Stato dell'esperimento contributo di Roma3 e preventivi 2026

Mauro Iodice

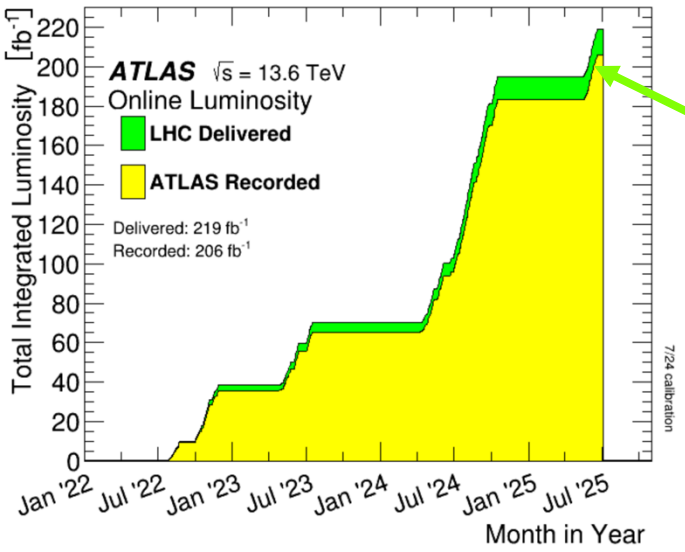
Roma Tre

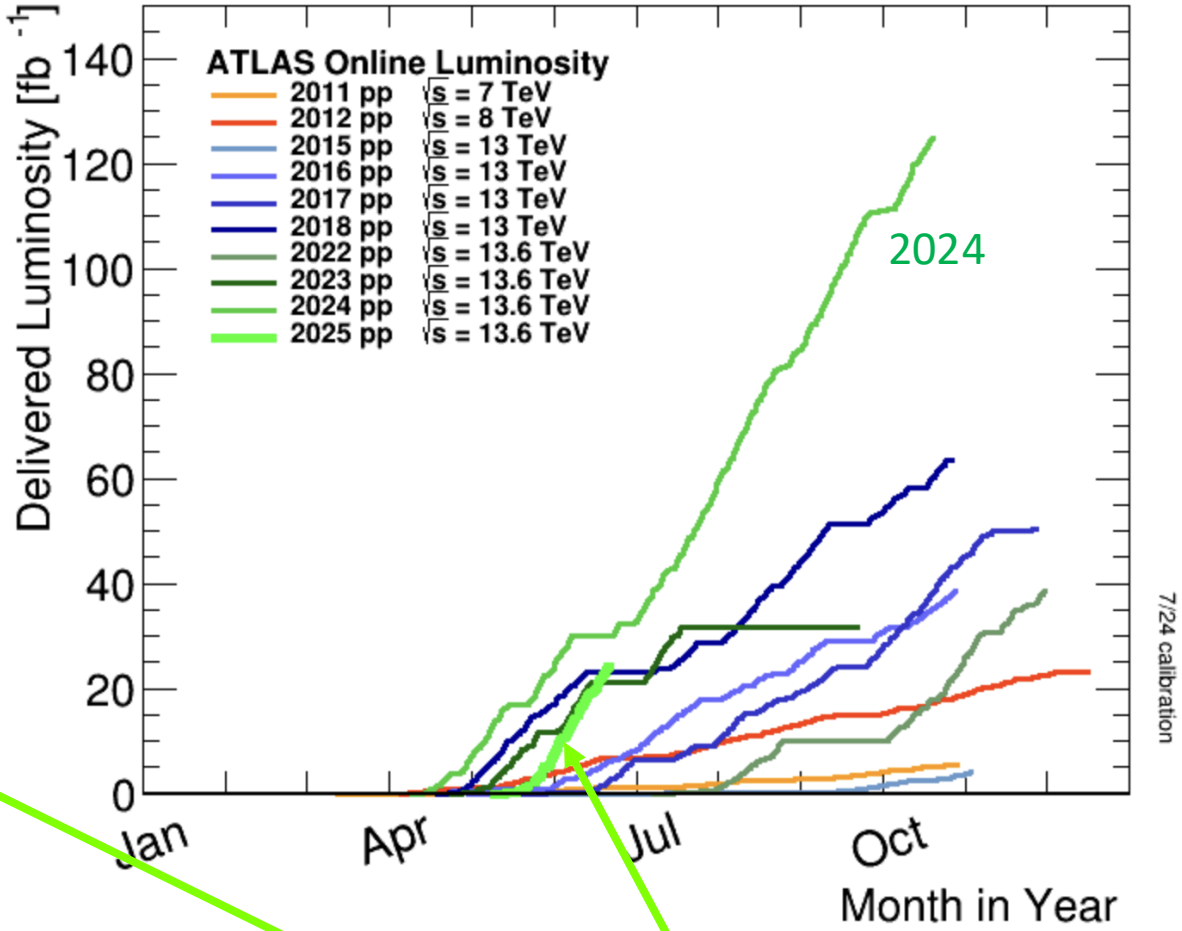
4 Luglio 2025

ATLAS Luminosity History and 2025 restart

ATLAS is in full DATA TAKING

