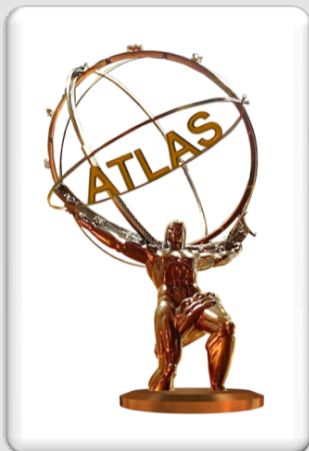


ATLAS: stato e prospettive 2016

Chiara Roda

Universita` di Pisa e INFN

A nome del gruppo ATLAS Pisa



Lavori su LHC secondo previsioni

Dalla presentazione dello scorso anno
V.Cavasinni



CERN's accelerator complex schedule:

2 June 2014: restart of the Booster

18 June 2014: restart of the Proton Synchrotron (PS)

Early July: powering tests at the Super Proton Synchrotron (SPS)

Mid- July: Physics programme to restart at the Isolde facility and at the PS

Mid-August: Antimatter Physics programme to restart at the Antiproton Decelerator (AD)

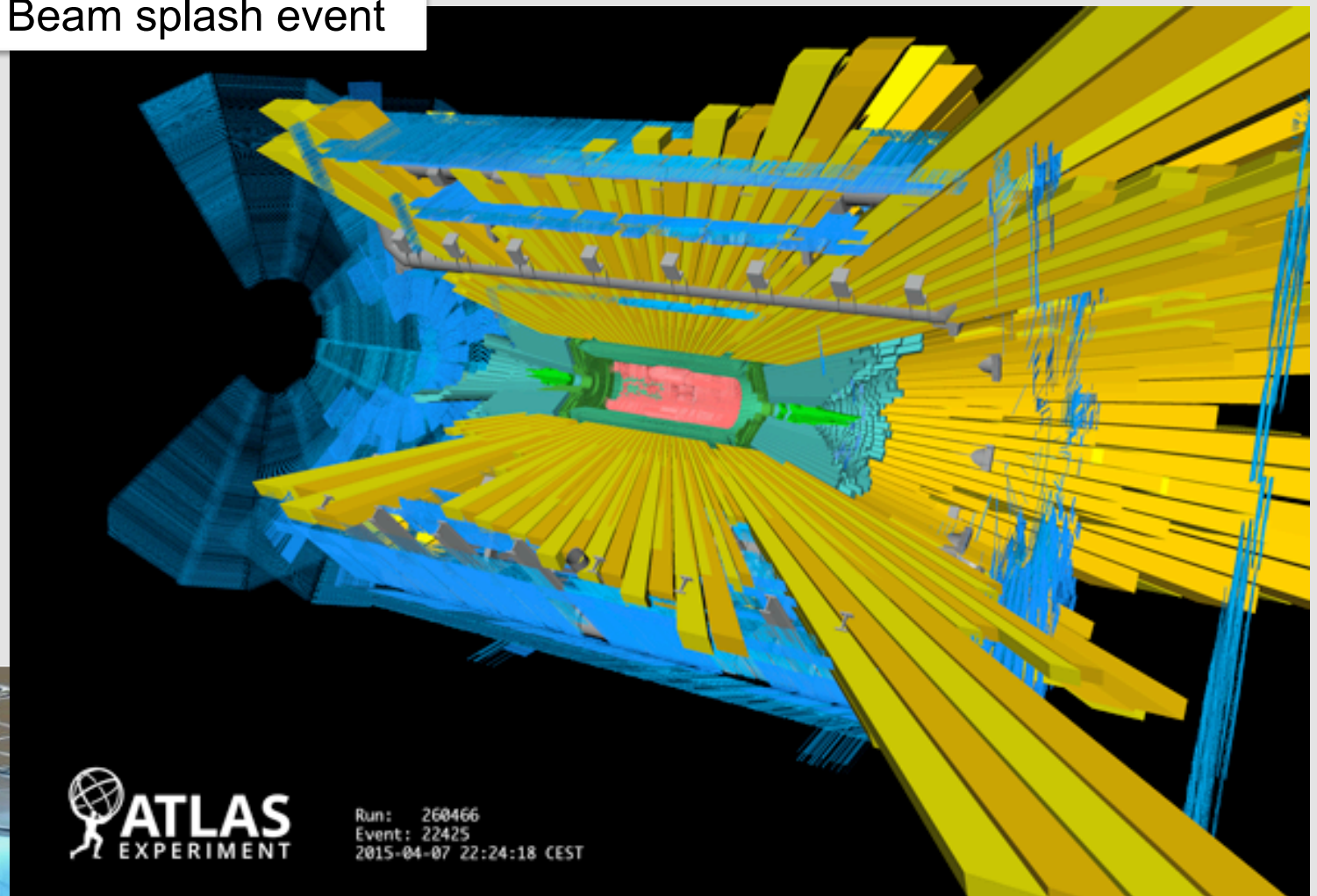
Mid- October: Physics programme to restart at the SPS

Early 2015: Beam back into the Large Hadron Collider (LHC)

