_bin_0	±0.00 0.00%	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_84_845_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_825_8275_cuts_bir_0	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 00.00%	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±1.81 [6.2%]	±0.00 [0.00%] ±0.00 [0.00%]
gamma_stat_SR_DF0J_8125.815_cuts_bin_0	±0.00 [0.00%]	$\pm 2.04$ [5.3%]	$\pm 0.00$ [0.00%]	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_MUON_EFF_TrigSystUncertainty alpha Recommendian Ziete	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]
alpha Renormalization Zjets	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma stat CR Dib cuts bin 0	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$
gamma_stat_SR_DF0J_86_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_CKKW_Zjets	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_PILEUP	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$
gamma_stat_SR_SF0J_785.79_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_SF0J_775_78_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha Factorization Zjets	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_815_8175_cuts_bin_0 ramma_stat_SR_DF0J_83_8325_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±1.77 [6.4%] ±0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
gamma_stat_SR_SF0J_78_785_cuts_bin_0	±0.00 0.00%	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
pamma_stat_SR_SF0J_81_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]

Post-fit

Table 10: Breakdown of the dominant systematic uncertainties on background estimates in the various signal regions. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel

SR.DF0J.85.86

SR DE01 86

Post-fit

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al background expectation	23.98	18.62	21.54	21.65	24.79	24.68	29.89	20.68
al statistical $(\sqrt{N_{exp}})$	$\pm 4.90$	$\pm 4.32$	$\pm 4.64$	$\pm 4.65$	$\pm 4.98$	$\pm 4.97$	±5.47	$\pm 4.55$
al background systematic	$\pm 8.71$ [36.33%]	±6.96 [37.39%]	$\pm 7.42$ [34.44%]	$\pm 4.57$ [21.11%]	$\pm 6.13$ [24.72%]	$\pm 7.20$ [29.19%]	$\pm 5.58$ [18.67%]	±6.90 [33.359
ha_Resummation_VV	±6.18 [25.8%]	±4.76 [25.6%]	±0.73 [3.4%]	$\pm 0.41$ [1.9%]	±2.37 [9.6%]	$\pm 4.08$ [16.5%]	±0.99 [3.3%]	$\pm 2.67$ [12.9%]
ns, Ar. 1 "Soft Frk, ResoPerp ha. CKKW. VV	±3.31 [13.8%] ±3.10 [12.9%]	$\pm 0.64$ [3.4%] $\pm 2.61$ [14.0%]	$\pm 2.43$ [11.3%] $\pm 3.30$ [15.3%]	$\pm 1.15$ [5.3%] $\pm 3.40$ [15.7%]	±2.48 [10.0%] ±0.12 [0.49%]	$\pm 3.18$ [12.9%] $\pm 1.53$ [6.2%]	$\pm 2.04$ [6.8%] $\pm 2.77$ [9.3%]	±3.42 [16.5%] ±1.16 [5.6%]
ha DS Singletop	$\pm 2.19$ [9.1%]	±2.55 [13.7%]	$\pm 0.32$ [1.5%]	$\pm 0.12$ [0.54%]	$\pm 0.00 [0.00\%]$	$\pm 0.52$ [2.1%]	$\pm 1.76$ [5.9%]	±2.18 [10.59
ha.MET_SoftTrk_ResoPara	±1.74 [7.2%]	±1.87 [10.1%]	±2.14 [9.9%]	±1.18 [5.5%]	±1.31 [5.3%]	±1.77 [7.2%]	±0.98 [3.3%]	±1.89 [9.19
nma.stat.2srt.DF0J.83.8325.cuts.Jan.0 ha.Shower.ttbar	$\pm 1.42$ [5.9%] $\pm 1.33$ [5.6%]	±0.00 [0.00%] ±0.23 [1.3%]	$\pm 0.00 [0.00\%]$ $\pm 0.25 [1.1\%]$	±0.00 [0.00%] ±0.45 [2.1%]	±0.00 [0.00%] ±0.18 [0.72%]	±0.00 [0.00%] ±0.34 [1.4%]	$\pm 0.00 [0.00\%]$ $\pm 1.05 [3.5\%]$	±0.00 [0.00] ±0.46 [2.20]
ha_FNP_TOTAL_SYS	$\pm 1.25$ [5.2%]	$\pm 0.44$ [2.4%]	$\pm 1.20$ [5.5%]	$\pm 0.46$ [2.1%]	$\pm 0.75$ [3.0%]	$\pm 0.59$ [2.4%]	$\pm 0.56$ [1.9%]	±0.32 [1.59
ha_IER5	±0.74 [3.1%]	±0.29 [1.5%]	±1.40 [6.5%]	±0.53 [2.5%]	±0.91 [3.7%]	±0.24 [0.95%]	±0.35 [1.2%]	$\pm 0.91$ [4.49
ha_MET_SoftTrk_Scale	±0.72 [3.0%] ±0.69 [2.9%]	$\pm 0.66$ [3.5%] $\pm 1.40$ [7.5%]	$\pm 1.19$ [0.5%] $\pm 1.67$ [7.8%]	±0.55 [2.5%] ±0.19 [0.88%]	$\pm 0.96$ [3.9%] $\pm 1.91$ [7.7%]	±0.84 [3.4%] ±2.64 [10.7%]	$\pm 0.20 \ [0.66\%]$ $\pm 1.38 \ [4.6\%]$	±1.13 [5.5) ±2.49 [12.0]
ha Radiation ttbar	±0.57 [2.4%]	$\pm 0.25$ [1.3%]	$\pm 0.23$ [1.1%]	±0.63 [2.9%]	$\pm 1.59$ [6.4%]	$\pm 1.46$ [5.9%]	$\pm 1.08$ [3.6%]	$\pm 0.63$ [3.19
ha_JER_DataVsMC	$\pm 0.56$ [2.3%]	$\pm 0.62$ [3.3%]	$\pm 1.97$ [9.2%]	$\pm 0.45$ [2.1%]	$\pm 1.00 [4.0\%]$	$\pm 0.29$ [1.2%]	$\pm 0.34$ [1.1%]	$\pm 0.62$ [3.0]
ha_JER6	±0.52 [2.2%]	±0.30 [1.6%]	$\pm 1.42$ [6.6%]	±0.35 [1.6%]	±1.18 [4.7%]	±0.38 [1.6%]	±0.30 [1.0%]	±0.96 [4.6%
ha_JER7 ha_JET_Flavor_Composition	$\pm 0.51$ [2.1%] $\pm 0.45$ [1.9%]	$\pm 0.60$ [3.2%] $\pm 0.56$ [3.0%]	$\pm 1.74$ [8.1%] $\pm 1.08$ [5.0%]	$\pm 0.51$ [2.4%] $\pm 0.58$ [2.7%]	$\pm 0.92$ [3.7%] $\pm 1.70$ [6.9%]	$\pm 0.72$ [2.9%] $\pm 0.52$ [2.1%]	$\pm 0.61$ [2.0%] $\pm 1.55$ [5.2%]	$\pm 0.87$ [4.27 $\pm 0.66$ [3.2]
ha Generator thar	$\pm 0.44$ [1.8%]	$\pm 0.37$ [2.0%]	$\pm 0.64$ [3.0%]	$\pm 0.49$ [2.3%]	$\pm 0.26$ [1.0%]	$\pm 0.19$ [0.78%]	$\pm 0.15$ [0.50%]	$\pm 0.27$ [1.3)
ha_JET_Flavor_Response	$\pm 0.44$ [1.8%]	$\pm 0.35$ [1.9%]	$\pm 0.51$ [2.3%]	$\pm 0.14$ [0.62%]	$\pm 0.80$ [3.2%]	$\pm 0.41$ [1.7%]	$\pm 0.63$ [2.1%]	$\pm 0.30$ [1.49
ha_JER2	±0.34 [1.4%]	±0.36 [2.0%]	±1.94 [9.0%]	±0.59 [2.7%]	±1.14 [4.6%]	±1.19 [4.8%]	$\pm 0.46$ [1.5%]	±1.12 [5.49
ha_PDF_VV	±0.33 [1.4%] ±0.23 [0.97%]	±0.03 [0.14%]	±0.23 [1.1%]	$\pm 0.40 [2.1\%]$ $\pm 0.10 [0.48\%]$	±0.30 [1.2%]	±0.25 [1.0%]	$\pm 0.38$ [1.3%]	±0.31 [1.59
a JET Pileup RhoTopology	$\pm 0.20$ [0.85%]	$\pm 0.58$ [3.1%]	$\pm 0.64$ [3.0%]	±0.52 [2.4%]	$\pm 1.15$ [4.6%]	$\pm 0.17$ [0.69%]	$\pm 1.21$ [4.1%]	$\pm 0.53$ [2.59]
ha_EG_SCALE	$\pm 0.17$ [0.71%]	$\pm 0.20$ [1.1%]	$\pm 0.68$ [3.2%]	$\pm 0.39$ [1.8%]	$\pm 0.33$ [1.3%]	$\pm 0.17$ [0.70%]	$\pm 0.15$ [0.49%]	$\pm 0.01$ [0.04]
a_MUON_SCALE	+0.17 [0.71%]	±0.28 [1.5%]	±0.18 [0.82%]	+0.42 [2.0%]	±0.07 [0.27%]	±0.32 [1.3%] ±1.12 [4.5%]	$\pm 0.25$ [0.84%] $\pm 0.27$ [1.297]	±0.12 [0.60 ±0.70 [2.89
a Factorization_ttbar	$\pm 0.15$ [0.61%]	±0.07 [0.35%]	±0.13 [0.59%]	±0.10 [0.47%]	±0.06 [0.25%]	±0.05 [0.21%]	±0.19 [0.64%]	±0.03 [0.14]
a_MUON_EFF_ISO_STAT	$\pm 0.14$ [0.59%]	$\pm 0.08$ [0.41%]	$\pm 0.08$ [0.37%]	$\pm 0.09$ [0.39%]	$\pm 0.09$ [0.38%]	$\pm 0.17$ [0.70%]	$\pm 0.19$ [0.65%]	$\pm 0.15$ [0.71]
a_Renormalization_VV	$\pm 0.14$ [0.58%]	$\pm 0.57$ [3.0%]	$\pm 0.04$ [0.21%]	$\pm 0.40 [1.9\%]$	$\pm 0.40 [1.6\%]$	$\pm 0.03$ [0.13%]	$\pm 0.08$ [0.26%]	$\pm 0.76$ [3.79
a.Renormalization.ttbav	±0.14 [0.57%] ±0.14 [0.57%]	$\pm 0.12 [0.66\%]$ $\pm 0.08 [0.45\%]$	±0.16 [0.76%] ±0.01 [0.03%]	±0.09 [0.41%] ±0.10 [0.46%]	±0.21 [0.85%] ±0.00 in n1%]	±0.09 [0.38%] ±0.05 [0.21%]	±0.21 [0.69%] ±0.17 [0.56%]	±0.15 [0.73] ±0.20 in ord
a MUON ID	$\pm 0.14$ [0.57%]	±0.21 [1.1%]	±0.09 [0.42%]	±0.01 [0.03%]	±0.15 [0.59%]	±0.44 [1.8%]	±0.39 [1.3%]	±0.14 [0.68]
in FT EFF Light	$\pm 0.11$ [0.44%]	$\pm 0.08 \ [0.42\%]$	$\pm 0.08$ [0.37%]	$\pm 0.08$ [0.37%]	$\pm 0.11$ [0.43%]	$\pm 0.10$ [0.40%]	$\pm 0.13$ [0.43%]	$\pm 0.11$ [0.53]
a_JET_Pileup_PtTerm	±0.10 [0.43%]	±0.05 [0.26%]	±0.18 [0.82%]	±0.06 [0.29%]	±0.15 [0.61%]	±0.09 [0.37%]	±0.28 [0.94%]	±0.02 [0.089
a_ractorization_VV	±0.10 [0.42%] ±0.10 [0.41%]	±0.11 [0.61%] ±0.10 [0.56%]	±0.01 [0.05%] ±0.08 in 35%]	±0.20 [0.92%] ±0.08 fo 38%]	±0.02 [0.07%] ±0.14 [0.56%]	±0.08 [0.30%] ±0.10 [0.42%]	$\pm 0.10$ [0.34%] $\pm 0.14$ [0.46%]	±0.66 [3.2%] ±0.09 in +*
a JET EffectiveNP Detector1	±0.09 [0.39%]	±0.02 [0.13%]	±0.05 [0.25%]	±0.04 [0.17%]	±0.05 [0.19%]	±0.05 [0.19%]	±0.13 [0.44%]	±0.00 [0.02]
ia,MUON,MS	$\pm 0.09$ [0.39%]	$\pm 0.51$ [2.7%]	±0.25 [1.2%]	$\pm 0.39$ [1.8%]	$\pm 0.62$ [2.5%]	$\pm 0.02 \ [0.10\%]$	$\pm 0.26$ [0.88%]	$\pm 0.19$ [0.90]
ii IFT Blaun OfficitNDV	±0.09 [0.39%] ±0.09 [0.39%]	$\pm 0.02 [0.13\%]$ $\pm 0.71 [1.7\%]$	±0.17 [0.78%] ±0.27 [1.790]	±0.24 [1.1%] +0.15 [0.69%]	±0.04 [0.17%]	±0.18 [0.73%] ±0.01 [0.07%]	±0.09 [0.30%] ±0.05 [0.16%]	±0.01 [0.049
a_JET_EffectiveNP_Modelling2_Mixed1	±0.09 [0.38%] ±0.08 [0.35%]	$\pm 0.31$ [1.7%] $\pm 0.02$ [0.11%]	±0.37 [1.7%] ±0.08 [0.39%]	$\pm 0.15$ [0.69%] $\pm 0.03$ [0.12%]	±0.37 [1.5%] ±0.02 [0.07%]	±0.01 [0.03%] ±0.00 [0.01%]	$\pm 0.05 [0.16\%]$ $\pm 0.09 [0.29\%]$	±0.17 [0.835 ±0.00 [0.027
a JET_EffectiveNP_Mixed3	±0.08 [0.33%]	±0.03 [0.15%]	±0.02 [0.11%]	±0.01 [0.04%]	±0.04 [0.17%]	±0.01 [0.03%]	±0.15 [0.51%]	±0.01 [0.05?