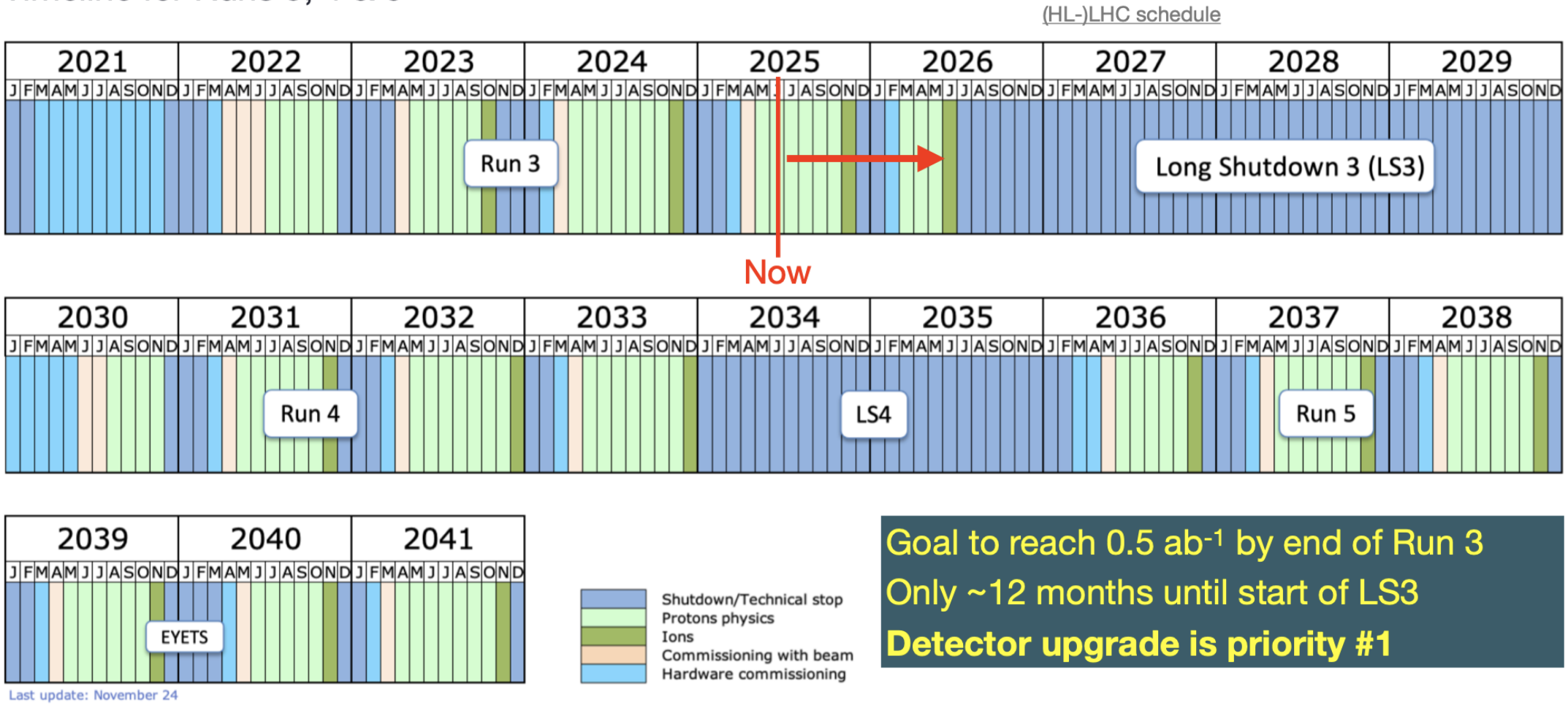
- **2025 successful restart in May.**
  - Very short time to arrive at nominal lumi (2 x 10^{34})
  - High average num of interactions per bunch: **~62**
- **Data taking for 2025 until November**