Spring 2015: Physics programme to restart at the LHC experiments

Commissioning della «nuova macchina» da gennaio 2015

Beam splash event



First stable beams, 3 June

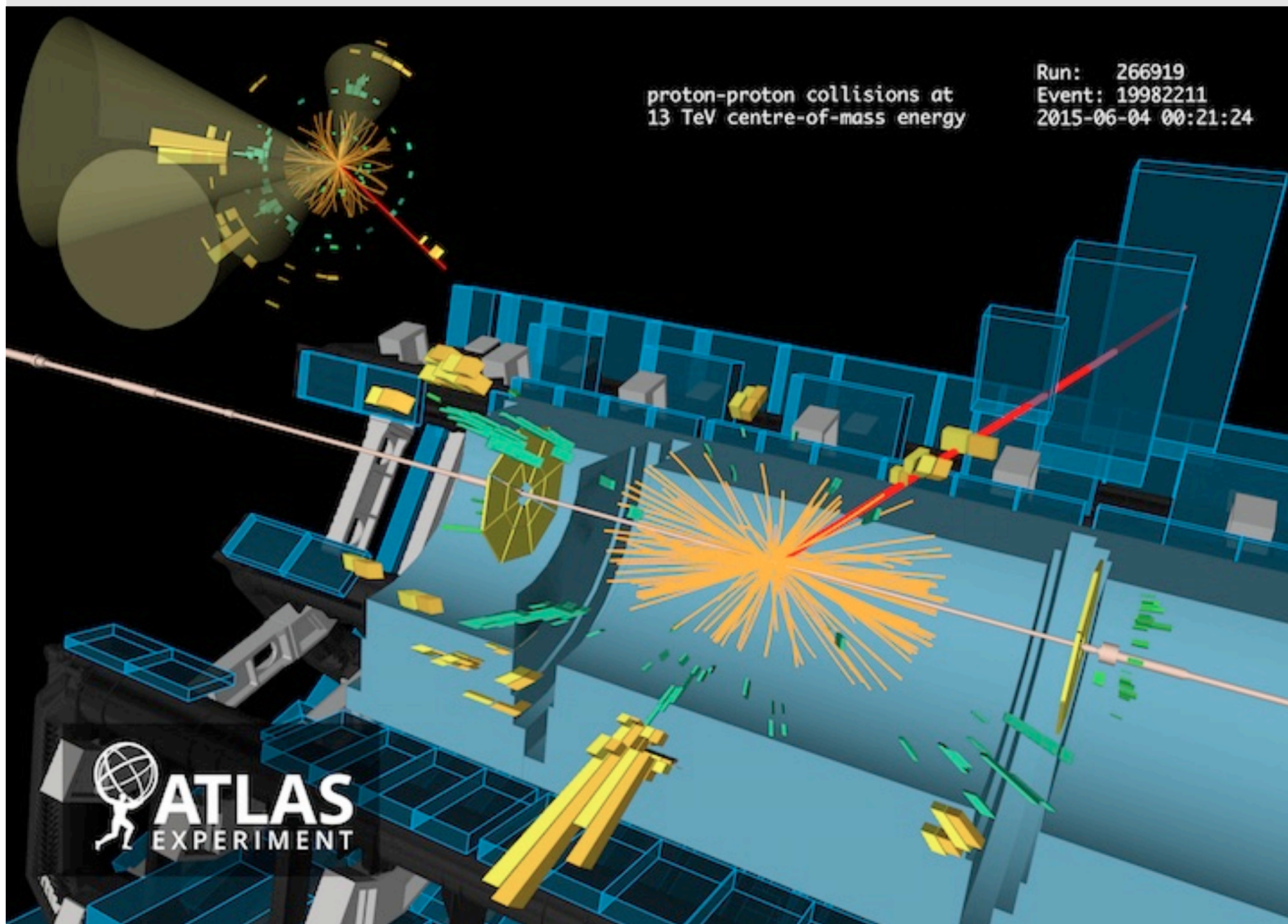
PROTON PHYSICS: STABLE BEAMS

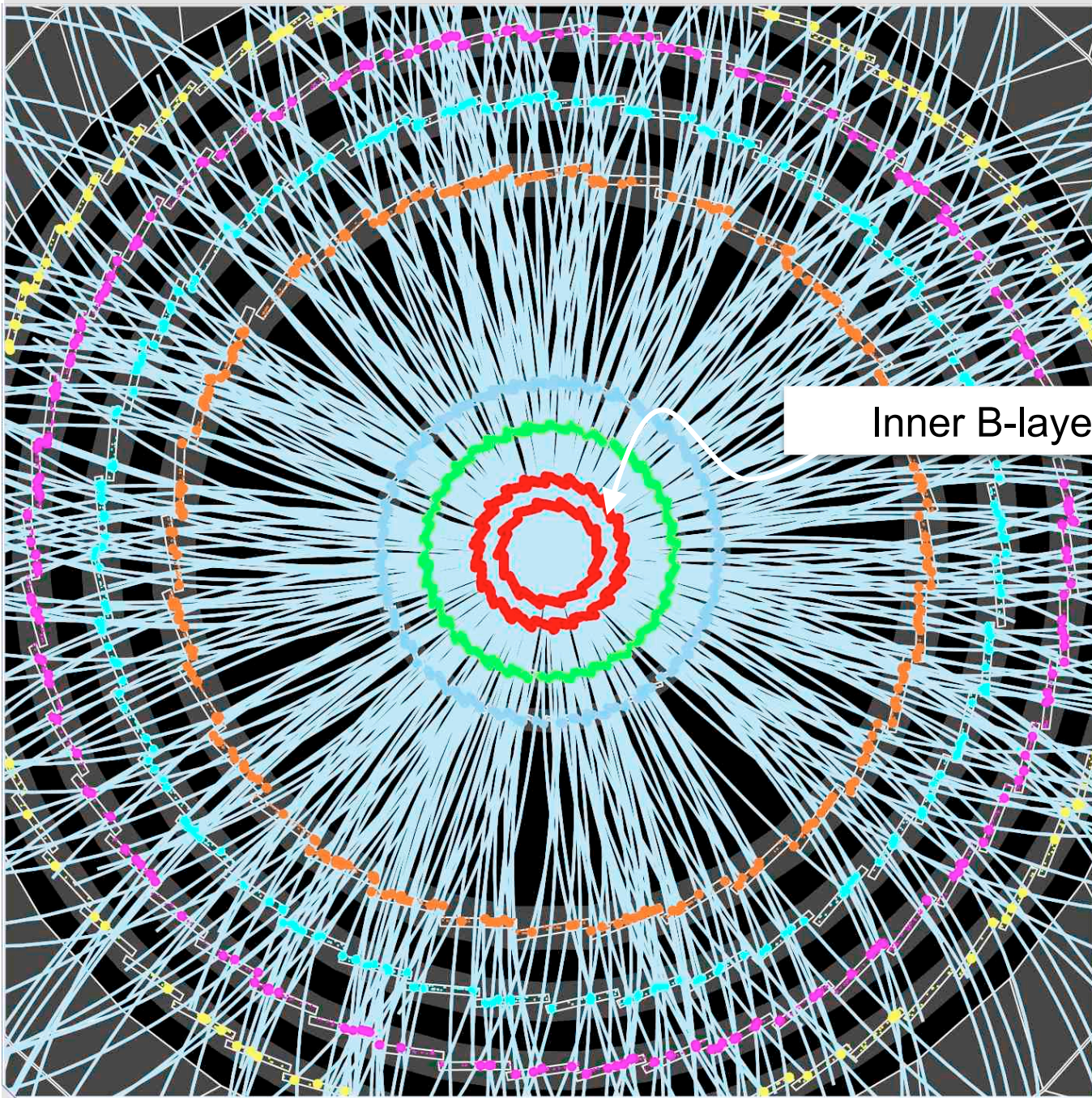
Energy:	6500 GeV	I(B1):	2.87e+11	I(B2):	2.87e+11
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proton-proton collisions at
13 TeV centre-of-mass energy

Run: 266919
Event: 19982211
2015-06-04 00:21:24



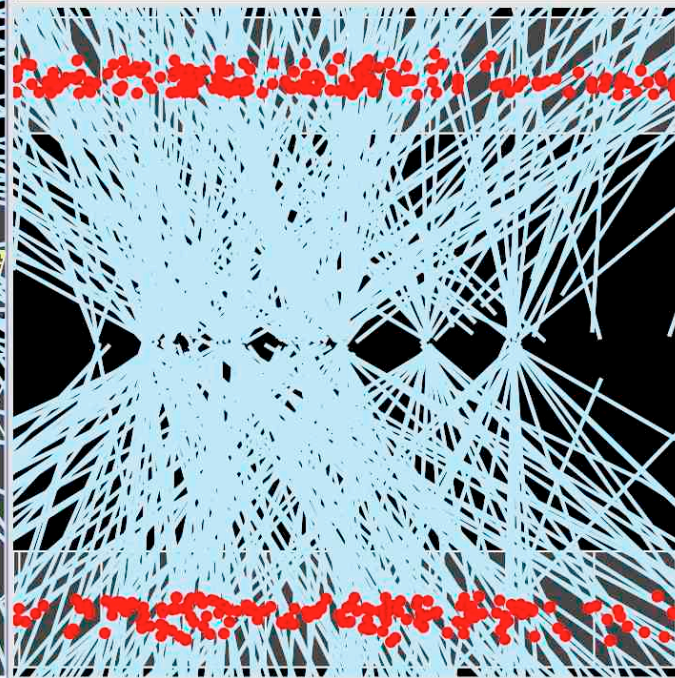


ATLAS
EXPERIMENT

Run Number: 266904, Event Number: 25884805

Inner B-layer – New

06-03 13:41:54 CEST



Physics data dal 3 Giugno

Short summary of the data:

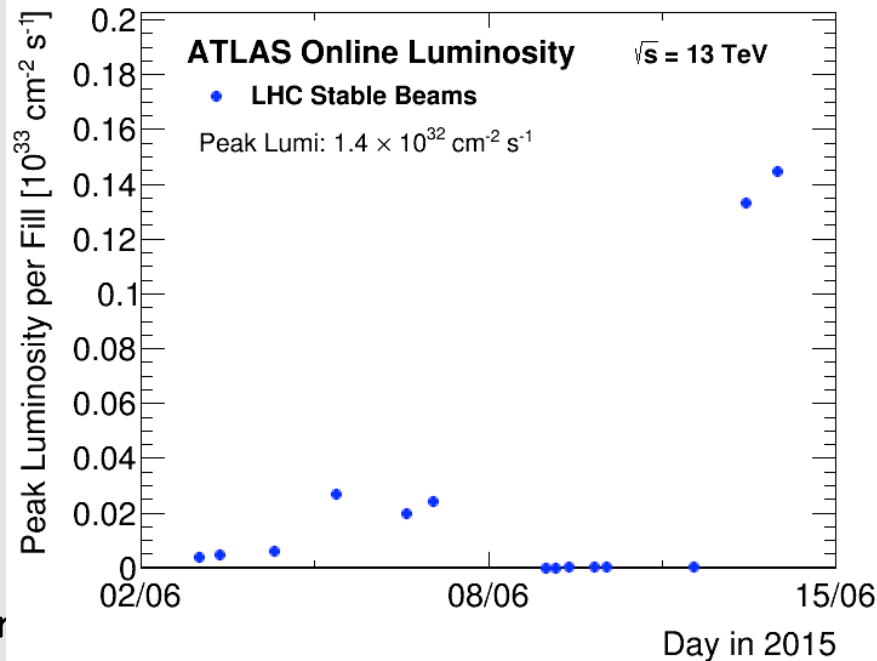
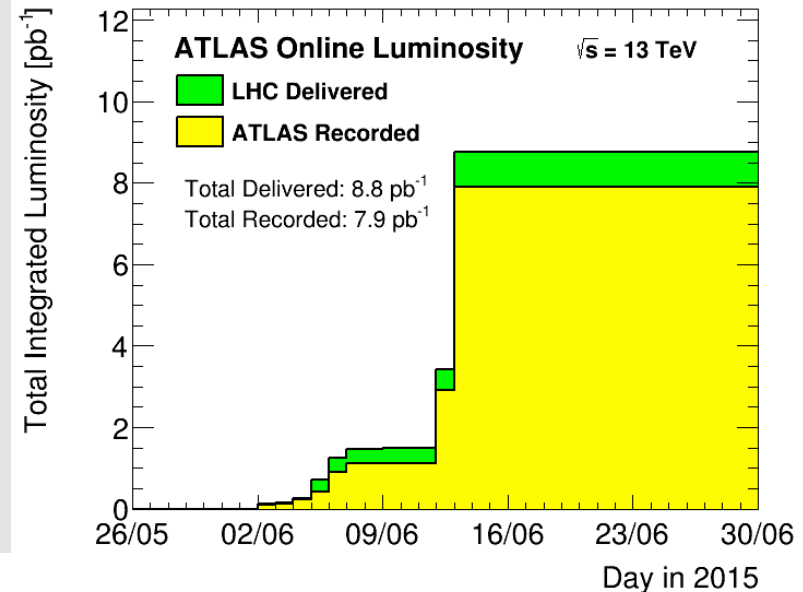
Intensity ramp-up

- 3 fills with 2 colliding bunches
- 3 fills with 8/6 colliding bunches
- 2 fills with 38 colliding bunches

Total $\sim 8 \text{ pb}^{-1}$ delivered

Low- μ running

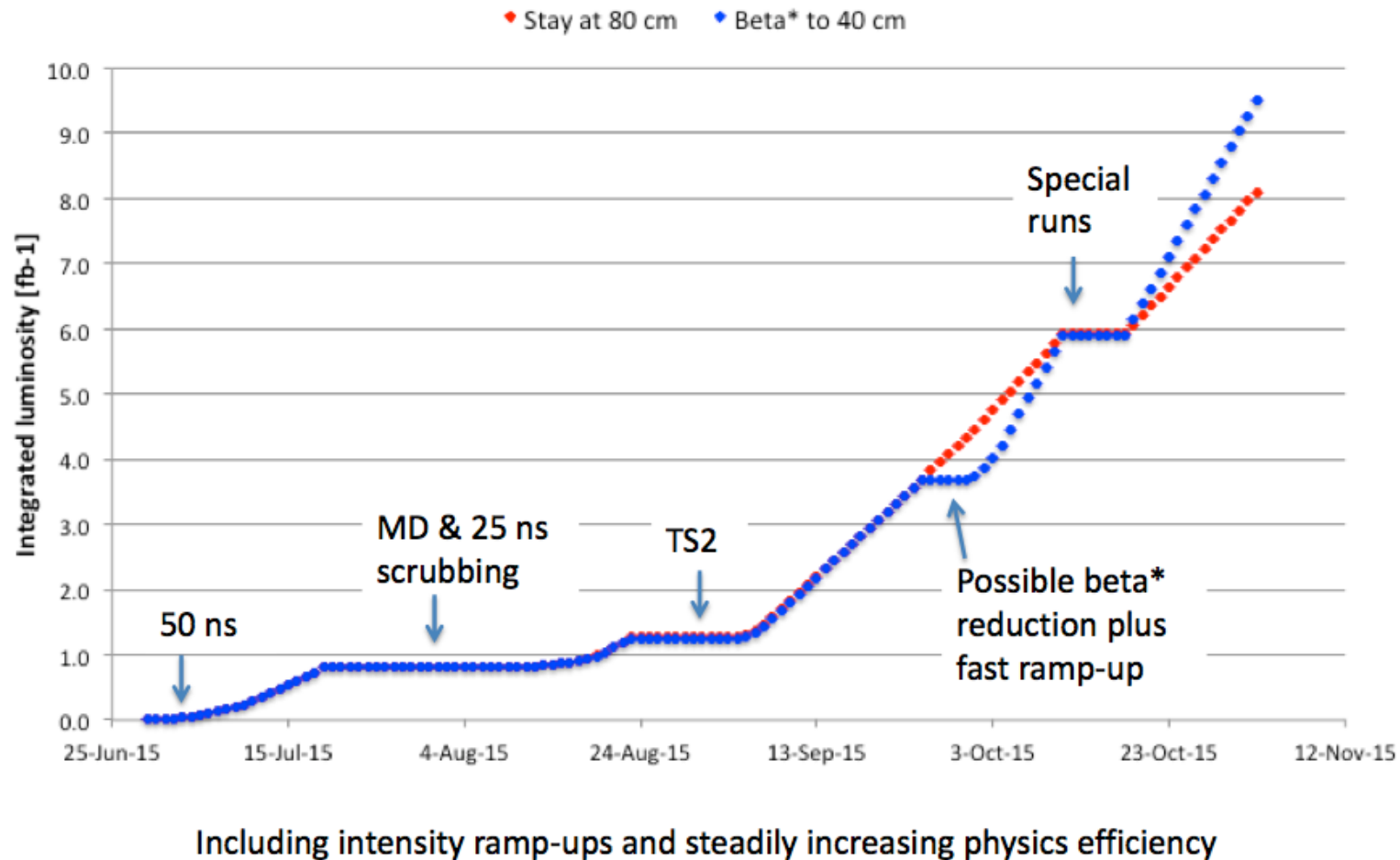
- $\sim 7\text{h}$ with $\mu \sim 0.01$
- $\sim 27\text{h}$ with $\mu \sim 0.03$



Luminosità integrata: 8 pb^{-1}
Peak Lumi: $1.4 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$

Luminosita` da qui alla fine dell'anno...