a_JET_Pileup_OffsetMu	$\pm 0.06 \ [0.27\%]$	$\pm 0.32$ [1.7%]	$\pm 0.66$ [3.1%]	$\pm 0.14$ [0.65%]	$\pm 0.49$ [2.0%]	$\pm 0.57$ [2.3%]	$\pm 0.02$ [0.08%]	$\pm 0.10$ [0.49]
a.EG.RES	±0.05 [0.23%]	±0.52 [2.8%]	±0.32 [1.5%]	±0.59 [2.7%]	±0.39 [1.6%]	±0.27 [1.1%]	$\pm 0.01$ [0.04%]	±0.01 [0.049
a Jr. 1	$\pm 0.05 [0.23\%]$ +0.05 [0.20\%]	±0.04 [0.20%] +0.04 [0.22%]	$\pm 0.03 [0.14\%]$ +0.04 [0.18\%]	$\pm 0.01 [0.07\%]$ +0.04 [0.16%]	±0.01 [0.03%] +0.05 [0.19%]	±0.03 [0.11%] +0.05 [0.18%]	±0.00 [0.01%] ±0.06 [0.19%]	±0.00 [0.00] +0.05 [0.24]
a JET_EffectiveNP_Mixed2	±0.04 [0.17%]	±0.04 [0.24%]	±0.14 [0.64%]	±0.04 [0.19%]	±0.06 [0.25%]	±0.01 [0.03%]	±0.14 [0.47%]	±0.00 0.01
a_JET_EffectiveNP_Modelling4_Mixed1	$\pm 0.04$ [0.15%]	$\pm 0.04$ [0.22%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.02$ [0.10%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 \ [0.00\%]$	±0.00 0.009
a_JET_EffectiveNP_Statistical6_Mixed1	$\pm 0.03$ [0.14%]	$\pm 0.04$ [0.21%]	$\pm 0.00 [0.02\%]$	$\pm 0.00 \ [0.02\%]$	$\pm 0.03 [0.11\%]$	$\pm 0.00$ [0.02%]	$\pm 0.01$ [0.02%]	$\pm 0.00 [0.02]$
a JE I "EffectiveNP "Statistical4 "Mixed1 . EL EEE ID	±0.03 [0.14%]	+0.07 [0.40%]	+0.02 [0.08%]	+0.01 [0.03%]	±0.01 [0.05%]	±0.03 [0.11%]	±0.01 [0.04%] ±0.04 [0.14%]	+0.02 [0.04)
a JET_EffectiveNP_Modelling1_Mixed1	±0.03 [0.13%]	±0.00 [0.01%]	±0.56 [2.6%]	±0.02 [0.10%]	±0.17 [0.70%]	±0.17 [0.67%]	±0.56 [1.9%]	±0.26 [1.2)
a.RenormalizationFactorization.VV	$\pm 0.03 [0.11\%]$	$\pm 0.67$ [3.6%]	$\pm 0.03 [0.16\%]$	±0.60 [2.8%]	$\pm 0.42$ [1.7%]	$\pm 0.04$ [0.15%]	$\pm 0.02 \ [0.07\%]$	$\pm 0.03$ [0.16]
a_JET_EffectiveNP_Statistical2_Mixed1	$\pm 0.03$ [0.11%]	$\pm 0.04$ [0.22%]	$\pm 0.13$ [0.59%]	$\pm 0.13$ [0.59%]	$\pm 0.07 [0.27\%]$	$\pm 0.04$ [0.15%]	$\pm 0.05$ [0.16%]	$\pm 0.02 [0.11]$
a.MUON.EFF.ISO.SYS a JFT EffectionND Statistical5 Miscell	$\pm 0.02 [0.10\%]$ $\pm 0.02 [0.05\%]$	$\pm 0.02 [0.10\%]$ $\pm 0.07 [0.40\%]$	$\pm 0.01 [0.05\%]$ $\pm 0.02 [0.08\%]$	$\pm 0.02 [0.07\%]$ $\pm 0.01 [0.07\%]$	±0.03 [0.11%] ±0.01 [0.05%]	±0.02 [0.07%]	$\pm 0.02 [0.08\%]$ $\pm 0.17 [0.58\%]$	±0.03 [0.14]
a JET EffectiveNP Modelling3 Mixed1	±0.01 [0.05%]	±0.06 [0.34%]	±0.05 [0.23%]	±0.05 [0.23%]	±0.00 [0.02%]	±0.04 [0.14%]	$\pm 0.11$ [0.38%]	±0.01 [0.02]
a_JET_EffectiveNP_Mixed1	$\pm 0.01$ [0.04%]	$\pm 0.01$ [0.05%]	$\pm 0.04$ [0.16%]	$\pm 0.00 \ [0.02\%]$	$\pm 0.04$ [0.15%]	$\pm 0.04$ [0.16%]	$\pm 0.02$ [0.05%]	$\pm 0.01$ [0.03]
ia_EL_EFF_Reco	$\pm 0.01$ [0.02%]	$\pm 0.01$ [0.03%]	$\pm 0.01$ [0.03%]	$\pm 0.01$ [0.04%]	$\pm 0.01$ [0.05%]	$\pm 0.01$ [0.05%]	$\pm 0.01$ [0.05%]	$\pm 0.02$ [0.08]
a FT EFF extrFromCharm	±0.01 [0.02%] ±0.00 [0.02%]	±0.00 [0.02%] ±0.00 [0.01%]	±0.00 [0.02%] ±0.00 [0.00%]	±0.00 [0.02%] ±0.01 [0.07%]	±0.01 [0.02%] ±0.00 [0.01%]	±0.01 [0.02%]	±0.01 [0.02%] ±0.00 [0.02%]	±0.01 [0.03]
a.EL.EFF.Iso	±0.00 [0.02%]	±0.00 [0.01%]	±0.00 [0.02%]	±0.00 [0.02%]	±0.00 [0.01%] ±0.01 [0.02%]	±0.00 [0.02%]	±0.00 [0.02%]	±0.01 [0.03]
a JET EtaIntercalibration.negEta	±0.00 [0.02%]	±0.04 [0.22%]	±0.02 [0.09%]	±0.06 [0.27%]	±0.02 [0.07%]	$\pm 0.08$ [0.31%]	±0.00 [0.00%]	$\pm 0.00 [0.02]$
na_JET_EffectiveNP_Statistical1_Mixed1	$\pm 0.00 [0.01\%]$	$\pm 0.02$ [0.10%]	$\pm 0.00 [0.01\%]$	$\pm 0.00 [0.01\%]$	$\pm 0.03$ [0.10%]	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 [0.01]$
a MUON EFF RECO SYS LOWPT	±0.00 [0.01%]	±0.00 [0.02%]	±0.00 [0.02%]	±0.00 [0.01%]	±0.01 [0.02%]	±0.00 [0.02%]	±0.01 [0.02%]	±0.00 [0.02]
MUON EFF RECO STAT LOWPT	+0.00 [0.01%]	+0.00 [0.01%]	+0.00 [0.01%]	+0.00 [0.01%]	+0.00 [0.01%]	+0.00 [0.01%]	+0.00 [0.01%]	+0.00 [0.02]
a MUON EFF RECO STAT	$\pm 0.00 [0.01\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.01%]	$\pm 0.00 [0.01\%]$	$\pm 0.00 [0.00\%]$	±0.00 0.019
VV	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00$ [0.019
a_JET_EffectiveNP_Statistical3_Mixed1	±0.00 [0.01%]	±0.02 [0.10%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 00.01	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.01]
a IFT FfectionND Detector?	+0.00 [0.00%]	+0.02 [0.10%]	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.00]
a.MUON_EFF_TTVA_SYS	±0.00 [0.00%]	±0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.01]
a.FT.EFF.extrapolation	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	±0.00 0.005
a_MUON_SAGITTA_RESBIAS	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.009
a_JE1_PunchThrough_MC16 a EL EFF Triggeroff	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00  0.009 +0.00  0.009
ma_stat_SR_DF0J_845_85_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±1.39 [5.6%]	±0.00 [0.00%]	2000] 00.0±
ma_stat_SR_DF0J_8325_835_cuts_bin_0	±0.00 [0.00%]	$\pm 1.31$ [7.0%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	±0.00 [0.009
ma_stat_SR_DF0J_8175_82_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.009
ma_saar_SR_SPU1_/9_795_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±1.15 [5.2%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.009
ma stat. SR SF0J 795-80 cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.005
ma_stat_CR_Top_cuts_bin_0	±0.00 [0.00%]	$\pm 0.00 \ [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	±0.00 0.009
ma_stat_SR_SF0J_77_775_cuts_bin_0	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00]
a_MUON_EFF_TrigStatUncertainty	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±1.28 [6.4%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00]
ma_stat_VR_Top_DF0J_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±1.35 [0.470] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 00.00
ma stat SR DF0J 8225 825 cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 0.00
ma_stat_SR_DF0J_85_86_cuts_bin_0	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 1.69$ [5.6%]	±0.00 [0.00
a_JET_EtaIntercalibration_highE	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00]
ma.stat.vr.10p.28F1J.cuts.bm.0 ma.stat.VR.Top.SF0J.cuts.bin.0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 00.01 ±0.00 00.02
ms_stat_SR_DF0J_8275_83_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00
ms_stat_SR_DF0J_82_8225_cuts_bin_0	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 0.00
na_stat_SR_SF0J_80_81_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 00.00
na_stat_VR_Top_DF1J.cuts.bin.0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.000
na stat SR DF0J 825 8275 cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 0.00
na_stat_SR_DF0J_8125_815_cuts_bin_0	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00
ma_stat_SR_DF0J_81_8125_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 00.0±
a MUON EFF TrisSectUncertainty	+0.00 [0.00%]	±0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 00.00
ELEFF Charge	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00
a_Resummation_Zjets	±0.00 [0.00%]	$\pm 0.00 \ [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	±0.00 0.00
a_Renormalization_Zjets	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 0.00
na_stat_CR_Dib_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 00.00
ma stat SR DF0J.86 cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00 ±1.37 [6.63
na stat. VR. Dib. SF0J. cuts. bin.0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 00.00
. CKKW Zjets	±0.00 [0.00%]	$\pm 0.00 \ [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	±0.00 0.00
a_PILEUP	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00]$
ma_stat_SR_SF0J.785_79_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00]
ma_stat_SR_SF0J.775.78_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00)
and the second se	10.00 [0.000]]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00?
a_Factorization_Zjets	±0:00 [0:0034]							
na_Factorization_Zjets ma_stat_SR_DF0J_815_8175_cuts_bin_0	±0.00 [0.00%]	$\pm 0.00 \ [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 00.0±