LHC Schedule – Towards High-Luminosity LHC

- Timeline for Runs 3, 4 & 5



Goal to reach 0.5 ab^{-1} by end of Run 3

Only ~12 months until start of LS3

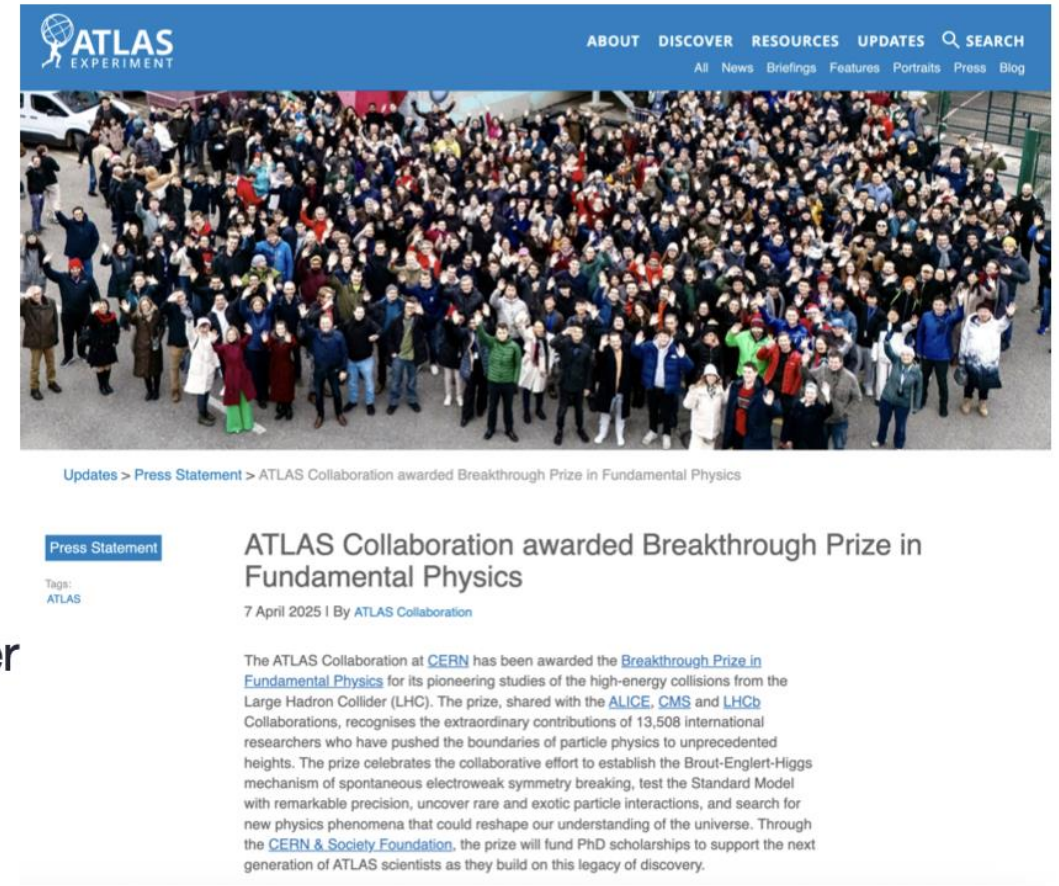
Detector upgrade is priority #1

2025 BREAKTHROUGH Prize in Fundamental Physics

Prize awarded to ATLAS and CMS, ALICE and LHCb

- **2025 Breakthrough Prize in Fundamental Physics**
  - **Prize money to fund PhD studentship at CERN**
  - Extension of successful ATLAS PhD grant scheme established by Peter Jenni and Fabiola Gianotti following 2013 Special Breakthrough Prize in Fundamental Physics
  - Eligibility:
    - Students enrolled in a PhD program at any of the ATLAS member institutes (member states or non-member states) and working on a PhD thesis on ATLAS
  - Details being worked out between Management and Collaboration Board Chairs
  - Aim to open first PhD studentship in 2026

ATLAS press statement

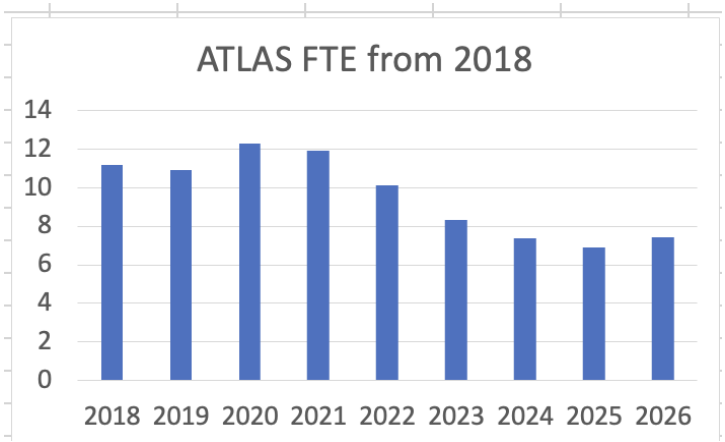


ATLAS a Roma Tre

	RICERCATORI	Posizione	Qualifica	ATLAS
1	Biglietti Michela	Dipendente	I Ric.	70
2	Ceradini Filippo	[P] Associat	Prof. Ordinario	0
3	Chmiel Kacper	Associato	Dottorando	80
4	De Angelis Ilaria	Inc. Ric.	Tecnologo	30