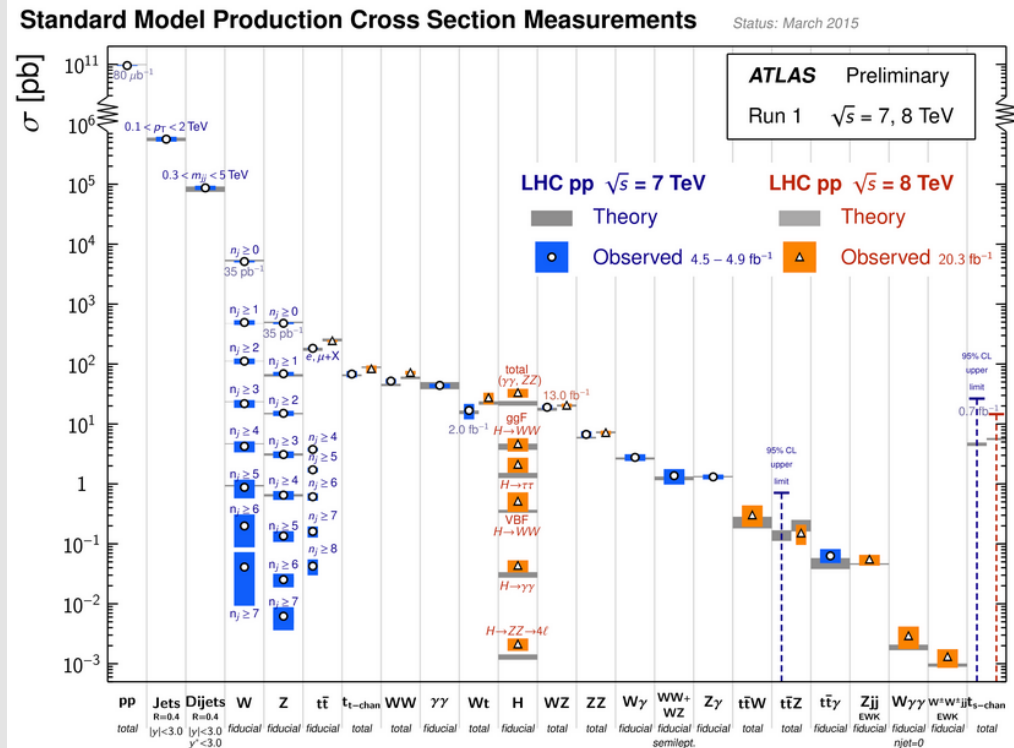
- 50 ns running: 21 days / 25 ns running: 70 days (split in $\beta^* = 80$ / ~ 40 cm phases)