#### Table 7: Breakdown of the dominant systematic uncertainties on background estimates in the various signal regions. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The presentages show the size of the uncertainty relative to the total expected background.

Total background expectation	29.66	23.39	25.96	25.87	30.42	30.11	36.89	26.43
Total statistical $(\sqrt{N_{exp}})$	$\pm 5.45$	$\pm 4.84$	$\pm 5.09$	±5.09	$\pm 5.52$	$\pm 5.49$	$\pm 6.07$	$\pm 5.14$
Total background systematic	$\pm 11.63$ [39.19%]	±9.14 [39.07%]	±9.84 [37.89%]	±6.08 [23.49%]	±7.99 [26.28%]	±9.26 [30.76%]	±7.12 [19.29%]	±8.51 [32.
alpha_Resummation_VV alpha_MET_SoftTrk_ResoPerp	$\pm 8.52$ [28.7%] $\pm 4.42$ [14.9%]	$\pm 6.56$ [28.0%] $\pm 0.85$ [3.6%]	±1.00 [3.9%] ±3.18 [12.2%]	$\pm 0.56$ [2.2%] $\pm 1.59$ [6.1%]	$\pm 3.26$ [10.7%] $\pm 3.66$ [12.0%]	$\pm 5.62$ [18.7%] $\pm 4.09$ [13.6%]	$\pm 1.37$ [3.7%] $\pm 3.14$ [8.5%]	$\pm 3.68$ [13 $\pm 4.44$ [16]
alpha_CKKW_VV	±4.27 [14.4%]	±3.60 [15.4%]	±4.55 [17.5%]	±4.69 [18.1%]	±0.17 [0.55%]	±2.10 [7.0%]	±3.81 [10.3%]	±1.59 [6.
alpha_DS_Singleton	±2.30 [7.8%]	±2.62 [10.8%] ±2.68 [11.4%]	±0.33 [1.3%]	$\pm 0.12$ [0.48%]	±0.00 [0.00%]	±0.55 [1.8%]	$\pm 1.49$ [4.0%] $\pm 1.85$ [5.0%]	±2.40 [9. ±2.29 [8.]
gamma_stat_SR_DF0J_83_8325_cuts_bin_0	$\pm 1.76$ [5.9%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.0
alpha_Shower_totar alpha_FNP_TOTAL_SYS	$\pm 1.40$ [4.1%] $\pm 1.20$ [4.1%]	±0.43 [1.8%]	$\pm 0.26$ [1.00%] $\pm 1.14$ [4.4%]	$\pm 0.47$ [1.8%] $\pm 0.45$ [1.7%]	±0.72 [2.4%]	±0.56 [1.9%]	$\pm 0.54$ [1.5%]	±0.31 [1.
mu.VV	$\pm 1.12$ [3.8%]	$\pm 0.94$ [4.0%]	$\pm 0.87$ [3.3%]	$\pm 0.84$ [3.2%]	$\pm 1.08$ [3.5%]	$\pm 1.08$ [3.6%]	$\pm 1.37$ [3.7%]	±1.16 [4.
alpha_JER5 alpha_JER3	$\pm 0.94$ [3.2%] $\pm 0.82$ [2.8%]	$\pm 0.42$ [1.8%] $\pm 0.87$ [3.7%]	$\pm 1.92$ [7.4%] $\pm 1.62$ [6.2%]	$\pm 0.71$ [2.7%] $\pm 0.71$ [2.7%]	$\pm 1.21$ [4.0%] $\pm 1.30$ [4.3%]	$\pm 0.21$ [0.68%] $\pm 1.18$ [3.9%]	$\pm 0.45$ [1.2%] $\pm 0.25$ [0.67%]	±1.14 [4. ±1.42 [5.
alpha MET_SoftTrk_Scale	±0.75 [2.5%]	±1.59 [6.8%]	±2.13 [8.2%]	±0.37 [1.4%]	±2.33 [7.7%]	±3.28 [10.9%]	±1.61 [4.4%]	±2.96 [11.
alpha_JER_DatavsMC alpha_JER6	$\pm 0.69$ [2.3%] $\pm 0.63$ [2.1%]	$\pm 0.76$ [3.2%] $\pm 0.42$ [1.8%]	$\pm 2.65$ [10.2%] $\pm 1.97$ [7.6%]	$\pm 0.56$ [2.2%] $\pm 0.45$ [1.7%]	$\pm 1.32$ [4.3%] $\pm 1.54$ [5.1%]	$\pm 0.38$ [1.3%] $\pm 0.46$ [1.5%]	$\pm 0.44$ [1.2%] $\pm 0.38$ [1.0%]	±0.77 [2: ±1.17 [4.
alpha_JER7	$\pm 0.62$ [2.1%]	$\pm 0.84$ [3.6%]	$\pm 2.41$ [9.3%]	$\pm 0.65$ [2.5%]	$\pm 1.20$ [3.9%]	$\pm 0.96$ [3.2%]	$\pm 0.80$ [2.2%]	$\pm 1.07$ [4]
alpha_Radiation_Itbar alpha_JER2	$\pm 0.60$ [2.0%] $\pm 0.58$ [2.0%]	$\pm 0.26$ [1.1%] $\pm 0.46$ [2.0%]	$\pm 0.24 \ [0.92\%]$ $\pm 2.61 \ [10.0\%]$	$\pm 0.67$ [2.6%] $\pm 0.73$ [2.8%]	$\pm 1.67$ [5.6%] $\pm 1.53$ [5.0%]	$\pm 1.53$ [5.1%] $\pm 1.59$ [5.3%]	$\pm 1.14$ [3.1%] $\pm 0.60$ [1.6%]	$\pm 0.66$ [2. $\pm 1.42$ [5.
alpha_JET_Flavor_Response	$\pm 0.47$ [1.6%]	$\pm 0.38$ [1.6%]	$\pm 0.57$ [2.2%]	$\pm 0.12$ [0.47%]	$\pm 0.95$ [3.1%]	$\pm 0.37$ [1.2%]	$\pm 0.70 [1.9\%]$	±0.34 [1.
alpha_UER1	$\pm 0.47$ [1.6%] $\pm 0.41$ [1.4%]	$\pm 0.33$ [1.7%] $\pm 0.33$ [1.4%]	±2.42 [9.3%]	$\pm 0.57$ [2.2%]	±1.12 [3.7%]	±2.03 [6.7%]	±0.88 [2.4%]	±1.77 [6.]
alpha_JET_Flavor_Composition	±0.38 [1.3%]	±0.62 [2.7%]	±1.23 [4.7%]	±0.72 [2.8%]	±1.99 [6.6%]	±0.52 [1.7%]	$\pm 1.70$ [4.6%]	±0.77 [2.
alpha MUON SCALE	±0.22 [1.1%] ±0.23 [0.77%]	±0.36 [1.5%]	±0.32 [1.276] ±0.26 [0.99%]	±0.30 [1.2%]	$\pm 0.01 [0.04\%]$	$\pm 0.45$ [1.5%]	$\pm 0.34 [0.91\%]$	±0.43 [15 ±0.19 [0.7
mu.top	±0.21 [0.70%]	±0.17 [0.73%]	±0.18 [0.68%]	±0.14 [0.55%]	±0.28 [0.91%]	±0.18 [0.60%]	±0.29 [0.77%]	±0.17 [0.6
alpha MUON EFF ISO STAT	$\pm 0.19$ [0.63%]	±0.10 [0.42%]	$\pm 0.06 [0.24\%]$ $\pm 0.11 [0.43\%]$	$\pm 0.11 [0.43\%]$	±0.14 [0.45%]	±0.23 [0.76%]	±0.11 [0.29%] ±0.26 [0.70%]	±0.20 [0.7
alpha.EG_SCALE	±0.19 [0.63%]	±0.23 [0.97%]	±0.83 [3.2%]	±0.46 [1.8%]	±0.52 [1.7%]	±0.17 [0.56%]	±0.18 [0.49%]	±0.04 [0.1
alpha_Factorization_ttbar	±0.15 [0.51%]	±0.14 [0.62%] ±0.07 [0.30%]	$\pm 0.13$ [0.52%]	±0.10 [0.41%]	±0.07 [0.22%]	$\pm 0.06 [0.18\%]$	$\pm 0.22$ [0.50%] $\pm 0.20$ [0.54%]	±0.18 [0.0 ±0.03 [0.1
alpha_FT_EFF_Light	±0.15 [0.49%]	±0.11 [0.46%]	±0.11 [0.42%]	±0.11 [0.42%]	±0.14 [0.47%]	±0.14 [0.45%]	±0.18 [0.48%]	±0.15 [0.5
alpha Factorization VV	$\pm 0.14$ [0.47%]	±0.16 [0.67%]	±0.01 [0.06%]	$\pm 0.27$ [1.1%]	±0.02 [0.08%]	±0.10 [0.34%]	$\pm 0.14$ [0.38%]	±0.91 [3.
alpha_MUON_ID	±0.12 [0.40%]	±0.30 [1.3%]	±0.07 [0.26%]	±0.02 [0.07%]	±0.15 [0.49%]	±0.55 [1.8%]	±0.52 [1.4%]	±0.14 [0.5
alpha_JET_Pileup_RhoTopology	±0.12 [0.40%] ±0.11 [0.38%]	±0.65 [2.8%]	±0.66 [2.6%]	±0.62 [2.4%]	±1.38 [4.5%]	$\pm 0.06 [0.19\%]$ $\pm 0.14 [0.47\%]$	$\pm 1.36$ [3.7%]	±0.62 [2.
alpha_JET_Pileup_PtTerm	±0.11 [0.37%]	±0.06 [0.28%]	±0.20 [0.77%]	±0.10 [0.40%]	±0.17 [0.57%]	±0.15 [0.50%]	±0.37 [1.0%]	±0.01 [0.0
alpha_JET_EffectiveNP_Mixed3	±0.11 [0.35%]	±0.03 [0.1376] ±0.02 [0.08%]	±0.03 [0.13%]	±0.01 [0.04%]	±0.05 [0.16%]	±0.01 [0.03%]	$\pm 0.14 [0.39\%]$ $\pm 0.21 [0.56\%]$	±0.01 [0.0
alpha_FT_EFF_B	±0.10 [0.35%] ±0.00 [0.71%]	±0.11 [0.47%] ±0.02 [0.10%]	±0.08 [0.31%] ±0.17 [0.64%]	±0.09 [0.34%] ±0.24 [0.91%]	±0.15 [0.48%] ±0.04 [0.14%]	±0.11 [0.37%]	±0.15 [0.40%] ±0.09 [0.24%]	±0.09 [0.3
alpha_JET_Pileup_OffsetNPV	±0.09 [0.30%]	±0.37 [1.6%]	±0.43 [1.7%]	±0.15 [0.59%]	±0.44 [1.4%]	±0.10 [0.32%]	±0.02 [0.07%]	±0.18 [0.6
alpha_JER4	±0.08 [0.27%]	±0.79 [3.4%]	±2.56 [9.9%]	±0.52 [2.0%]	±1.50 [4.9%]	±1.51 [5.0%]	±0.53 [1.4%]	±0.98 [3.
alpha_EG_RES	±0.07 [0.23%] ±0.07 [0.24%]	±0.62 [2.6%]	$\pm 0.48$ [1.1%] $\pm 0.48$ [1.8%]	$\pm 0.47$ [1.8%] $\pm 0.72$ [2.8%]	±0.44 [1.5%]	±0.38 [1.2%]	$\pm 0.12$ [0.34%]	±0.01 [0.0
alpha_JET_EtaIntercalibration_posEta	±0.07 [0.23%]	±0.05 [0.20%]	±0.04 [0.17%]	±0.02 [0.08%]	±0.01 [0.04%]	±0.04 [0.14%]	±0.00 [0.01%]	±0.00 0.0
alpha_JET_EffectiveNP_Mixed2	±0.05 [0.122%]	±0.03 [0.15%]	$\pm 0.03 [0.20\%]$ $\pm 0.17 [0.66\%]$	±0.05 [0.21%]	±0.08 [0.25%]	±0.00 [0.01%]	$\pm 0.08$ [0.21%] $\pm 0.20$ [0.54%]	±0.01 [0.0
alpha_JET_EffectiveNP_Modelling4_Mixed1	±0.05 [0.17%]	±0.04 [0.18%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.02 [0.08%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.0
alpha JET EffectiveNP Statistical6 Mixed1	±0.05 [0.16%]	±0.04 [0.17%]	±0.00 [0.02%]	±0.00 [0.02%]	±0.03 [0.10%]	±0.01 [0.02%]	±0.01 [0.02%]	±0.01 [0.0
alpha_JET_EffectiveNP_Statistical4_Mixed1	±0.05 [0.15%]	±0.09 [0.38%]	±0.02 [0.10%]	±0.01 [0.03%]	±0.01 [0.04%]	±0.03 [0.10%]	±0.01 [0.04%]	±0.01 [0.0
alpha_JET_Pileup_OffsetMu	±0.04 [0.12%]	±0.40 [1.7%]	±0.74 [2.9%]	$\pm 0.12 [0.45\%]$	±0.61 [2.0%]	±0.64 [2.1%]	±0.05 [0.12%]	±0.10 [0.3
alpha.MUON.EFF.ISO.SYS alpha. IFT Effection/D Modelling1 Mixed1	±0.03 [0.09%] ±0.02 [0.08%]	±0.02 [0.09%] ±0.02 [0.10%]	±0.01 [0.05%]	±0.02 [0.07%]	±0.03 [0.10%] ±0.22 [0.73%]	±0.02 [0.07%]	±0.03 [0.08%]	±0.03 [0.1
alpha_JET_EffectiveNP_Statistical2_Mixed1	$\pm 0.02 [0.07\%]$	$\pm 0.03$ [0.16%]	$\pm 0.16 \ [0.61\%]$	$\pm 0.14$ [0.53%]	$\pm 0.08 \ [0.27\%]$	$\pm 0.05 [0.16\%]$	$\pm 0.09 [0.25\%]$	±0.02 [0.0
alpha_JET_EffectiveNP_Statistical5_Mixed1 alpha_UET_EffectiveND_Mixed1	±0.02 [0.05%] ±0.01 [0.05%]	±0.09 [0.38%] ±0.00 [0.01%]	±0.03 [0.10%] ±0.05 [0.10%]	±0.01 [0.03%]	±0.01 [0.04%]	±0.02 [0.06%]	±0.23 [0.62%]	±0.01 [0.0
alpha_MUON_EFF_RECO_SYS	$\pm 0.01$ [0.03%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.01 [0.03%]	$\pm 0.01 [0.02\%]$	$\pm 0.01 \ [0.02\%]$	$\pm 0.01$ [0.02%]	±0.00 [0.0
alpha_EL_EFF_Reco alpha_FT_FFF_sectsFromCharm	±0.01 [0.03%] ±0.01 [0.02%]	$\pm 0.01 [0.03\%]$ $\pm 0.01 [0.07\%]$	±0.01 [0.04%] ±0.01 [0.02%]	±0.01 [0.05%]	±0.02 [0.05%] ±0.01 [0.02%]	±0.01 [0.05%]	±0.02 [0.05%]	±0.02 [0.0
alpha JET EffectiveNP Modelling3 Mixed1	$\pm 0.01$ [0.02%]	$\pm 0.08$ [0.34%]	±0.06 [0.22%]	$\pm 0.05$ [0.18%]	$\pm 0.00$ [0.01%]	$\pm 0.04$ [0.12%]	$\pm 0.17$ [0.47%]	±0.01 [0.0
alpha.EL.EFF.iso alpha.IFT.EffortionND Statistical1 Minud1	±0.01 [0.02%]	±0.01 [0.02%] +0.02 [0.08%]	±0.01 [0.02%]	±0.01 [0.02%]	±0.01 [0.02%] ±0.07 [0.09%]	±0.01 [0.02%]	±0.01 [0.02%]	±0.01 [0.0
alpha, MUON, EFF, RECO, SYS, LOWPT	±0.00 [0.01%]	±0.00 [0.02%]	±0.00 [0.02%]	±0.00 [0.02%]	$\pm 0.01 \ [0.02\%]$	$\pm 0.01 \ [0.02\%]$	$\pm 0.01 [0.02\%]$	±0.01 [0.0
alpha,MUON,EFF,TTVA,STAT alpha MUON EFF RECO STAT	$\pm 0.00 [0.01\%]$ $\pm 0.00 [0.01\%]$	$\pm 0.00 [0.02\%]$ $\pm 0.00 [0.00\%]$	$\pm 0.00 [0.01\%]$ $\pm 0.00 [0.00\%]$	±0.00 [0.01%] ±0.00 [0.00%]	±0.00 [0.01%] +0.00 [0.00%]	$\pm 0.00 [0.01\%]$ $\pm 0.00 [0.01\%]$	±0.01 [0.01%] ±0.00 [0.00%]	±0.00 [0.0 +0.00 [0.0
alpha, JET_EtaIntercalibration_negEta	$\pm 0.00 \ [0.01\%]$	$\pm 0.04$ [0.18%]	$\pm 0.02$ [0.08%]	$\pm 0.07$ [0.29%]	$\pm 0.02$ [0.05%]	$\pm 0.10$ [0.32%]	$\pm 0.01$ [0.01%]	±0.00 [0.0
alpha_MUON_EFF_RECO_STAT_LOWPT alpha_IET_EffectiveNP_Statistical3_Mixed1	$\pm 0.00 [0.01\%]$ $\pm 0.00 [0.01\%]$	$\pm 0.00 [0.01\%]$ +0.02 [0.08%]	$\pm 0.00 [0.01\%]$ $\pm 0.00 [0.01\%]$	±0.00 [0.01%] ±0.00 [0.01%]	±0.00 [0.01%] +0.00 [0.01%]	$\pm 0.00 [0.01\%]$ $\pm 0.00 [0.01\%]$	±0.00 [0.01%] ±0.00 [0.01%]	±0.00 [0.0 +0.00 [0.0
alpha_MUON_EFF_TTVA_SYS	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.0
alpha_JET_EffectiveNP_Detector2 alpha_FT_EFF_extrapolation	±0.00 [0.00%] +0.00 [0.00%]	±0.02 [0.09%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.0 +0.00 [0.0
alpha_MUON_SAGITTA_RESBIAS	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.0
alpha, JET, PunchThrough, MC16 alpha MUON SAGITTA BHO	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.0 +0.00 [0.0
alpha_JET_EtaIntercalibration_highE	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.0
alpha_EL_EFF_Triggereff alpha_EL_EFF_Charge	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.0 ±0.00 [0.0
alpha EL EFF Trigger	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 0.0
gamma_stat_SR_DF0J_845.85_cuts.bin_0 gamma_stat_SR_DF0J_8325_835_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±1.64 [7.0%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 1.69$ [5.6%] $\pm 0.00$ [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.0 ±0.00 [0.0
gamma_stat_SR_DF0J_8175_82_cuts_bin_0	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 0.0
gamma_stat_SR_SF0J_/9_79_cuts_bin_0 gamma_stat_SR_DF0J_8375_84_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 1.37 [5.3\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.0 ±0.00 [0.0
gamma_stat_SR_SF0J_795_80_cuts_bin_0	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.0
gamma_stat_CR_1op_cuts_bm_0 gamma_stat_SR_SF0J_77_775_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.0
alpha_MUON_EFF_TrigStatUncertainty	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.0
gamma_stat_SR_DF0J_835.8375.cuts_bin_0 gamma_stat_VR_Top_DF0J_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	$\pm 1.66$ [6.4%] $\pm 0.00$ [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.0
gamma_stat_SR_DF0J_8225_825_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.0
gamma_stat_VR_Top_SF1J_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.0
gamma_stat_VR_Top_SF0J_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.0
gamma_stat_SR_DF01_82_825_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.0
gamma_stat_SR_SF0J_80_81_cuts_bin_0 common_stat_SR_DE01_84_845_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±1.04 [6.4%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.0
gamma_stat_VR_Top_DF1J_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.0
gamma_stat_SR_DF0J_825.8275_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.0
gamma_stat_SR_DF0J_8128_0125_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.0
alpha_MUON_EFF_TrigSystUncertainty alpha Recommention Ziete	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.0
alpha_Renormalization_Zjets	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.0
gamma_stat_CR_Dib_cuts_bin_0 comma_stat_SR_DF01.86 cuts_bin_0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.0 +1.76 fe
gamma stat. VR.Dib.SF0J.cuts.bin.0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.0
alpha CKKW Zjets alroha PILEUP	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.0
gamma_stat_SR_SF0J_785_79_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.0
gamma_stat_VR_Dib_DF0J_cuts_bin_0 gamma_stat_SR_SF0J_775_78_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.0 ±0.00 [0.0
alpha_Factorization_Zjets	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.0
gamma_stat_SR_DF0J_815_8175_cuts_bin_0 gamma_stat_SR_SF0J_78_785_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.0 ±0.00 in r
gamma stat SR SF0J 81 cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]	±0.00 0.0