5	Di Micco Biagio	Inc. Ric.	Prof. Associato	80
6	Di Nardo Roberto	Inc. Ric.	Prof. Associato	80
7	Farilla Addolorata	[P] Associat	I Ric.	90
8	Iodice Mauro	Dipendente	I Ric.	70
9	Montereali Federico	Associato	Dottorando	85
10	Orestano Domizia	Inc. Ric.	Prof. Ordinario	70
11	Orlandini Romano	Associato	Dottorando	90
	TOTALE FTE			7,45

IN Kacper Chmiel PhD

Storico FTE ATLAS Rm3								
2018	2019	2020	2021	2022	2023	2024	2025	2026
11,2	10,9	12,3	11,9	10,1	8,3	7,4	6,9	7,45



Attivita' di Roma3 in ATLAS – Physics Analyses

Analysis team:

M. Biglietti, B. Di Micco, R. Di Nardo, A. Farilla,
K. Chmiel (new PhD), F. Montereali (post-Doc) , R. Orlandini (PhD)

1. Analisi VH, H-> WW misura della sezione d'urto WH e ZH e misura differenziale in pT W,Z ,

ATTIVITA' CONCLUSA CON LA PUBBLICAZIONE DELL'ARTICOLO con i dati del Run2 (2015-2018)

2. Analisi hh->WWbb ricerca di produzione non risonante hh->WWbb WW-> l nu qq,

e pp->SH, S->WW, H->bb

3. Analisi hh->bbγγ sui dati del Run3 tesi di dottorato di Federico e Romano. Lavoro su fit cinematico per migliorare la risoluzione sugli osservabili b-jet. Primi Risultati pubblici sui dati parziali di Run3 (2022-2024)