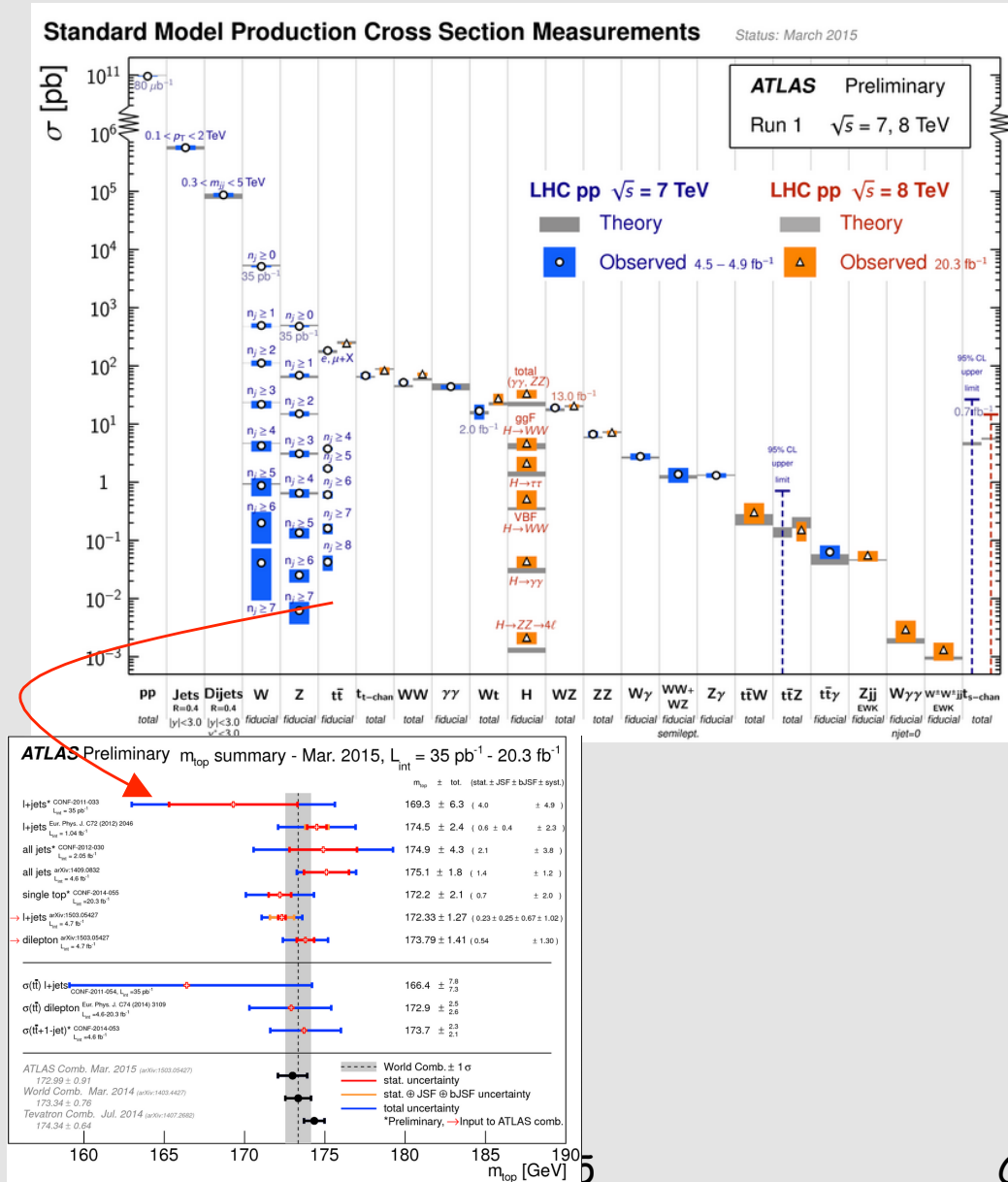
30

Il ricco raccolto dai dati del Run1
non solo Higgs 😊

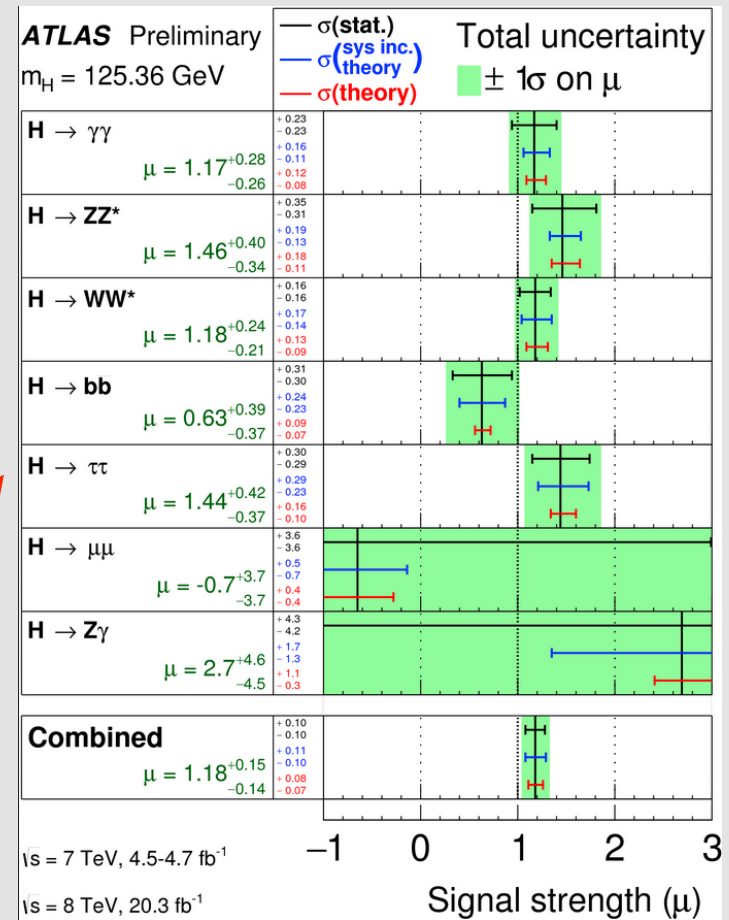
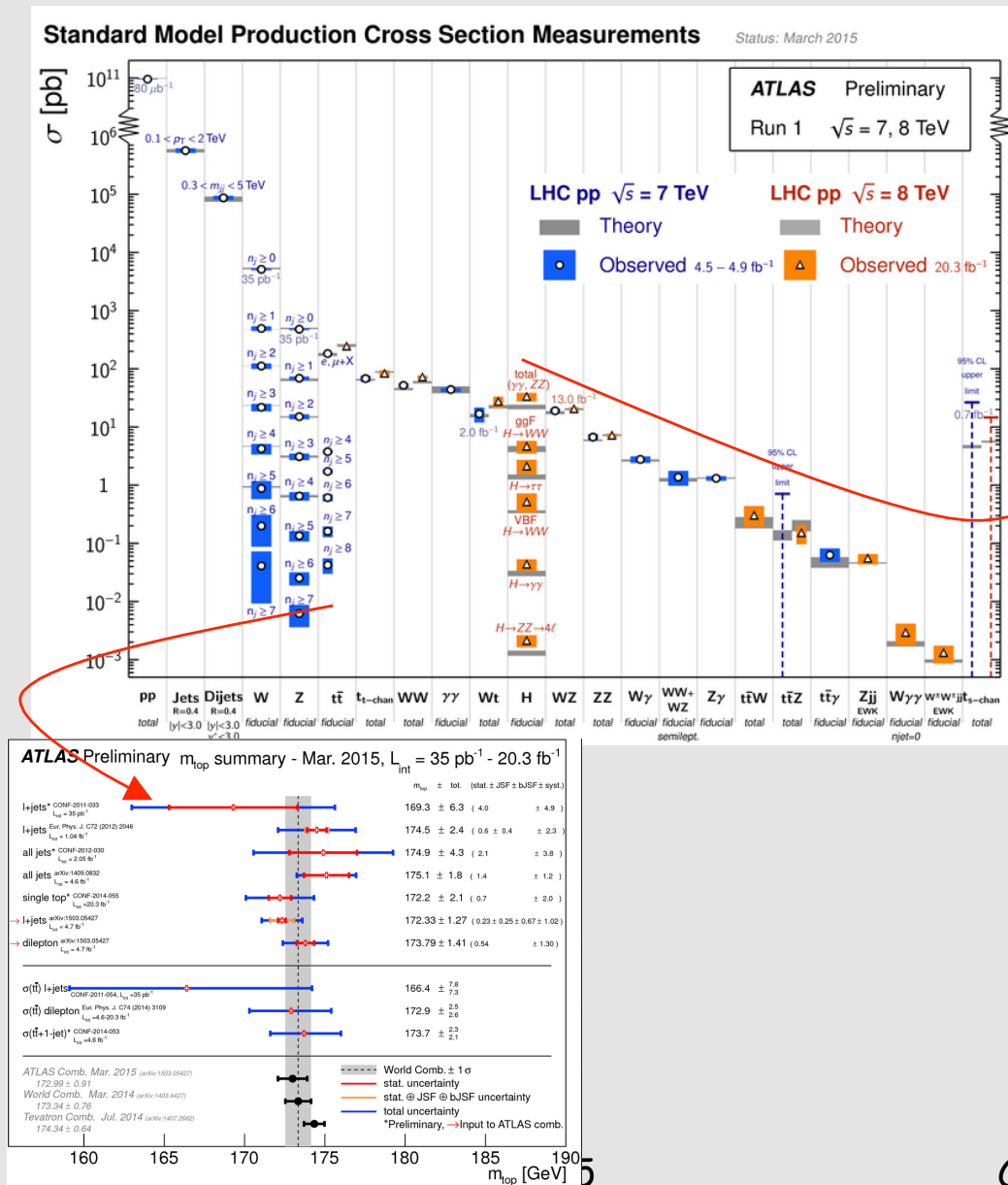
Il ricco raccolto dai dati del Run1 non solo Higgs 😊