Table 11: Breakdown of the dominant systematic uncertainties on background estimates in the various signal regions. Note that the individual uncertainties can be correlated, and do not uncessarily add up quadratically to the total background uncertainty. The protocages dow the vision of the individual and control and a protocal background and a protocal background.

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Uncertainty of channel

fotal background expectation	20.10	23.03	23.33	16.17	13.61	12.24	11.86	9.89
Total statistical $(\sqrt{N_{exp}})$	$\pm 5.01$	$\pm 4.80$	$\pm 4.83$	$\pm 4.02$	±3.72	$\pm 3.50$	$\pm 3.44$	$\pm 3.14$
Total background systematic	$\pm 4.43$ [17.63%]	$\pm 4.59$ [19.93%]	$\pm 7.43$ [31.81%]	±6.46 [39.95%]	$\pm 5.14$ [37.07%]	±3.17 [25.87%]	$\pm 4.02$ [33.89%]	$\pm 3.72$ [37.61%]
gamma_stat_SR_SF0J_77_775_cuts_bin_0	±2.19 [8.7%]	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_JET_Flavor_Composition	$\pm 2.17$ [8.6%]	$\pm 0.70$ [3.0%]	$\pm 1.20$ [5.1%]	$\pm 0.46$ [2.8%]	$\pm 1.50$ [10.8%]	$\pm 0.97$ [8.0%]	$\pm 0.29$ [2.4%]	$\pm 0.63$ [6.3%]
alpha_EG_RES	$\pm 1.68$ [6.7%]	$\pm 0.15 [0.63\%]$	$\pm 0.30$ [1.3%]	$\pm 0.04$ [0.26%]	$\pm 0.52$ [3.8%]	$\pm 0.09 [0.72\%]$	±0.00 [0.01%]	$\pm 0.05$ [0.54%]
alpha_Shower_Rbar alaha_CKKW_VV	+1.10 [4.7%]	±0.39 [1.7%] +1.14 [5.0%]	±1.05 [4.5%] ±2.82 [16.4%]	±1.81 [11.2%]	±0.39 [2.8%]	$\pm 0.05 [0.41\%]$ $\pm 1.70 [1.4 eW]$	±0.44 [3.7%] ±0.98 [7.4%]	±0.00 [0.00%]
alpha.MET.SoftTrk.ResoPerp	±0.80 [3.2%]	+0.54 [2.4%]	±1.32 [5.7%]	$\pm 1.12 [6.9\%]$	±0.49 [3.5%]	±0.57 [4.7%]	±0.08 [0.65%]	±1.12 [11.3%]
alpha.DS.Singletop	$\pm 0.63$ [2.5%]	$\pm 0.98$ [4.2%]	$\pm 1.05$ [4.5%]	$\pm 0.90$ [5.6%]	±0.51 [3.7%]	±0.63 [5.2%]	$\pm 0.45$ [3.8%]	±0.00 [0.00%]
alpha_MET_SoftTrk_ResoPara	$\pm 0.59$ [2.3%]	$\pm 1.20$ [5.2%]	$\pm 2.67$ [11.5%]	$\pm 1.52$ [9.4%]	$\pm 1.32$ [9.5%]	±0.25 [2.0%]	$\pm 0.49$ [4.1%]	$\pm 0.34$ [3.4%]
alpha_JET_Pileup_RhoTopology	$\pm 0.57$ [2.3%]	$\pm 0.35$ [1.5%]	$\pm 0.89$ [3.8%]	$\pm 0.21$ [1.3%]	$\pm 0.52$ [3.7%]	$\pm 0.63$ [5.2%]	±0.25 [2.1%]	$\pm 0.56$ [5.6%]
alpha_JET_Pileup_OffsetMu	$\pm 0.49$ [1.9%]	$\pm 0.00 [0.01\%]$	$\pm 0.18$  0.78%	$\pm 0.57$ [3.6%]	$\pm 0.18$ [1.3%]	$\pm 0.20$ [1.7%]	$\pm 0.15$ [1.3%]	$\pm 0.34$ [3.4%]
alpha JET Pileup OlisetNPV	±0.48 [1.9%]	±0.08 [0.37%]	±0.17 [0.73%]	±0.31 [1.9%]	±0.15 [1.1%]	±0.18 [1.5%]	±0.16 [1.3%]	±0.07 [0.72%]
alpha JE I F invor rasponse	+0.40 [1.6%]	+0.66 [2.0]	+0.02 [0.08[6]	+0.24 [2.195]	±0.13 [0.9376]	+0.12 [1.1%]	+0.05 [0.51%]	+0.16 [1.6%]
alpha JER1	+0.39 [1.6%]	+1 83 [8 0%]	+0.49 [2.1%]	+0.20 [1.2%]	+0.37 [2.7%]	+0.36 [3.0%]	+0.10 [0.84%]	+0.07 [0.72%]
alpha.Renormalization.VV	$\pm 0.38$ [1.5%]	$\pm 0.16$ [0.68%]	$\pm 0.42$ [1.8%]	$\pm 0.19$ [1.2%]	$\pm 0.17$ [1.2%]	$\pm 0.26$ [2.1%]	±0.03 [0.29%]	±0.07 [0.75%]
alpha_JET_EffectiveNP_Modelling1_Mixed1	$\pm 0.36$ [1.4%]	$\pm 0.25$ [1.1%]	$\pm 0.11$ [0.46%]	$\pm 0.44$ [2.7%]	$\pm 0.07$ [0.54%]	±0.27 [2.2%]	$\pm 0.10$ [0.86%]	±0.03 [0.35%]
alpha_JER6	$\pm 0.33$ [1.3%]	$\pm 0.80 [3.5\%]$	$\pm 0.04$ [0.18%]	$\pm 0.00$ [0.00%]	$\pm 0.02 \ [0.18\%]$	$\pm 0.14$ [1.2%]	±0.26 [2.2%]	$\pm 0.01 \ [0.11\%]$
alpha,MUON,MS	$\pm 0.31$ [1.2%]	$\pm 0.11$ [0.47%]	$\pm 0.08$ [0.33%]	$\pm 0.29$ [1.8%]	$\pm 0.29$ [2.1%]	$\pm 0.02 [0.20\%]$	$\pm 0.56$ [4.7%]	$\pm 0.07 [0.71\%]$
alpha,PDF,VV	±0.30 [1.2%]	±0.26 [1.1%]	±0.39 [1.7%]	±0.21 [1.3%]	±0.12 [0.84%]	±0.10 [0.81%]	±0.08 [0.66%]	±0.16 [1.6%]
alpha_Factorization_v v	+0.20 [1.2%]	+1 10 [4 8[5]	+0.51 [2.295]	+0.18 [1.192]	±0.08 [0.05%]	±0.05 [2.6%]	+0.22 [1.05]	±0.02 [0.24%]
alpha.Factorization.ttbar	+0.23 [0.93%]	±0.03 [0.12%]	±0.08 [0.32%]	$\pm 0.07$ [0.42%]	±0.16 [1.1%]	±0.05 [0.39%]	$\pm 0.17$ [1.4%]	±0.00 [0.00%]
alpha_JER4	±0.23 [0.92%]	$\pm 1.19$ [5.2%]	$\pm 0.41$ [1.7%]	$\pm 0.21$ [1.3%]	$\pm 0.08$ [0.57%]	$\pm 0.25$ [2.1%]	±0.04 [0.34%]	$\pm 0.12$ [1.2%]
alpha_FNP_TOTAL_SYS	$\pm 0.23$ [0.91%]	$\pm 0.27$ [1.2%]	$\pm 0.10$ [0.45%]	$\pm 0.02$ [0.15%]	$\pm 0.20$ [1.4%]	$\pm 0.07$ [0.57%]	$\pm 0.12$ [1.1%]	$\pm 0.05$ [0.51%]
alpha_MUON_ID	$\pm 0.21 \ [0.82\%]$	$\pm 0.14$ [0.61%]	±0.89 [3.8%]	$\pm 0.84$ [5.2%]	$\pm 1.10$ [7.9%]	$\pm 0.16 [1.3\%]$	$\pm 0.39$ [3.3%]	$\pm 0.16$ [1.6%]
alpha_Resummation_VV	$\pm 0.16 \ [0.63\%]$	$\pm 1.15$ [5.0%]	$\pm 2.57$ [11.0%]	$\pm 0.30$ [1.9%]	$\pm 1.81$ [13.0%]	$\pm 0.05 [0.38\%]$	$\pm 2.46$ [20.7%]	$\pm 0.10$ [1.00%]
alpha_JVT	$\pm 0.16$ [0.63%]	$\pm 0.08 [0.34\%]$	$\pm 0.42$ [1.8%]	$\pm 0.27$ [1.7%]	$\pm 0.14$ [1.0%]	$\pm 0.20$ [1.6%]	$\pm 0.17$ [1.5%]	$\pm 0.23$ [2.4%]
alpha_JERG	±0.14 [0.56%]	±1.45 [6.3%]	±0.37 [1.6%]	±0.22 [1.4%]	±0.03 [0.20%]	±0.18 [1.5%]	±0.02 [0.17%]	±0.06 [0.59%]
alpha IFP7	+0.12 [0.47%]	+1.17 [5.1%]	+0.17 [0.72%]	+0.12 [0.77%]	+0.15 [1.195]	±0.22 [2.7%]	+0.00 [0.31%]	±0.04 [0.42%]
alpha FT.EFF.B	$\pm 0.11$ 0.46%	$\pm 0.10$ [0.43%]	±0.06 0.24%	$\pm 0.07$ 0.41%	$\pm 0.05 [0.41\%]$	±0.04 [0.34%]	±0.05 0.43%	±0.02 0.23%
alpha_EL_EFF_ID	$\pm 0.10$ [0.40%]	$\pm 0.01$ [0.03%]	$\pm 0.01$ [0.03%]	$\pm 0.03$ [0.16%]	$\pm 0.05$ [0.33%]	$\pm 0.04$ [0.36%]	±0.08 [0.67%]	±0.03 [0.33%]
alpha_Radiation_ttbar	$\pm 0.09 \ [0.36\%]$	$\pm 0.01$ [0.06%]	$\pm 0.68$ [2.9%]	±3.91 [24.2%]	$\pm 1.61$ [11.6%]	$\pm 0.91$ [7.4%]	$\pm 1.82$ [15.3%]	±0.00 [0.00%]
alpha_MUON_SCALE	$\pm 0.07 [0.27\%]$	$\pm 0.16$ [0.68%]	$\pm 0.11$ [0.47%]	$\pm 0.18$ [1.1%]	$\pm 0.00 \ [0.02\%]$	$\pm 0.20$ [1.7%]	$\pm 0.23$ [2.0%]	$\pm 0.12$ [1.2%]
alpha_JER5	±0.07 [0.27%]	±0.91 [3.9%]	±0.10 [0.41%]	±0.12 [0.75%]	±0.07 [0.47%]	±0.23 [1.9%] ±0.05 [0.4007]	±0.22 [1.8%]	±0.00 [0.04%]
alpha BenormalizationFactorization VV	±0.06 [0.25%] ±0.06 [0.23%]	±0.08 [0.35%] +0.23 [1.00%]	±0.40 [0.63%] +0.28 [1.2%]	±0.05 [0.29%] +0.15 [0.90%]	±0.10 [1.1%] ±0.09 [0.63%]	±0.05 [0.43%] +0.22 [1.8%]	±0.04 [0.37%] +0.14 [1.2%]	+0.05 [0.4997]
alpha.Generator.ttbar	±0.05 [0.22%]	±0.20 [0.89%]	±0.82 [3.5%]	±1.95 [12.1%]	±1.25 [9.0%]	±0.38 [3.1%]	±0.01 [0.07%]	±0.00 [0.00%]
alpha,FT,EFF,C	±0.05 [0.21%]	±0.05 [0.21%]	±0.05 [0.19%]	±0.04 [0.23%]	$\pm 0.04$ [0.31%]	±0.03 [0.21%]	±0.03 [0.24%]	±0.02 [0.19%]
alpha_JET_EffectiveNP_Statistical5_Mixed1	$\pm 0.04$ [0.15%]	$\pm 0.01$ [0.04%]	$\pm 0.01$ [0.03%]	$\pm 0.01$ [0.04%]	$\pm 0.00$ [0.03%]	$\pm 0.01$ [0.04%]	±0.00 [0.04%]	±0.00 [0.03%]
alpha_JET_EffectiveNP_Mixed3	$\pm 0.04$ [0.15%]	$\pm 0.01$ [0.06%]	$\pm 0.01$ [0.04%]	$\pm 0.01$ [0.05%]	$\pm 0.01$ [0.04%]	$\pm 0.01$ [0.09%]	$\pm 0.01$ [0.06%]	±0.00 [0.04%]
alpha_JET_Pileup_PtTerm	$\pm 0.03$ [0.14%]	$\pm 0.14$ [0.61%]	$\pm 0.03$ [0.13%]	$\pm 0.09$ [0.56%]	$\pm 0.01$ [0.10%]	$\pm 0.02 \ [0.19\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.02$ [0.18%]
alpha_Renormalization_ttbar	±0.03 [0.12%]	±0.10 [0.42%]	±0.03 [0.13%]	±0.07 [0.45%]	±0.02 [0.13%]	±0.04 [0.33%]	±0.30 [2.6%]	±0.00 [0.00%]
alpha Factorization Zinto	±0.03 [0.11%] ±0.02 [0.10%]	±0.03 [0.15%] +0.01 [0.04%]	±0.02 [0.08%] +0.06 in 25%]	±0.00 [0.01%] +0.02 [0.1262]	±0.02 [0.11%] ±0.04 [0.2292]	±0.00 [0.03%] +0.02 [0.18%]	±0.00 [0.01%] +0.02 io 15%]	±0.00 [0.00%]
alpha MET SoftTrk Scale	+0.02 [0.10%]	+0.89 [3.9%]	+3 39 [14 5%]	+2.12 [13.1%]	+1.49 [10.8%]	+0.02 [0.18%]	+0.61 [5.1%]	+2 71 [27.4%]
alpha_JET_EtaIntercalibration_negEta	±0.02 [0.08%]	±0.02 [0.07%]	±0.07 [0.29%]	±0.01 [0.07%]	$\pm 0.02 [0.14\%]$	±0.03 [0.22%]	±0.02 [0.15%]	±0.02 [0.21%]
alpha_JET_EffectiveNP_Modelling2_Mixed1	$\pm 0.02 [0.08\%]$	$\pm 0.03$ [0.11%]	±0.00 0.00%	$\pm 0.01$ [0.07%]	$\pm 0.01$ [0.05%]	$\pm 0.00 [0.03\%]$	±0.00 [0.03%]	±0.01 [0.09%]
alpha_EG_SCALE	$\pm 0.02 [0.06\%]$	$\pm 0.22 [0.96\%]$	±0.17 [0.74%]	$\pm 0.04$ [0.28%]	±0.34 [2.4%]	$\pm 0.21$ [1.7%]	$\pm 0.07$ [0.56%]	±0.05 [0.49%]
alpha_JET_EffectiveNP_Mixed2	$\pm 0.01$ [0.06%]	$\pm 0.05 [0.22\%]$	$\pm 0.00 [0.01\%]$	$\pm 0.01$ [0.06%]	$\pm 0.01$ [0.07%]	$\pm 0.01$ [0.07%]	±0.00 0.04%	$\pm 0.01$ [0.08%]