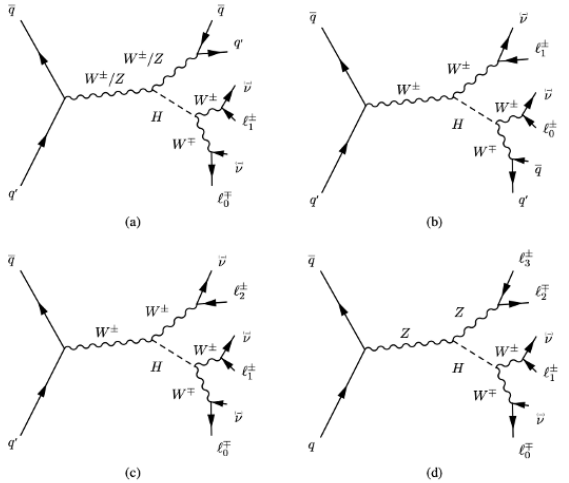
4. LHC-Higgs Combination Group (R. Di Nardo) working group per risultati combinati ATLAS e CMS su risultati di analisi sull'Higgs

Produzione associata Higgs+Vector Boson

M. Biglietti, B. Di Micco, R. Di Nardo, A. Farilla

Multiple final states (2l, 3l and 4l plus missing energy and jets)

Full Run2 analysis, pp collisions correponding to 140 fb^{-1}



Accepted!

EUROPEAN ORGANISATION FOR NUCLEAR RESEARCH (CERN)

ATLAS EXPERIMENT

Submitted to: JHEP

CERN-EP-2025-037
26th March 2025

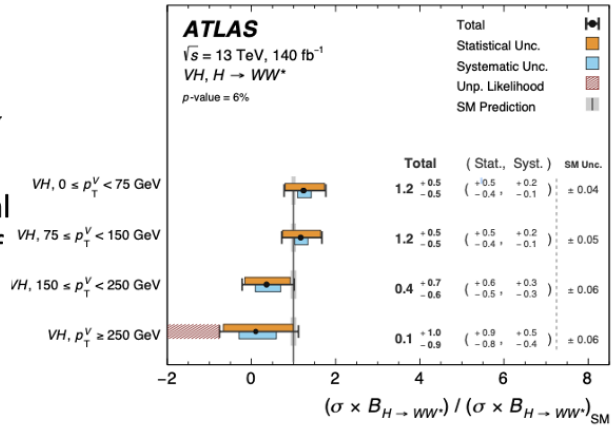
arXiv:2503.19420v1 [hep-ex] 25 Mar 2025

Measurements of the production cross-sections of a Higgs boson in association with a vector boson and decaying into WW^* with the ATLAS detector at $\sqrt{s}$ = 13 TeV

The ATLAS Collaboration

Measurements of the total and differential Higgs boson production cross-sections, via WH and ZH associated production using $H \to WW^* \to \ell\nu\ell\nu$ and $H \to WW^* \to \ell\nu jj$ decays, are presented. The analysis uses proton–proton events delivered by the Large Hadron Collider at a centre-of-mass energy of 13 TeV and recorded by the ATLAS detector between 2015 and 2018. The data correspond to an integrated luminosity of 140 fb^{-1}. The sum of the WH and ZH cross-sections times the $H \to WW^*$ branching fraction is measured to be $0.44^{+0.10}_{-0.09}$ (stat.) $^{+0.06}_{-0.05}$ (syst.) pb, in agreement with the Standard Model prediction. Higgs boson production is further characterised through measurements of the differential cross-section as a function of the transverse momentum of the vector boson and in the framework of Simplified Template Cross-Sections.