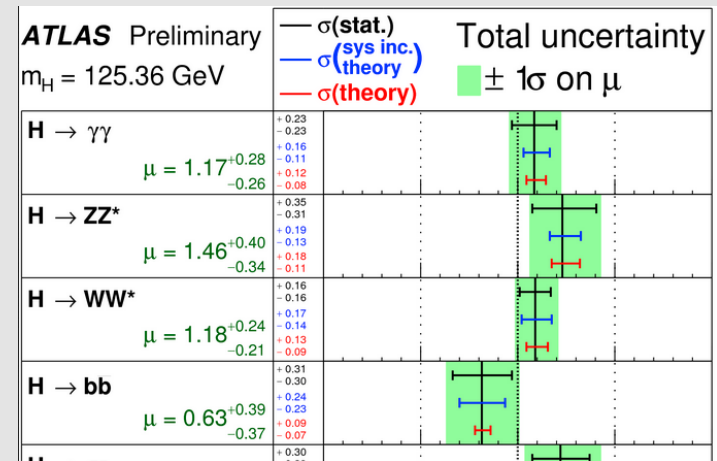
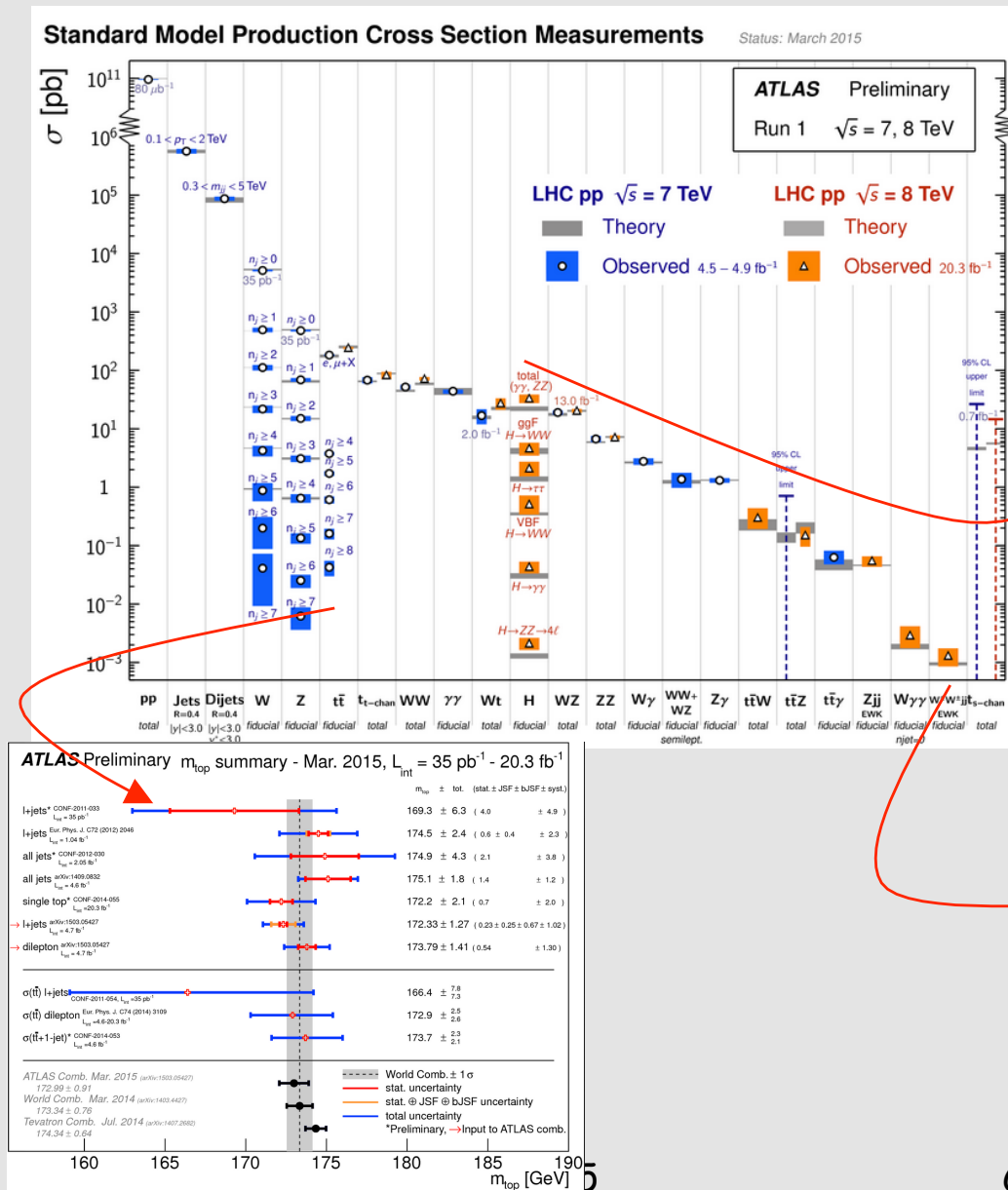
Il ricco raccolto dai dati del Run1 non solo Higgs ☺



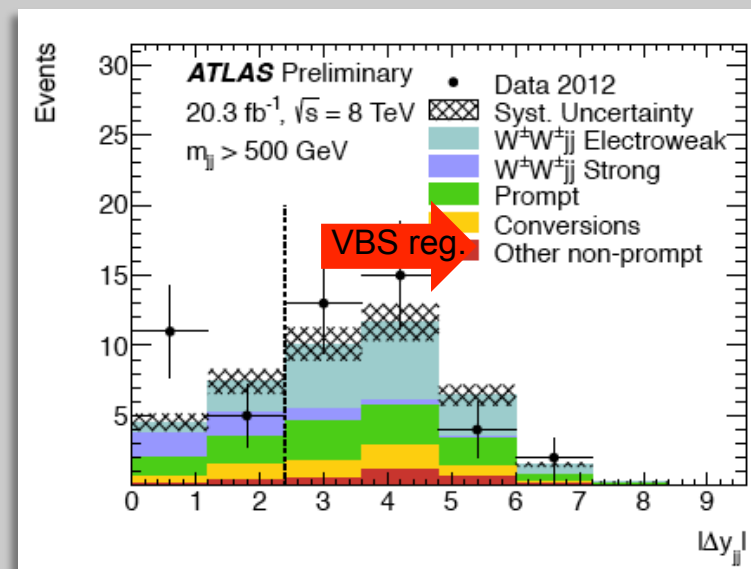
Il ricco raccolto dai dati del Run1 non solo Higgs ☺



Il ricco raccolto dai dati del Run1 non solo Higgs ☺



**First evidence of VBS Scattering:
 $W^\pm W^\pm jj$ – EWK @ 3.6σ at 95%CL**



Phys. Rev. Lett. 113, 141803

C.R.

H → tau tau 7/8 TeV

H → tau tau è un segnale fondamentale per misurare l'accoppiamento a fermioni.
L'icerca del segnale nel decadimento adronico dei tau è un'analisi in cui siamo stati pionieri.