alpha JET EffectiveNP Detector1	±0.01 [0.05%]	±0.01 [0.04%]	±0.01 [0.03%]	±0.00 [0.03%]	±0.01 [0.05%]	±0.01 [0.07%]	±0.00 [0.04%]	±0.01 [0.06%]
alpha JET EllectiveNr Statistica4 Mixed1	+0.01 [0.04%]	+0.08 [0.34%]	+0.11 [0.46%]	+0.02 [0.50%]	+0.05 [0.03%]	+0.09 [0.72%]	+0.10 [0.04%]	±0.00 [0.03%]
alpha MUON EFF ISO SYS	+0.01 [0.04%]	+0.02 [0.07%]	+0.03 [0.12%]	+0.01 [0.04%]	+0.02 [0.13%]	+0.00 [0.01%]	+0.03 [0.28%]	+0.00 [0.01%]
alpha_JET_EffectiveNP_Modelling3_Mixed1	$\pm 0.01$ [0.03%]	$\pm 0.03 [0.11\%]$	±0.02 [0.07%]	$\pm 0.01$ [0.07%]	$\pm 0.01$ [0.05%]	±0.00 [0.02%]	±0.00 [0.03%]	±0.01 [0.09%]
alpha_EL_EFF_Reco	$\pm 0.01$ [0.03%]	$\pm 0.01$ [0.06%]	±0.01 [0.03%]	$\pm 0.01$ [0.08%]	$\pm 0.01$ [0.08%]	$\pm 0.01$ [0.06%]	$\pm 0.02$ [0.13%]	±0.00 [0.03%]
alpha_JET_EffectiveNP_Statistical2_Mixed1	$\pm 0.01$ [0.02%]	$\pm 0.03 [0.11\%]$	$\pm 0.01$ [0.02%]	$\pm 0.02$ [0.13%]	$\pm 0.01$ [0.07%]	$\pm 0.03 [0.26\%]$	$\pm 0.01$ [0.07%]	$\pm 0.01$ [0.13%]
alpha_Resummation_Zjets	$\pm 0.01 \ [0.02\%]$	$\pm 0.00 [0.01\%]$	$\pm 0.01$ [0.06%]	$\pm 0.00$ [0.03%]	$\pm 0.01$ [0.08%]	$\pm 0.01 \ [0.04\%]$	$\pm 0.00 \ [0.04\%]$	$\pm 0.01 \ [0.11\%]$
alpha_FT_EFF_extrFromCharm	$\pm 0.01 \ [0.02\%]$	$\pm 0.01 [0.02\%]$	$\pm 0.01$ [0.02%]	$\pm 0.00 \ [0.02\%]$	$\pm 0.00 \ [0.02\%]$	$\pm 0.00 [0.02\%]$	$\pm 0.00 [0.03\%]$	±0.00 [0.02%]
alpha, MUON, EFF, RECO, SYS, LOWPT alpha, IET EffortingND Statisticali Miscall	+0.01 [0.02%]	+0.00 [0.02%]	±0.00 [0.02%]	±0.00 [0.02%]	±0.00 [0.02%]	±0.00 [0.02%] ±0.00 [0.02%]	±0.00 [0.02%]	±0.00 [0.01%]
alpha Renormalization Ziets	+0.00 [0.02%]	+0.00 [0.01%]	+0.01 [0.05%]	+0.00 [0.02%]	+0.01 [0.05%]	+0.00 [0.02%]	+0.00 [0.03%]	+0.01 [0.08%]
alpha_CKKW_Ziets	±0.00 [0.02%]	±0.00 [0.01%]	±0.01 [0.04%]	±0.00 [0.02%]	$\pm 0.01$ [0.05%]	±0.00 [0.03%]	±0.00 [0.03%]	$\pm 0.01$ [0.08%]
alpha_JET_EffectiveNP_Statistical1_Mixed1	$\pm 0.00 [0.01\%]$	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.01%]	$\pm 0.00 [0.01\%]$	±0.00 [0.01%]	±0.00 [0.01%]
alpha_EL_EFF_lso	$\pm 0.00 [0.01\%]$	$\pm 0.01 [0.02\%]$	±0.00 [0.02%]	$\pm 0.00 [0.03\%]$	$\pm 0.00 \ [0.02\%]$	$\pm 0.00 [0.02\%]$	±0.00 [0.04%]	±0.00 [0.02%]
alpha_MUON_EFF_RECO_SYS	$\pm 0.00 [0.01\%]$	$\pm 0.01 [0.03\%]$	$\pm 0.01$ [0.04%]	$\pm 0.00 \ [0.02\%]$	$\pm 0.01 \ [0.07\%]$	$\pm 0.00 \ [0.02\%]$	$\pm 0.00 [0.02\%]$	$\pm 0.00 \ [0.02\%]$
alpha_MUON_EFF_RECO_STAT_LOWPT	$\pm 0.00 [0.01\%]$	$\pm 0.00 [0.01\%]$	±0.00 [0.01%]	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 [0.01\%]$	±0.00 [0.01%]	$\pm 0.00 [0.01\%]$
alpha_MUON_EFF_RECO_STAT	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.02%]	±0.00 [0.01%]	±0.01 [0.06%]	±0.00 [0.00%]	±0.00 [0.02%]	±0.00 [0.01%]
alaba IFT EffectiveND Statistical? Mixed1	+0.00 [0.01%]	+0.00 [0.01%]	+0.00 [0.01%]	+0.00 [0.01%]	+0.00 [0.00%]	+0.00 [0.01%]	+0.00 [0.01%]	+0.00 [0.01%]
alpha MUON EFF TTVA STAT	±0.00 0.01%	±0.00 0.01%	±0.00 0.00%	±0.00 0.01%	±0.00 0.00%	±0.00 [0.02%]	±0.00 0.02%	±0.00 0.01%
alpha JET EffectiveNP Modelling4 Mixed1	$\pm 0.00 [0.01\%]$	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]
alpha_MUON_EFF_TTVA_SYS	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.02\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 [0.01\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 \ [0.01\%]$
alpha_JET_EffectiveNP_Detector2	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 0.00%	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]
nin_top alaba IET EffastineND Minadi	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.02%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha FT FFF extrapolation	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.02%]	+0.00 [00376]	+0.00 [0.02%]	+0.00 [0.02%]	+0.00 [0.08%]	+0.00 [0:02%]
alpha, MUON, SAGITTA, RESBIAS	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_JET_PunchThrough_MC16	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_EL_EFF_Triggereff	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_845_85_cuts_bin_0	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_8325_835_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_SF0J_79 795 cute his 9	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±3.04 [21.9%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma stat_SR_DF0J_8375.84 cuts bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_SF0J_795_80_cuts_bin_0	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 1.53$ [12.5%]	±0.00 0.00%	±0.00 [0.00%]
gamma_stat_CR_Top_cuts_bin_0	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]
alpha_MUON_EFF_TrigStatUncertainty	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$
gamma_stat_SR_DF0J_835_8375_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_VR_Top_DP0J_cuts_bin_0 gamma_stat_SR_DF0J_8225_825_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 0.00%	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]
gamma stat_SR_DF0J_85_86_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha JET EtaIntercalibration highE	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 0.00%	±0.00 [0.00%]
gamma_stat_VR_Top_SF1J_cuts_bin_0	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_VR_Top_SF0J_cuts_bin_0	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_8275_83_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_82_8225_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
eamma stat SE DE01 84 845 cuts bin 0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±1.90 [16.6%] +0.00 [0.00%]	+0.00 [0.00%]
gamma_stat_VR_Ton_DF1J_cuts_bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_825_8275_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_8125_815_cuts_bin_0	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 0.00%	±0.00 [0.00%]
gamma_stat_SR_DF0J_81_8125_cuts_bin_0	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]
alpha_MUON_SAGITTA_RHO	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00 \ [0.00\%]$	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]
alpha_MUON_EFF_TrigSystUncertainty	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha.EL.EFF.Charge	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
aloha EL EFF Trigger	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [00006]	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.00%]	+0.00 [0.00%]
gamma_stat_SR_DF0J.86_cuts_bin.0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_VR_Dib_SF0J_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 0.00%	±0.00 [0.00%]
alpha_PILEUP	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_SF0J_785_79_cuts_bin_0	$\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$	±0.00 [0.00%]	±2.00 [12.4%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_VR_Dib_DF0J_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_SF0J_775_78_cuts_bin_0 camma_stat_SR_DF01_815_8175_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±1.49 [6.5%] +0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_83_8325_cute bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_SF0J_78_785_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 2.34$ [10.0%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_SF0J_81_cuts_bin_0	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00 [0.00\%]$	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±1.97 [19.9%]
Table 8: Breakdown of the dominant system percentages show the size of the uncertaint	natic uncertainties on backg v relation to the total error	round estimates in the various and background	signal regions. Note that th	he individual uncertainties c	an be correlated, and do no	t necessarily add up quadra	atically to the total backgro	und uncertainty. The