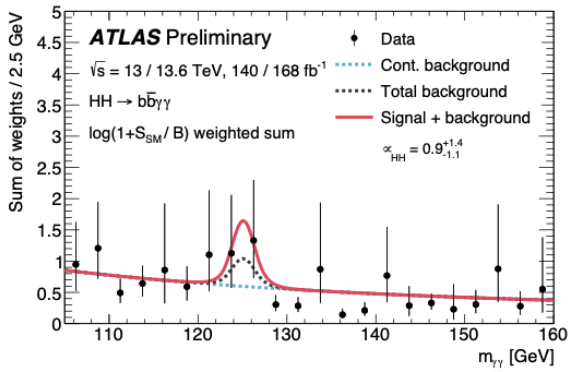
measurement of WH and ZH cross-sections times the $H \to WW^*$ BR and of the differential cross-sections as a function of the pT of the vector boson in the framework of Simplified Template Cross-Sections



A, Farilla - Analysis Contact
B. Di Micco - Contact Editor.

Di-Higgs Search

Latest $b\bar{b}\gamma\gamma$ results



- ✓ Achieved an **observed** (**expected**) significance of **0.84σ** (**1σ**)
- ✓ **~100% improvement** in expected significance from the [previous analysis]

  ↳ **5% from the new Kinematic Fit**

Conference Note: [ATLAS-CONF-2025-005]

Paper publication next week

- *F. Montereali: PhD thesis*
- *R. Orlandini: Master thesis (and PhD ongoing)*
- *A. Trudu: Master thesis*
- *B. Di Micco*

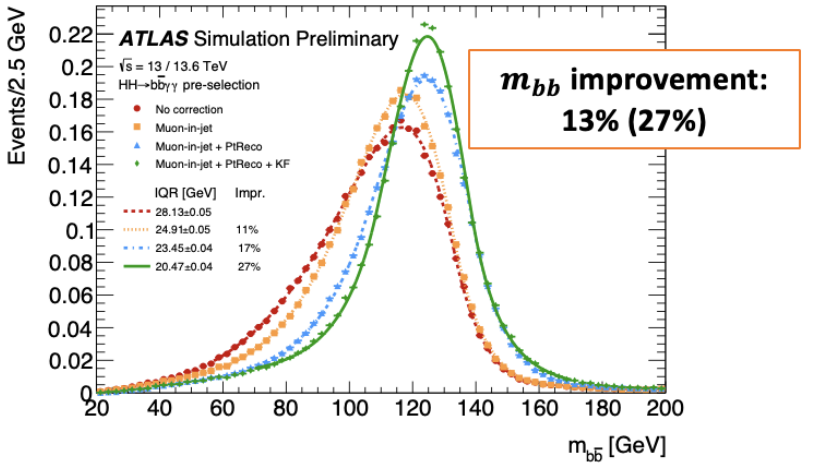
$HH \rightarrow WWb\bar{b}$ 1 lepton

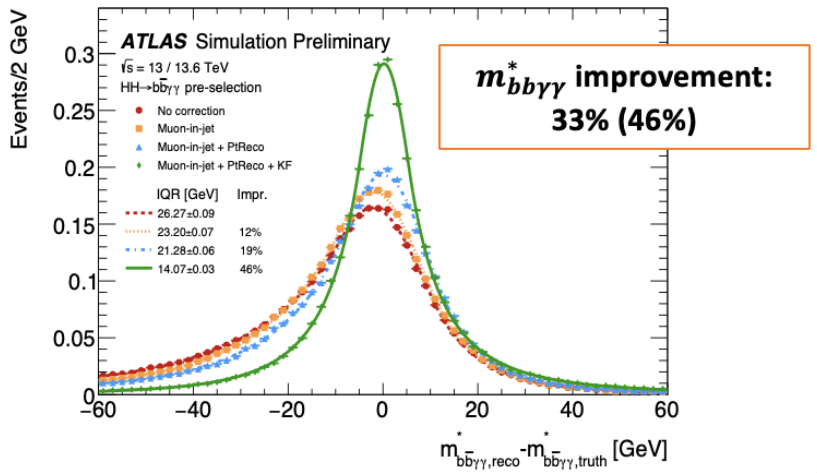
- *B. Di Micco: Contact editor*
- *V. D'Amico (Roma Tre PhD, now Munchen): Analysis contact*

Analysis fully approved *Publication in 2025*

Run2 dataset (140 fb^{-1}) HH *non-resonant &* $X \rightarrow SH$ *interpretation*