V.Cavasinni segue in cotutela con Università di Gottinga A.De Maria



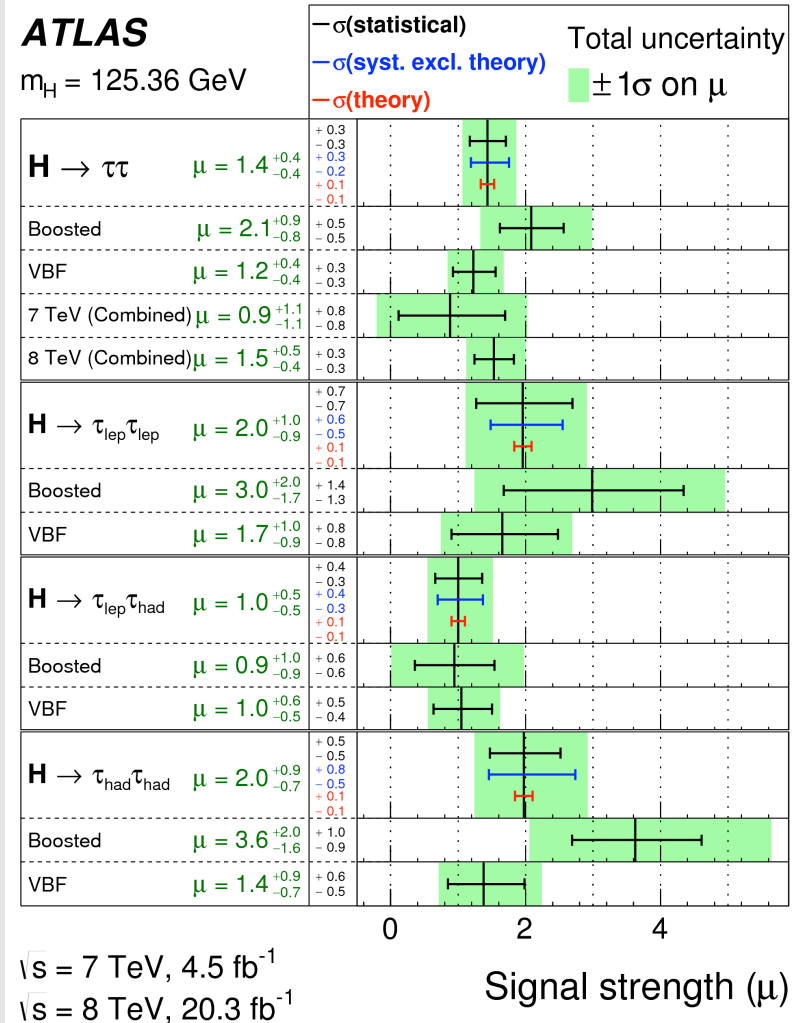
PUBLISHED FOR SISSA BY SPRINGER

RECEIVED: January 21, 2015

ACCEPTED: March 30, 2015

PUBLISHED: April 21, 2015

Evidence for the Higgs-boson Yukawa coupling to tau leptons with the ATLAS detector



V.Cavasinni, A.De Maria

$WW/WZ \rightarrow \ell\nu jj$ 7/8 TeV – SM

Analisi importante per:

- Limiti sull'anomalous Triple Gauge Coupling (aTGC)
- ricostruzione di jj risonanze a basso p_T

Tesi di dottorato F.Bertolucci Maggio 2015

JHEP01(2015)049 – 7 TeV
C.Roda, F.Bertolucci editors



PUBLISHED FOR SISSA BY SPRINGER

RECEIVED: October 28, 2014

ACCEPTED: December 19, 2014

PUBLISHED: January 12, 2015

Measurement of the $WW + WZ$ cross section and limits on anomalous triple gauge couplings using final states with one lepton, missing transverse momentum, and two jets with the ATLAS detector at $\sqrt{s} = 7$ TeV

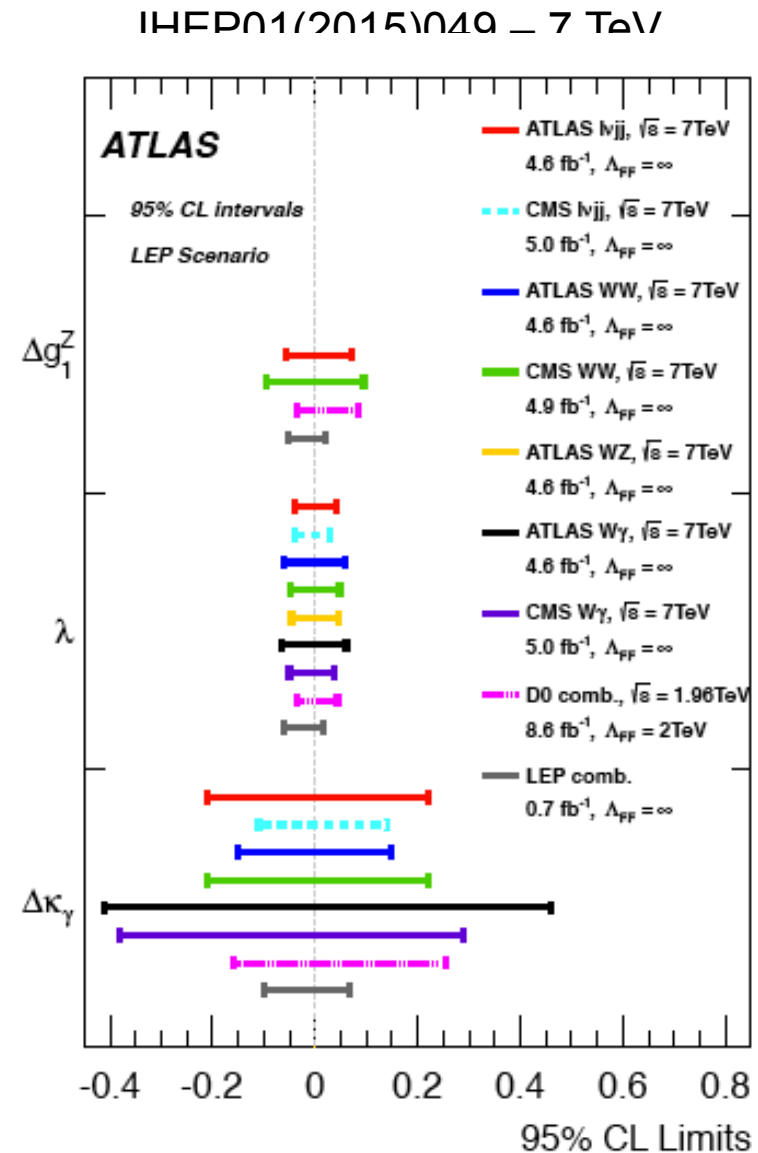
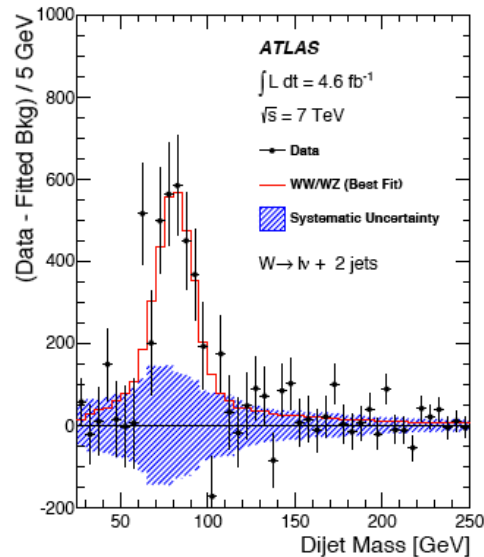
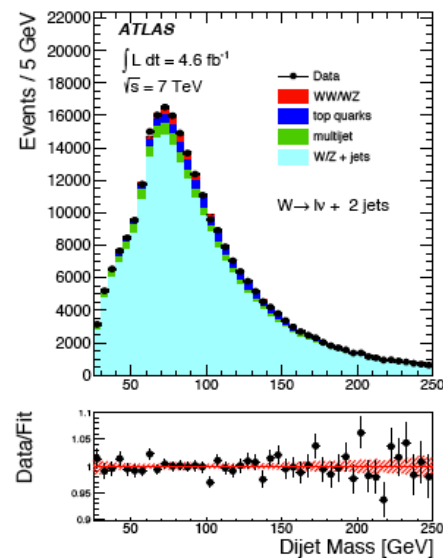
JHEP01(2015)049