# Post-fit

tour mangement infection	31.41	20.10	20.00		10000			12.05
Total statistical $(\sqrt{N_{exp}})$	±5.61	$\pm 5.36$	±5.37	$\pm 4.52$	±4.05	±3.90	±3.88	±3.47
Iotal background systematic	±0.04 [16.02%]	±5.60 [19.50%]	±9.41 [32.68%]	±7.18 [35.16%]	±6.13 [37.42%]	±3.92 [25.82%]	±5.16 [34.27%]	±4.13 [34.26%]
alpha_JET_Flavor_Composition	±2.74 [8.7%] ±2.30 [7.3%]	±0.00 [0.00%] ±0.73 [2.5%]	$\pm 0.00$ [0.00%] $\pm 1.24$ [4.3%]	±0.00 [0.00%] ±0.54 [2.6%]	$\pm 0.00 [0.00\%]$ $\pm 1.51 [9.2\%]$	$\pm 0.00 [0.00\%]$ $\pm 1.18 [7.7\%]$	$\pm 0.00$ [0.00%] $\pm 0.29$ [1.9%]	$\pm 0.00 [0.00\%]$ $\pm 0.61 [5.1\%]$
alpha_EG_RES	$\pm 1.77$ [5.6%]	$\pm 0.15$ [0.52%]	$\pm 0.34$ [1.2%]	$\pm 0.03$ [0.16%]	$\pm 0.62$ [3.8%]	$\pm 0.15$ [0.96%]	$\pm 0.04$ [0.27%]	$\pm 0.08 \ [0.66\%]$
alpha_CKKW_VV alpha_Shower_ttbar	$\pm 1.64$ [5.2%] $\pm 1.51$ [4.8%]	$\pm 1.58$ [5.5%] $\pm 0.40$ [1.4%]	$\pm 5.26$ [18.3%] $\pm 1.10$ [3.8%]	$\pm 2.76$ [13.5%] $\pm 1.90$ [9.3%]	$\pm 0.35$ [2.1%] $\pm 0.41$ [2.5%]	±2.47 [16.2%] ±0.05 [0.34%]	$\pm 1.22$ [8.1%] $\pm 0.46$ [3.1%]	±0.09 [4.9%] ±0.00 [0.00%]
mu.VV	$\pm 1.25$ [4.0%]	$\pm 1.14$ [4.0%]	$\pm 1.09$ [3.8%]	$\pm 0.86$ [4.2%]	$\pm 0.49$ [3.0%]	$\pm 0.59$ [3.9%]	$\pm 0.65$ [4.3%]	$\pm 0.44$ [3.7%]
alpha_MET_Soft Trk_ResoPerp	$\pm 1.01$ [3.2%] $\pm 0.81$ [2.6%]	$\pm 1.51$ [5.3%] $\pm 0.59$ [2.0%]	$\pm 3.78$ [13.1%] $\pm 1.73$ [6.0%]	$\pm 1.97$ [9.6%] $\pm 1.44$ [7.0%]	$\pm 1.94$ [11.8%] $\pm 0.82$ [5.0%]	$\pm 0.38$ [2.5%] $\pm 0.77$ [5.1%]	$\pm 0.67$ [4.4%] $\pm 0.10$ [0.66%]	$\pm 0.51$ [4.2%] $\pm 1.41$ [11.7%]
alpha_DS_Singletop	$\pm 0.66$ [2.1%]	$\pm 1.03$ [3.6%]	$\pm 1.10$ [3.8%]	$\pm 0.95$ [4.6%]	$\pm 0.54$ [3.3%]	$\pm 0.66$ [4.4%]	$\pm 0.48$ [3.2%]	$\pm 0.00$ [0.00%]
alpha_JET_Pileup_RhoTopology alpha_JET_Pileup_OffsetMu	$\pm 0.65$ [2.1%] $\pm 0.58$ [1.8%]	$\pm 0.34$ [1.2%] $\pm 0.03$ [0.11%]	$\pm 0.94$ [3.3%] $\pm 0.20$ [0.70%]	$\pm 0.30$ [1.5%] $\pm 0.51$ [2.5%]	$\pm 0.50$ [3.1%] $\pm 0.22$ [1.3%]	$\pm 0.76$ [5.0%] $\pm 0.29$ [1.9%]	$\pm 0.30$ [2.0%] $\pm 0.18$ [1.2%]	$\pm 0.55$ [4.5%] $\pm 0.33$ [2.7%]
alpha_JER1	$\pm 0.56$ [1.8%]	$\pm 2.35$ [8.2%]	$\pm 0.66$ [2.3%]	$\pm 0.18$ [0.87%]	$\pm 0.53$ [3.2%]	$\pm 0.52$ [3.4%]	$\pm 0.13$ [0.89%]	$\pm 0.08 [0.66\%]$
alpha_JER_DataVshC alpha_JET_Pileup_OffsetNPV	$\pm 0.55$ [1.8%] $\pm 0.52$ [1.7%]	$\pm 0.84$ [2.9%] $\pm 0.11$ [0.37%]	$\pm 0.05$ [0.18%] $\pm 0.17$ [0.60%]	$\pm 0.44$ [2.1%] $\pm 0.28$ [1.3%]	$\pm 0.85$ [5.2%] $\pm 0.16$ [1.00%]	$\pm 0.20$ [1.3%] $\pm 0.23$ [1.5%]	$\pm 0.06 [0.41\%]$ $\pm 0.20 [1.3\%]$	$\pm 0.22$ [1.8%] $\pm 0.11$ [0.95%]
alpha_Renormalization_VV	$\pm 0.52$ [1.6%]	$\pm 0.22$ [0.75%]	$\pm 0.57$ [2.0%]	$\pm 0.27$ [1.3%]	$\pm 0.23$ [1.4%]	$\pm 0.36$ [2.4%]	$\pm 0.05$ [0.31%]	$\pm 0.10$ [0.85%]
alpha_JER6	±0.44 [1.4%]	±0.99 [3.4%]	$\pm 0.21 [0.74\%]$ $\pm 0.05 [0.16\%]$	$\pm 0.03$ [0.13%]	±0.12 [0.71%] ±0.05 [0.32%]	±0.21 [1.4%]	±0.13 [0.84%] ±0.34 [2.3%]	$\pm 0.05 [0.43\%]$ $\pm 0.01 [0.06\%]$
alpha_MUON_MS	$\pm 0.43$ [1.4%]	$\pm 0.14$ [0.47%]	$\pm 0.03$ [0.12%]	$\pm 0.32$ [1.6%]	$\pm 0.31$ [1.9%]	$\pm 0.03$ [0.19%]	$\pm 0.48$ [3.2%]	$\pm 0.09 [0.74\%]$
alpha_PDF_VV alpha_JER2	$\pm 0.42 [1.3\%]$ $\pm 0.41 [1.3\%]$	$\pm 0.35$ [1.2%] $\pm 1.37$ [4.8%]	$\pm 0.64 [1.9\%]$ $\pm 0.69 [2.4\%]$	$\pm 0.29$ [1.4%] $\pm 0.16$ [0.76%]	$\pm 0.16$ [0.98%] $\pm 0.50$ [3.0%]	$\pm 0.14$ [0.90%] $\pm 0.62$ [4.1%]	±0.11 [0.72%] ±0.33 [2.2%]	$\pm 0.22 [1.8\%]$ $\pm 0.09 [0.78\%]$
alpha_Factorization_VV	$\pm 0.41$ [1.3%]	$\pm 0.09$ [0.32%]	$\pm 0.17$ [0.58%]	$\pm 0.07$ [0.35%]	$\pm 0.11$ [0.64%]	$\pm 0.05 \ [0.32\%]$	$\pm 0.14$ [0.95%]	$\pm 0.03$ [0.28%]
alpha_JE1_EffectiveNP_Modeling1_Mixed1 alpha_JER4	$\pm 0.37 [1.2\%]$ $\pm 0.31 [0.98\%]$	$\pm 0.28$ [0.99%] $\pm 1.51$ [5.3%]	$\pm 0.13$ [0.46%] $\pm 0.54$ [1.9%]	$\pm 0.47$ [2.3%] $\pm 0.25$ [1.2%]	$\pm 0.07$ [0.42%] $\pm 0.14$ [0.87%]	$\pm 0.35$ [2.3%] $\pm 0.35$ [2.3%]	$\pm 0.13$ [0.83%] $\pm 0.03$ [0.22%]	$\pm 0.01 [0.0956]$ $\pm 0.17 [1.4%]$
alpha_Factorization_ttbar	$\pm 0.25$ [0.78%]	$\pm 0.03$ [0.10%]	$\pm 0.08$ [0.28%]	$\pm 0.07$ [0.35%]	$\pm 0.17$ [1.0%]	$\pm 0.05 \ [0.33\%]$	$\pm 0.17 [1.2\%]$	$\pm 0.00 [0.00\%]$
alpha_MUON_ID alpha_MET_SoftTrk_Scale	$\pm 0.23 \ [0.73\%]$ $\pm 0.23 \ [0.72\%]$	$\pm 0.32$ [1.1%] $\pm 1.22$ [4.2%]	$\pm 0.89$ [3.1%] $\pm 3.48$ [12.1%]	$\pm 0.72$ [3.6%] $\pm 2.09$ [10.2%]	$\pm 1.13$ [6.9%] $\pm 1.80$ [11.0%]	$\pm 0.19$ [1.3%] $\pm 0.17$ [1.1%]	$\pm 0.51$ [3.4%] $\pm 1.10$ [7.3%]	$\pm 0.23$ [1.9%] $\pm 2.81$ [23.4%]
alpha_FNP_TOTAL_SYS	$\pm 0.22$ [0.70%]	$\pm 0.25$ [0.88%]	$\pm 0.10$ [0.35%]	$\pm 0.02 [0.11\%]$	$\pm 0.19 \ [1.1\%]$	$\pm 0.07 \ [0.44\%]$	$\pm 0.12$ [0.79%]	$\pm 0.05 [0.40\%]$
alpha_Resummation_VV mu_top	$\pm 0.22 [0.69\%]$ $\pm 0.22 [0.69\%]$	±1.59 [0.5%] ±0.19 [0.65%]	$\pm 3.54$ [12.3%] $\pm 0.17$ [0.58%]	$\pm 0.42$ [2.0%] $\pm 0.12$ [0.59%]	$\pm 2.49$ [15.2%] $\pm 0.11$ [0.65%]	±0.06 [0.42%] ±0.10 [0.64%]	$\pm 3.38$ [22.5%] $\pm 0.08$ [0.50%]	$\pm 0.14$ [1.1%] $\pm 0.05$ [0.40%]
alpha_JVT	±0.17 0.54%	±0.08 [0.27%]	$\pm 0.43$ [1.5%]	±0.28 [1.4%]	±0.14 [0.86%]	±0.21 [1.4%]	±0.18 [1.2%]	$\pm 0.23$ [1.9%]
alpha_FT_EFF_Light	±0.16 [0.52%]	±0.15 [0.51%]	$\pm 0.14$ [0.48%]	$\pm 0.11$ [0.54%]	±0.07 [0.43%] ±0.06 [0.39%]	±0.08 [0.50%]	$\pm 0.04$ [0.28%] $\pm 0.08$ [0.55%]	±0.06 [0.47%]
alpha_JER7	±0.14 [0.46%]	±1.45 [5.0%]	±0.23 [0.82%]	$\pm 0.12$ [0.58%] $\pm 0.07$ [0.24%]	±0.18 [1.1%]	±0.45 [3.0%]	±0.09 [0.60%]	±0.05 [0.41%]
alpha_MUON_SCALE	±0.12 [0.39%] ±0.12 [0.37%]	±0.13 [0.45%]	$\pm 0.17$ [0.58%]	±0.30 [1.5%]	±0.00 [0.00%]	±0.23 [1.5%]	±0.27 [1.8%]	±0.15 [1.2%]
alpha_EL_EFF_ID alpha Radiation tthat	±0.11 [0.35%]	±0.01 [0.05%]	±0.02 [0.06%]	±0.04 [0.18%]	±0.06 [0.34%]	±0.06 [0.41%]	±0.10 [0.69%]	±0.05 [0.44%]
apma_roadiation_ttbar alpha_EG_SCALE	$\pm 0.10 \ [0.30\%]$ $\pm 0.09 \ [0.27\%]$	$\pm 0.02 [0.05\%]$ $\pm 0.24 [0.84\%]$	$\pm 0.71$ [2.5%] $\pm 0.21$ [0.72%]	$\pm 4.11$ [20.1%] $\pm 0.09$ [0.45%]	$\pm 1.69 [10.3\%]$ $\pm 0.39 [2.4\%]$	$\pm 0.95$ [6.3%] $\pm 0.27$ [1.8%]	$\pm 1.91$ [12.7%] $\pm 0.07$ [0.45%]	$\pm 0.00 [0.00\%]$ $\pm 0.07 [0.59\%]$
alpha_RenormalizationFactorization_VV	±0.08 [0.25%]	±0.32 [1.1%]	±0.39 [1.4%]	±0.20 [0.98%]	±0.12 [0.74%]	±0.30 [2.0%]	±0.19 [1.3%]	±0.07 [0.55%]
alpha_JER5	$\pm 0.07 [0.23\%]$ $\pm 0.07 [0.22\%]$	$\pm 0.07 [0.23\%]$ $\pm 1.12 [3.9\%]$	$\pm 0.06$ [0.22%] $\pm 0.14$ [0.47%]	$\pm 0.05 [0.25\%]$ $\pm 0.13 [0.63\%]$	$\pm 0.05 [0.33\%]$ $\pm 0.14 [0.86\%]$	$\pm 0.03 [0.23\%]$ $\pm 0.32 [2.1\%]$	$\pm 0.04 \ [0.26\%]$ $\pm 0.28 \ [1.8\%]$	$\pm 0.03 [0.21\%]$ $\pm 0.01 [0.11\%]$
Lumi	±0.06 [0.20%]	±0.08 [0.28%]	±0.15 [0.51%]	±0.05 [0.23%]	±0.15 [0.92%]	±0.05 [0.35%]	±0.04 [0.29%]	±0.11 [0.88%]
apma_venerator_Itbar alpha_JET_EffectiveNP_Mixed3	$\pm 0.06 [0.18\%]$ $\pm 0.05 [0.16\%]$	$\pm 0.22 [0.75\%]$ $\pm 0.02 [0.07\%]$	±0.86 [3.0%] ±0.01 [0.04%]	$\pm 2.05 [10.05]$ $\pm 0.01 [0.05\%]$	$\pm 1.32$ [8.0%] $\pm 0.01$ [0.04%]	$\pm 0.40$ [2.6%] $\pm 0.02$ [0.10%]	±0.01 [0.06%] ±0.01 [0.07%]	±0.00 [0.00%] ±0.00 [0.04%]
alpha_JET_Pileup_PtTerm	$\pm 0.04$ [0.14%]	$\pm 0.19$ [0.64%]	$\pm 0.03$ [0.09%]	$\pm 0.08$ [0.40%]	$\pm 0.02 \ [0.13\%]$	$\pm 0.04$ [0.26%]	$\pm 0.00$ [0.01%]	$\pm 0.02 \ [0.20\%]$
alpha_JET_EffectiveNP_Statisticals_Miced1 alpha_Renormalization_ttbar	±0.04 [0.13%] ±0.03 [0.10%]	±0.01 [0.04%] ±0.10 [0.36%]	$\pm 0.01 [0.03\%]$ $\pm 0.03 [0.11\%]$	$\pm 0.01 [0.04\%]$ $\pm 0.08 [0.37\%]$	$\pm 0.01 [0.03\%]$ $\pm 0.02 [0.12\%]$	$\pm 0.01$ [0.05%] $\pm 0.04$ [0.28%]	$\pm 0.01$ [0.04%] $\pm 0.32$ [2.1%]	$\pm 0.00 [0.03%]$ $\pm 0.00 [0.00%]$
alpha_JET_EffectiveNP_Modelling2_Mixed1	$\pm 0.03$ [0.10%]	$\pm 0.03$ [0.11%]	$\pm 0.01$ [0.02%]	$\pm 0.01$ [0.07%]	$\pm 0.01$ [0.03%]	$\pm 0.01$ [0.04%]	$\pm 0.01$ [0.04%]	$\pm 0.01 \ [0.09\%]$
alpha_JET_EtaIntercalibration_posEta alpha_JET_EffectiveNP_Mixed2	±0.03 [0.09%] ±0.03 [0.09%]	$\pm 0.04$ [0.13%] $\pm 0.07$ [0.25%]	$\pm 0.02 [0.09\%]$ $\pm 0.00 [0.01\%]$	$\pm 0.00 \ [0.01\%]$ $\pm 0.01 \ [0.06\%]$	$\pm 0.02 [0.13\%]$ $\pm 0.01 [0.05\%]$	$\pm 0.01$ [0.04%] $\pm 0.01$ [0.09%]	$\pm 0.00 [0.01\%]$ $\pm 0.01 [0.05\%]$	$\pm 0.00 [0.01\%]$ $\pm 0.01 [0.08\%]$