$b\bar{b}\gamma\gamma$ Kinematic Fit





Attivita' di Roma3 in ATLAS - Detector

ATTIVITA' sul RIVELATORE prevalentemente concentrata sui muoni - Muon Spectrometer

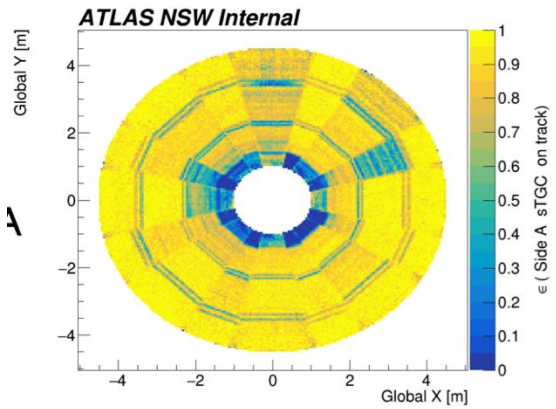
- Studi di Performance nell'ambito del Muon Detector Performance group **[Mauro, Federico, Romano, Kacper]**
- Sviluppo e mantenimento di packages per il Data Quality offline di MDT e Micromegas **[Michela]**
- Calibrazioni MDT **[Roberto]**
- NSW operation expert **[Biagio]**

Prevediamo inoltre una partecipazione ai turni di presa
dati di RUN3 sia desk Muoni che Shift-Leader

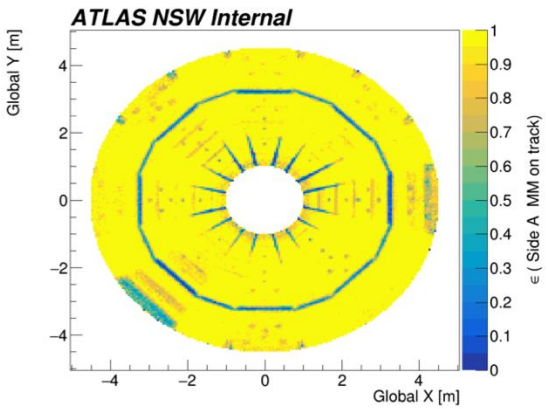
New Small Wheel – Micromegas

Un grande contributo di Roma3

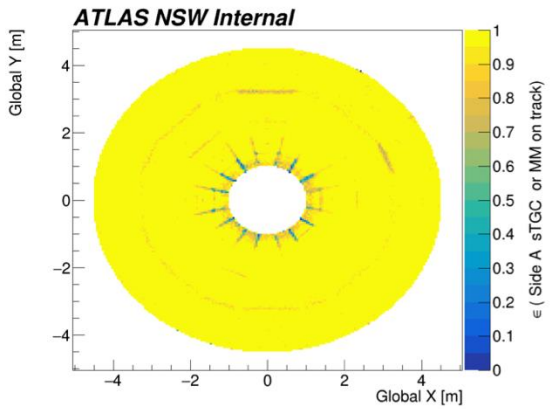
- Installate dall'inizio del Run3 nel 2022 e subito incluse nel DAQ
- Dal 2023 incluso nel tracciamento di ATLAS
- Dal 2024 partecipa al Trigger di ATLAS Muon → Uno degli obiettivi principali per il Run3
- Il gruppo di Muon Detector Performance (con un rilevante contributo di Roma3 – Romano, Federico, Kacper, Mauro) dedica un impegno costante allo studio e al miglioramento delle prestazioni delle NSW (in particolare delle Micromegas)



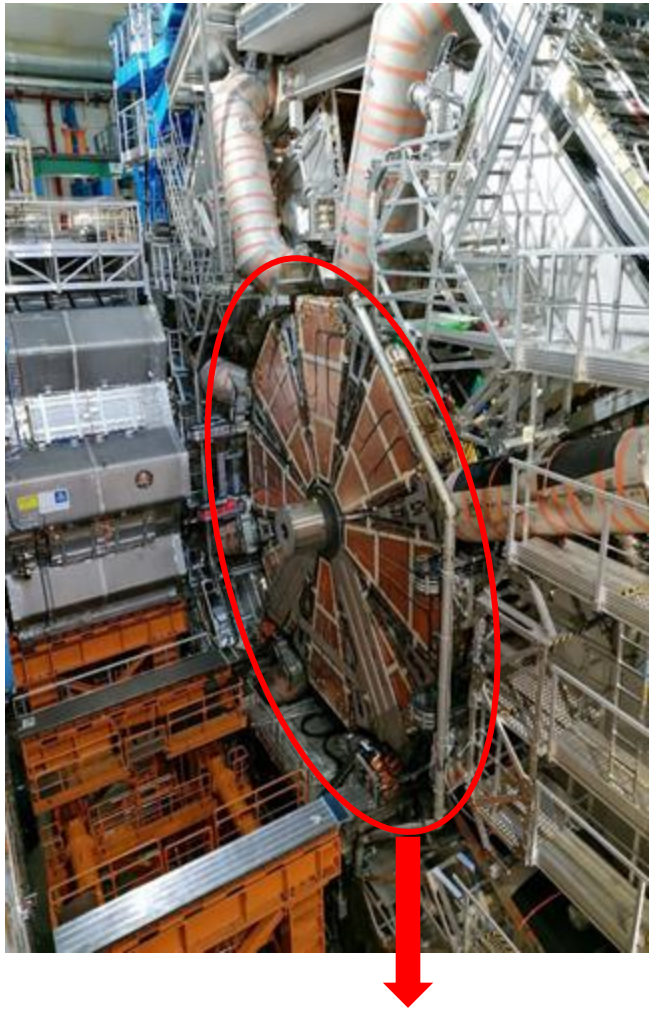
sTGC Tracking Efficiency



Micromegas Efficiency



NSW Combined Efficiency



NSW: Micromegas + sTGC

Responsabilità'

Responsabilità (Livello2)

- R. Di Nardo Convenership nell' LHC Higgs Combination Group (LHC-HCG)
- M. Iodice Convenership nel Muon Detector Performance group
- M. Iodice Chair of the ATLAS-Muon Speakers Committee

Responsabilità (Livello3)

- Di Nardo MDT Calibration Expert

Richieste Finanziarie

PRELIMINARI
- Da finalizzare in questi giorni

TOT FTE ATLAS:	**7,45**	
Missione Costo/FTE [kEuro]	**3,7**	
TOT m.u. per Responsabilita'	7.5	m.u.: Di Nardo 3 Iodice 3 Iodice 3*0.5
Tot m.u. per OTP Classe 1 e classe 3	7,45	1 x FTE
DATABASE PREVENTIVI:		
Voce	**kEuro**	**Note**
Missioni (metabolismo)	27,57	3.7kE/FTE x 1.25 m.u./FTE
Missioni per Responsabilita'	11,10	Di Nardo
Missioni per Responsabilita'	11,10	Iodice
Missioni per Responsabilita'	5,55	Iodice
Missioni per Responsabilita' TOT		27,75
Missioni per OTP Classe 1+3	27,57	1 m.u./FTE
TOT Missioni	**82,88**	
CONSUMO Metabolismo	11,175	1,5kE/FTE
TOT CONSUMO	**11,175**	
TOT RICHIESTE ATLAS	**94,055**	

Nota: missioni da agoritmi concordati con la Collab. ATLAS e con i referee (!!!)
In generale viene applicato una riduzione di un fattore > 2 (!!!)

SERVIZI

Supporto al Calcolo ATLAS a Roma Tre:

Supporto al calcolo locale

- Principali problematiche: Gestione dello storage
- L'impegno medio è di circa 1-2 MU

Supporto al calcolo via Grid

- Presa dati 2026
- Coordinamento nazionale fra tutti i tier
  - Installazione e configurazione di nuovi servizi

→ Per il prossimo anno si stima un impegno di circa 2-3 MU

Sui Servizi
TUTTO MOLTO PRELIMINARE
(da richieste scorso anno)