alpha_JET_EffectiveNP_Detector1	±0.03 0.08%	±0.01 0.05%	±0.00 [0.01%]	±0.01 [0.03%]	±0.01 [0.06%]	±0.01 [0.08%]	±0.01 [0.04%]	±0.01 [0.06%]
alpha_Factorization_Zjets alpha_JET_EtaIntercalibration_negEta	$\pm 0.02 [0.08\%]$ $\pm 0.02 [0.07\%]$	$\pm 0.01$ [0.03%] $\pm 0.02$ [0.06%]	$\pm 0.06 [0.20\%]$ $\pm 0.08 [0.26\%]$	$\pm 0.02 [0.08\%]$ $\pm 0.02 [0.08\%]$	$\pm 0.04$ [0.27%] $\pm 0.03$ [0.17%]	$\pm 0.02 [0.14\%]$ $\pm 0.03 [0.20\%]$	$\pm 0.02 \ [0.11\%]$ $\pm 0.02 \ [0.16\%]$	$\pm 0.04$ [0.35%] $\pm 0.02$ [0.18%]
alpha_MUON_EFF_ISO_STAT	$\pm 0.02$ [0.06%]	$\pm 0.10$ [0.36%]	$\pm 0.15$ [0.53%]	$\pm 0.11$ [0.52%]	$\pm 0.08 \ [0.50\%]$	$\pm 0.12$ [0.78%]	$\pm 0.13$ [0.88%]	$\pm 0.08$ [0.67%]
alpha_JE1_EffectiveNP_Statistical4_Miced1 alpha_MUON_EFF_ISO_SYS	$\pm 0.01$ [0.04%] $\pm 0.01$ [0.03%]	$\pm 0.01$ [0.04%] $\pm 0.02$ [0.06%]	$\pm 0.01 [0.04\%]$ $\pm 0.03 [0.10\%]$	$\pm 0.01 \ [0.04\%]$ $\pm 0.01 \ [0.04\%]$	$\pm 0.01$ [0.03%] $\pm 0.02$ [0.10%]	$\pm 0.01 [0.06\%]$ $\pm 0.00 [0.00\%]$	$\pm 0.01 [0.04\%]$ $\pm 0.03 [0.22\%]$	$\pm 0.00 [0.04\%]$ $\pm 0.00 [0.01\%]$
alpha_FT_EFF_extrFromCharm	$\pm 0.01$ [0.03%]	$\pm 0.01$ [0.03%]	$\pm 0.01$ [0.02%]	$\pm 0.01$ [0.03%]	$\pm 0.00 \ [0.02\%]$	$\pm 0.00 \ [0.02\%]$	$\pm 0.00$ [0.03%]	$\pm 0.00 [0.02\%]$
alpha_EL_EFF_Reco alpha_JET_EffectiveNP_Mixed1	$\pm 0.01 \ [0.03\%]$ $\pm 0.01 \ [0.02\%]$	±0.02 [0.06%] ±0.03 [0.09%]	$\pm 0.01 [0.04\%]$ $\pm 0.01 [0.02\%]$	$\pm 0.02 [0.08\%]$ $\pm 0.01 [0.03\%]$	$\pm 0.01 [0.08\%]$ $\pm 0.00 [0.02\%]$	±0.01 [0.07%] ±0.00 [0.02%]	$\pm 0.02 [0.13\%]$ $\pm 0.01 [0.09\%]$	$\pm 0.01 [0.05%]$ $\pm 0.00 [0.02\%]$
alpha_MUON_EFF_RECO_SYS_LOWPT	$\pm 0.01$ [0.02%]	$\pm 0.01$ [0.02%]	$\pm 0.00$ [0.02%]	$\pm 0.00 \ [0.02\%]$	$\pm 0.00 \ [0.02\%]$	$\pm 0.00 \ [0.02\%]$	$\pm 0.00 \ [0.02\%]$	$\pm 0.00 \ [0.02\%]$
alpha_JE 1_EffectiveNP_Statistical6_Miced1 alpha_Resummation_Ziets	$\pm 0.01 \ [0.02\%]$ $\pm 0.01 \ [0.02\%]$	±0.01 [0.02%] ±0.00 [0.01%]	$\pm 0.00 [0.02\%]$ $\pm 0.01 [0.05\%]$	$\pm 0.00 [0.02\%]$ $\pm 0.00 [0.02\%]$	$\pm 0.00 [0.02\%]$ $\pm 0.01 [0.06\%]$	±0.00 [0.02%] ±0.01 [0.03%]	±0.00 [0.02%] ±0.00 [0.03%]	$\pm 0.00 [0.02\%]$ $\pm 0.01 [0.09\%]$
alpha_JET_EffectiveNP_Statistical2_Mixed1	$\pm 0.00 \ [0.02\%]$	$\pm 0.04$ [0.14%]	$\pm 0.01$ [0.04%]	$\pm 0.03$ [0.13%]	$\pm 0.01$ [0.03%]	$\pm 0.05$ [0.30%]	$\pm 0.01$ [0.09%]	$\pm 0.02 \ [0.14\%]$
alpha_Renormalization_Zjets alpha_JET_EffectiveNP_Statistical1_Mixed1	$\pm 0.00 [0.01\%]$ $\pm 0.00 [0.01\%]$	±0.00 [0.01%] ±0.00 [0.01%]	$\pm 0.01 [0.04\%]$ $\pm 0.00 [0.01\%]$	$\pm 0.00 \ [0.02\%]$ $\pm 0.00 \ [0.01\%]$	$\pm 0.01$ [0.05%] $\pm 0.00$ [0.01%]	$\pm 0.00 [0.03\%]$ $\pm 0.00 [0.01\%]$	±0.00 [0.02%] ±0.00 [0.02%]	$\pm 0.01 [0.07\%]$ $\pm 0.00 [0.01\%]$
alpha_CKKW_Zjets	$\pm 0.00 [0.01\%]$	$\pm 0.00 [0.01\%]$	$\pm 0.01$ [0.04%]	$\pm 0.00 \ [0.02\%]$	$\pm 0.01$ [0.05%]	$\pm 0.00 \ [0.02\%]$	$\pm 0.00 \ [0.02\%]$	$\pm 0.01 \ [0.06\%]$
alpha. EL EFF iso alpha. MUON.EFF RECO.STAT.LOWPT	$\pm 0.00 [0.01\%]$ $\pm 0.00 [0.01\%]$	$\pm 0.01$ [0.03%] $\pm 0.00$ [0.01%]	$\pm 0.01 [0.02\%]$ $\pm 0.00 [0.01\%]$	$\pm 0.01 [0.03%]$ $\pm 0.00 [0.01\%]$	$\pm 0.00 [0.03\%]$ $\pm 0.00 [0.01\%]$	$\pm 0.00 [0.03\%]$ $\pm 0.00 [0.01\%]$	$\pm 0.01 [0.04\%]$ $\pm 0.00 [0.01\%]$	$\pm 0.00 [0.02\%]$ $\pm 0.00 [0.01\%]$
alpha_MUON_EFF_RECO_STAT	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.00 \ [0.01\%]$	$\pm 0.01$ [0.05%]	$\pm 0.00 \ [0.01\%]$	$\pm 0.00$ [0.01%]	$\pm 0.00 [0.01\%]$
alpha_JET_EffectiveNP_Statistical3_Mixed1 alpha_JET_EffectiveNP_Modelling3_Mixed1	$\pm 0.00$   0.01% $\pm 0.00$   0.01%	$\pm 0.00$   0.01% $\pm 0.03$   0.11%	$\pm 0.00$ $ 0.01\% $ $\pm 0.02$ $ 0.07\% $	$\pm 0.00$ [0.01%] $\pm 0.01$ [0.07%]	$\pm 0.00$ [0.00%] $\pm 0.01$ [0.03%]	$\pm 0.00$ [0.01%] $\pm 0.00$ [0.01%]	$\pm 0.00$ [0.01%] $\pm 0.01$ [0.04%]	$\pm 0.00$ [0.01%] $\pm 0.01$ [0.09%]
alpha_MUON_EFF_TTVA_STAT	±0.00 [0.01%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.02%]	±0.00 [0.02%]	±0.00 [0.02%]
alpha_JET_EffectiveNP_Modelling4_Mixed1	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.01 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.02%]
alpha_JET_EffectiveNP_Detector2	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_ST_EFF_extrapolation	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.01%]
alpha,MUON,SAGITTA,RHO alpha IET BurghThranch MC16	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha,MUON,SAGITTA,RESBIAS	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.01%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_JET_EtaIntercalibration_highE alpha_FI_FFF Triggroupf	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_EL_EFF_Charge	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	+0.00 [0.00%]	±0.00 [0.00%]
alpha,EL,EFF,Trigger samma stat SR DE01 845 85 cuts him 0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%2	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]
gamma stat SR DF0J 8325 835 cuts bin 0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_8175_82_cuts_bin_0 gamma_stat_SR_SF01_79_795_cuts_bin_0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%2	±0.00 [0.00%] +3.59 [21.9%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
gamma stat_SR.DF0J.8375.84 cuts.bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma.stat.SR.SF0J.795.80.cuts.bin.0 gamma.stat.CR.Top.cuts.bin.0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 0.00% ±0.00 0.00%	±0.00 0.00% ±0.00 0.00%	±0.00 0.00% ±0.00 0.00%	±0.00 [0.00%] ±0.00 [0.00%]	±1.90 [12.5%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 0.00%
alpha_MUON_EFF_TrigStatUncertainty	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_835_8375_cuts_bin_0 samma_stat_VR_Ton_DF0J_cuts_bir_0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
gamma_stat_SR_DF0J_8225_825_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_85_85_cuts_bin_0 gamma_stat_VR_Ton_SF11_cuts_bin_0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
gamma_stat_VR_Top_SF0J_cuts_bin_0	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_8275_83_cuts_bin_0 gamma_stat_SR_DF0J_82_8225_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 in no%1	±0.00 [0.00%] ±0.00 [0.00%]
gamma_stat_SR_SF0J_80_81_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±2.49 [16.6%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_84_845_cuts_bin_0 gamma_stat_VR_Ton_DF11_cuts_bir_0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
gamma_stat_SR_DF0J.825.8275_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_DF0J_8125_815_cuts_bin_0 gamma_stat_SR_DF01_91_9125_outs_bin_0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%]
alpha_MUON_EFF_TrigSystUncertainty	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_CR_Dib_cuts_bin_0 gamma_stat_SR_DE01.86 cuts_bin_0	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%2	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]	±0.00 [0.00%] +0.00 [0.00%]
gamma_stat_VR_Dib_SF0J_cuts_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
alpha_PILEUP gamma_stat_SR_SF01.785.79.cuts.bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 2.53 [12.4\%]$	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$
gamma_stat_VR_Dib_DF0J_cuts_bin_0	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_SF0J_775_78_cuts_bin_0 gamma_stat_SR_DF0J_815_8175_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 1.86 \ [6.5\%]$ $\pm 0.00 \ [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]
gamma_stat_SR_DF0J_83_8325_cuts_bin_0	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	$\pm 0.00$ [0.00%]	$\pm 0.00$ [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR_SF0J_78_785_cuts_bin_0 gamma_stat_SR_SF0J_81_cuts_bin_0	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 2.89$ [10.0%] $\pm 0.00$ [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	$\pm 0.00 [0.00\%]$ $\pm 0.00 [0.00\%]$	±0.00 [0.00%] ±0.00 [0.00%]	±0.00 [0.00%] ±0.00 [0.00%]	$\pm 0.00 [0.00\%]$ $\pm 2.40 [19.9\%]$
	manne fannerst	manato fanance)	activity features	action forestel	annun funntal	anno fanosti	menta ferratel	and to [1000.00]

Table 12: Breakdown of the dominant systematic uncertainties on background estimates in the various signal regions. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total acqueeted background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

#### C1C1WW – Fit paramters comparison



#### C1C1WW - FNP systematics

- FNP estimates are negative in some of our analysis regions: set them to 0.01.
  - In particular, the statistics is high in CR\_Top and so are the systematic variations relative to a 0.01 yield
- Now considering the up/down variations relative to the nominal yields: the nominal yield thus inherits the systematic shif. This fixes the large syst errors appended to zero/negative yields.
- In general, 2 ways to compute the systematic components:

1. For every entry, compute the FNP\_TOTAL\_SYSTEMATIC from the FNP systematic components and finally read its value in a given channel

2. For all the entries in a given channel, consider the FNP systematic components and compute the FNP\_TOTAL\_SYSTEMATIC

Currently following the second approach which gives compatible results from the first approach but provides better systematic estimates for negative yields than the first approach (which overestimates them).

• FNP systematics computed by hand and careful implementation in the fit config as "userHistoSys" (with additional crosschecks of the produced up/down variation histograms from the HF data folder)

#### C1C1WW - FNP systematics

- FNP estimates are negative in our CRs: set to 0.01.
  - In particular, CR\_Top statistics is large and so are the systematic variations relatively to a 0.01 yield
- Now considering the up/down variations relatively to the nominal yields: the nominal yield thus inherits the systematic shift. This fixes the large syst errors appended to zero/negative yields.
- In general, 2 ways to compute the systematic components:

   For every entry, compute the FNP\_TOTAL\_SYSTEMATIC from the FNP systematic components and finally read its value in a given channel

2. For all the entries in a given channel, consider the FNP systematic components and compute the FNP\_TOTAL\_SYSTEMATIC

• Currently following the second approach which gives compatible results from the first approach but provides better systematic estimates for negative yields than the first approach (which overestimates them).

```
yield_down = get_quadrature_summed_weights_down(df_cut)
error_up = yield_up - region_yield
error_down = region_yield - yield_down
print("{0} FNP = {1:.2f}, +{2:.2f} - {3:.2f}".format(region, region_yield,_u)
```

```
→error_up, error_down))
```

#### C1C1WW - FNP systematics

• FNP systematics computed by hand and careful implementation in the fit config as "userHistoSys" (with additional crosschecks of the produced up/down variation histograms from the HF data folder)

CR\_Dib FNP = -10.59, +2.81 - 2.58 CR\_Top FNP = -117.95, +23.86 - 23.42 VR\_Dib\_DFOJ FNP = -3.76, +4.54 - 4.21 VR\_Dib\_SFOJ FNP = 7.79, +4.45 - 3.70 VR\_Top\_DF1J FNP = -25.01, +10.00 - 9.71 VR\_Top\_SF1J FNP = 4.23, +1.33 - 1.17 VR\_Top\_DF0J FNP = 20.47, +8.63 - 8.40 VR\_Top\_SF0J FNP = 0.05, +0.22 - 0.22

 $SR_DFOJ_81_8125 FNP = 2.13, +0.30 - 0.24$  $SR_DF0J_8125_815 FNP = 3.50, +0.37 - 0.34$  $SR_DF0J_815_8175 FNP = -0.99, +0.12 - 0.12$ SR DF0J 8175 82 FNP = -0.56, +0.34 - 0.35 $SR_DF0J_82_8225 FNP = 6.47, +0.67 - 0.67$  $SR_DF0J_8225_825 FNP = 1.35, +0.48 - 0.47$  $SR_DF0J_825_8275 FNP = 1.65, +0.57 - 0.60$  $SR_DFOJ_8275_83 FNP = -1.54, +0.37 - 0.36$ SR\_DF0J\_83\_8325 FNP = 2.32, +1.26 - 1.25  $SR_DFOJ_8325_835$  FNP = 0.43, +0.46 - 0.44 SR\_DF0J\_835\_8375 FNP = 4.26, +1.20 - 1.19  $SR_DFOJ_8375_84 FNP = 6.05, +0.47 - 0.46$ SR DFOJ 84 845 FNP = 0.93, +0.75 - 0.75 $SR_DFOJ_845_85 FNP = 4.59, +0.61 - 0.57$  $SR_DF0J_85_86 FNP = 2.15, +0.57 - 0.56$ SR DF0J 86 FNP = 0.09, +0.55 - 0.53

SR\_SFOJ\_77\_775 FNP = -3.38, +0.45 - 0.42 SR\_SFOJ\_775\_78 FNP = 1.41, +0.33 - 0.20 SR\_SFOJ\_78\_785 FNP = -0.97, +0.20 - 0.18 SR\_SFOJ\_785\_79 FNP = -1.76, +0.23 - 0.23 SR\_SFOJ\_79\_795 FNP = 1.11, +0.19 - 0.20 SR\_SFOJ\_795\_80 FNP = -1.21, +0.13 - 0.11 SR\_SFOJ\_80\_81 FNP = -1.72, +0.24 - 0.23 SR\_SFOJ\_81 FNP = -0.78, +0.09 - 0.08

#### C1C1WW - FNP systematics implementation

• Implementation in the fit of the FNP systematics

CR\_VV=myTopLvl.addChannel("cuts", ['CR\_Dib'], cutsNBins, cutsBinLow, cutsBinHigh)
CR\_top=myTopLvl.addChannel("cuts", ['CR\_Top'], cutsNBins, cutsBinLow, cutsBinHigh)
if doSyst == True:

CR\_VV.getSample("FNP").addSystematic( Systematic("FNP\_TOTAL\_SYS","",(0.01+2.81)/0.01,0.,"user","userHistoSys") )
CR\_top.getSample("FNP").addSystematic( Systematic("FNP\_TOTAL\_SYS","",(0.01+23.86)/0.01,0.,"user","userHistoSys") )

myTopLvl.addBkgConstrainChannels([CR\_VV,CR\_top])

#### if CRonlyFit == False:

VR\_VV\_DF0J=myTopLvl.addChannel("cuts",['VR\_Dib\_DF0J'],cutsNBins,cutsBinLow,cutsBinHigh) VR\_VV\_SF0J=myTopLvl.addChannel("cuts",['VR\_Dib\_SF0J'],cutsNBins,cutsBinLow,cutsBinHigh) VR\_top\_DF1J=myTopLvl.addChannel("cuts",['VR\_Top\_SF1J'],cutsNBins,cutsBinLow,cutsBinHigh) VR\_top\_DF0J=myTopLvl.addChannel("cuts",['VR\_Top\_SF1J'],cutsNBins,cutsBinLow,cutsBinHigh) VR\_top\_DF0J=myTopLvl.addChannel("cuts",['VR\_Top\_SF0J'],cutsNBins,cutsBinLow,cutsBinHigh)

VR\_VV\_DF0J.getSample("FNP").addSystematic( Systematic("FNP\_T0TAL\_SYS","",(0.01+4.54)/0.01,0.,"user","userHistoSys") )
VR\_VV\_SF0J.getSample("FNP").addSystematic( Systematic("FNP\_T0TAL\_SYS","",(7.79+4.45)/7.79,(7.79-3.70)/7.79,"user","userHistoSys") )
VR\_top\_DF1J.getSample("FNP").addSystematic( Systematic("FNP\_T0TAL\_SYS","",(0.01+10)/0.01,0.,"user","userHistoSys") )
VR\_top\_DF0J.getSample("FNP").addSystematic( Systematic("FNP\_T0TAL\_SYS","",(4.23+1.33)/4.23,(4.23-1.17)/4.23,"user","userHistoSys") )
VR\_top\_DF0J.getSample("FNP").addSystematic( Systematic("FNP\_T0TAL\_SYS","",(20.47+8.63)/20.47,(20.47+8.40)/20.47,"user","userHistoSys") )
VR\_top\_DF0J.getSample("FNP").addSystematic( Systematic("FNP\_T0TAL\_SYS","",(0.05+0.22)/0.05,0.,"user","userHistoSys") )

myTopLvl.addValidationChannels([VR\_VV\_DFØJ,VR\_VV\_SFØJ,VR\_top\_DF1J,VR\_top\_SF1J,VR\_top\_DF0J,VR\_top\_SFØJ])

	if ch == 'SR DF0J 81 8125' and doSyst == True:
	SR channel.getSample("FNP").addSystematic(Systematic("FNP TOTAL SYS","",(2.13+0.30)/2.13,(2.13-0.24)/2.13, "user", "histoSys"))
	elif ch == 'SR DF0J 8125 815' and doSyst == True:
	SR_channel.getSample("FNP").addSystematic(Systematic("FNP_TOTAL_SYS","",(3.50+0.37)/3.50,(3.50-0.34)/3.50, "user", "histoSys"))
	elif ch == 'SR DF0J 815 8175' and doSyst == True:
	SR channel_getSample("FNP").addSystematic(Systematic("FNP TOTAL SYS","",(0.01+0.12)/0.01,0., "user", "histoSys"))
	elif ch == 'SR DF0J 8175 82' and doSyst == True:
	SR channel.getSample("FNP").addSystematic(Systematic("FNP TOTAL SYS","",(0.01+0.34)/0.01.0., "user", "histoSys"))
	elif ch == 'SR DF0J 82 8225' and doSyst == True:
	SR channel.getSample("FNP").addSystematic(Systematic("FNP_TOTAL_SYS"."".(6.47+0.67)/6.47.(6.47-0.67)/6.47. "user". "histoSys"))
	elif ch == 'SR DF01 8225 825' and doSvst == True:
	SR channel.getSample("FNP").addSystematic(Systematic("FNP TOTAL SYS"."".(1.35+0.48)/1.35.(1.35-0.47)/1.35. "user". "histoSys"))
	elif ch == 'SR DF01 825 8275' and doSvst == True:
	SR channel.netSample("ENP").addSystematic(Systematic("ENP_TOTAL_SYS"."".(1.65+0.57)/1.65.(1.65-0.60)/1.65. "user". "histoSys"))
	elif ch == 'SR DF01 8275 83' and doSvst == True:
	SR channel.orfSample("FNP").addSystematic(Systematic("FNP TOTAL SYS","", (0,01+0.37)/0.01.0., "user", "histoSys"))
	elif ch == 'SR DF01 83 8325' and dosyst == True:
	SR channel.oetSample("FNP").addsystematic(Systematic("FNP TOTAL SYS"."", (2,32+1,26)/2,32, (2,32-1,25)/2,32, "user", "histoSys"))
	elif ch == 'SR DF01 8325 835' and dosyst == True:
	SR channel.oetSample("FNP").addSystematic("FNP TOTAL SYS"."".(0.43+0.46)/0.43.0., "user", "histoSys"))
	elif ch == 'SR DF01.835.8375' and dosvst == True:
	SR channel.oetSample("FNP").addSystematic("SNP TOTAL SYS"."".(4.26+1.20)/4.26.(4.26-1.19)/4.26. "user". "histoSys"))
	elif ch == 'SR DF01.8375.84' and dosyst == True:
	SR channel.oetSample("FNP").addsystematic(Systematic("FNP TOTAL SYS"."".(6.05+0.47)/6.05.(6.05-0.46)/6.05. "user", "histoSys"))
	elife == 'SR DF01 84 845' and doSyst == True:
	SR channel.oetSample("FNP").addSystematic("SVStematic("FNP TOTAL SYS"."".(0.93+0.75)/0.93.(0.93-0.75)/0.93. "user", "histoSys"))
	elif ch == 'SR DF01 845 85' and dosyst == True:
	SR channel.oetSample("FNP").addSystematic("SVStematic("FNP TOTAL SYS"."".(4.59+0.61)/4.59.(4.59-0.57)/4.59. "user", "histoSys"))
	elif chamiltar is the second
	SR channel.oetSample("FNP").addSystematic(Systematic("FNP TOTAL SYS"."", (2.15+0.57)/2.15, (2.15-0.56)/2.15, "user", "histoSys"))
	elif ch == 'SR DF01.86' and doSvst == True:
	SR channel.getSample("FNP").addSystematic(Systematic("FNP TOTAL SYS","",(0,09+0.55)/0.09.0., "user", "histoSys"))
	elif ch == 'SR SF01 77 775' and doSvst == True:
)	Sp channel gatSample("END") addSustamatic(Sustamatic("END TOTAL SVS" "" (0.01±0.45)/0.01.0. "user" "bistoSvs"))
	sign and the second state and the state and
))	$\mathbf{e}_{\mathbf{L}} = \mathbf{s}_{\mathbf{L}} - \mathbf{r}_{\mathbf{L}} - $
Sys")	SR_crannel.getSample("FNP").addSystematic(Systematic("FNP_IUTAL_STS","",(1.41+0.33)/1.41,(1.41-0.20)/1.41, "User", "histosys"))
	eLif ch == 'SR_SF0J_/8_/85' and doSyst == True:
	<pre>SR_channel.getSample("FNP").addSystematic(Systematic("FNP_TOTAL_SYS","",(0.01+0.20)/0.01,0., "user", "histoSys"))</pre>
	elif ch == 'SR_SF0J_785_79' and doSyst == True:
	<pre>SR_channel.getSample("FNP").addSystematic(Systematic("FNP_TOTAL_SYS","",(0.01+0.23)/0.05,0., "user", "histoSys"))</pre>
	elif ch == 'SR_SF0J_79_795' and doSyst == True:
	<pre>SR_channel.getSample("FNP").addSystematic(Systematic("FNP_TOTAL_SYS","",(1.11+0.19)/1.11,(1.11-0.20)/1.11, "user", "histoSys"))</pre>
	elif ch == 'SR SF0J 795 80' and doSyst == True:
	SR channel_getSample("ENP").addSystematic(Systematic("ENP TOTAL_SYS"."".(0.01+0.13)/0.01.0., "user", "histoSys"))
	alif che se SEG 180 811 and dosvet = True
	Spended and an advantage of the doubt and advantage of the state of th
	on_training typestamptet fire /.audusystematic( fire_forAL_STS , //0.0140.24//0.01/0. USer , fistosys"))
	$e_{\text{LLI} \text{ cli}} = 5\pi_2 - r \sigma_2 - 01 \text{ and } uousyst == 1 r ue:$
	<pre>SK_CHAINDEL.getSample("FNP").addSyStematlc(SyStematlc("FNP_IUIAL_SYS","",(0.01+0.09)/0.01,0., "USEF", "histoSyS"))</pre>

myTopLvl.addSignalChannels(SR\_channel)