WW/WZ $\rightarrow$ $\ell\nu jj$ 7/8 TeV – SM

Analisi importante per:

- Limiti sull'anomalous Triple Gauge Coupling (aTGC)
- ricostruzione di jj risonanze a basso p_T

Tesi di dottorato F.Bertolucci Maggio 2015



WW/WZ $\rightarrow$ $\ell\nu jj$ 7/8 TeV – SM

Analisi importante per:

- Limiti sull'anomalous Triple Gauge Coupling (aTGC)
- ricostruzione di jj risonanze a basso p_T

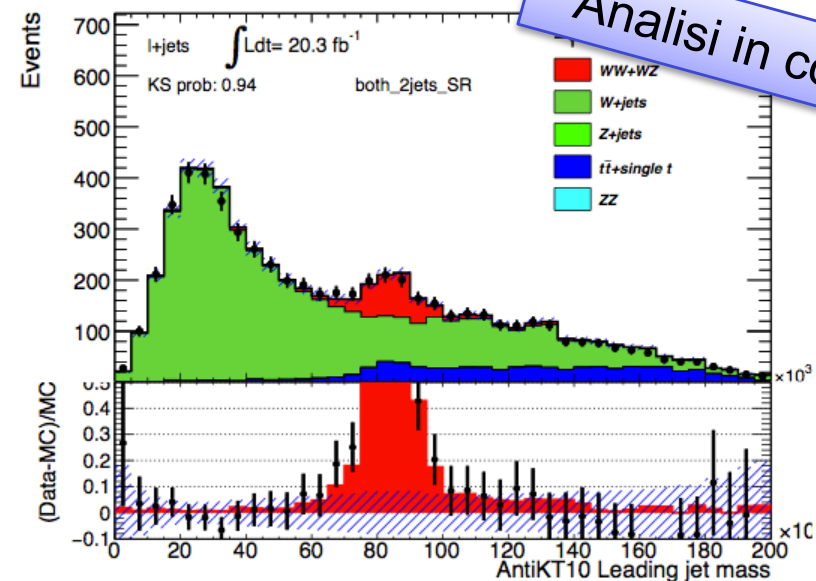
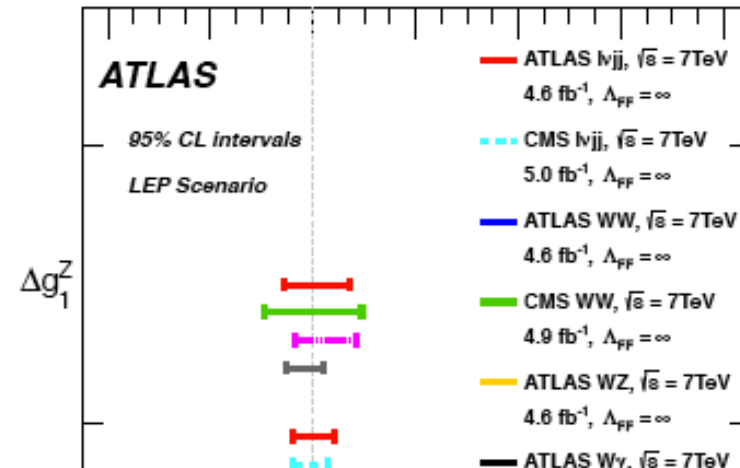
Tesi di dottorato F.Bertolucci Maggio 2015

Next step – analisi a 8 TeV

- Limiti aTGC $\rightarrow$ miglioramento 30-50%
- canale risolto e canale boostato
- migliore descrizione W+jet (Sherpa)

M.Spalla, M.Calvetti, F.Bertolucci,
C.Roda (analysis contact)

HEP01/2015/040 – 7 TeV



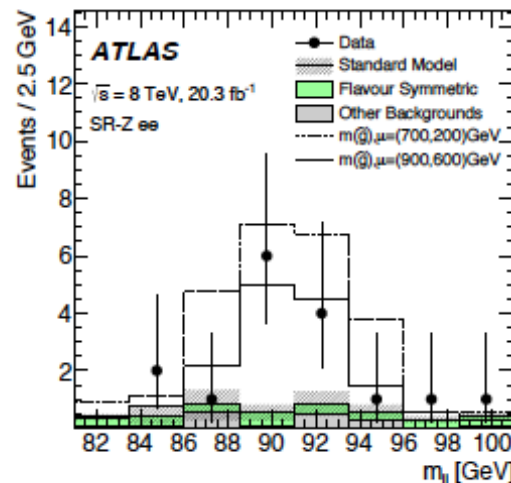
Analisi in corso

Run1 – misure con qualche discrepanza...

We also have a few legacy plots to verify with 13 TeV

2L(Z) + MET

<http://arxiv.org/abs/1503.03290>



A few theory papers with ideas:

<http://arxiv.org/abs/1504.02244>

<http://arxiv.org/abs/1506.04435>

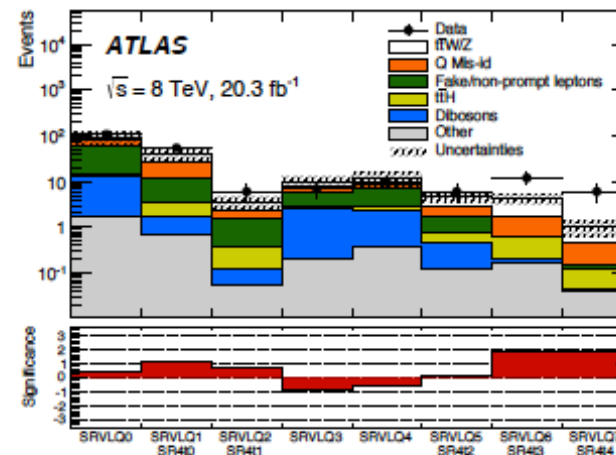
<http://arxiv.org/abs/1504.01768>

<http://arxiv.org/abs/1503.04184>

...

2L(SS) + b-jets + H_T + MET

<http://arxiv.org/abs/1504.04605>

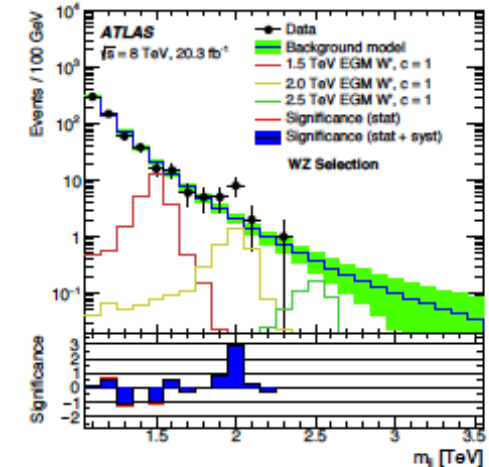


A few theory papers with ideas:

None !??? (but public since mid Apr only)

Diboson resonance ($VV' \rightarrow JJ$)

<http://arxiv.org/abs/1506.00962>



A few theory papers with ideas:

<http://arxiv.org/abs/1506.04392>

<http://arxiv.org/abs/1506.03931>

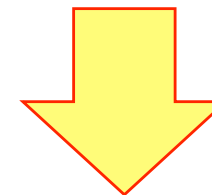
<http://arxiv.org/abs/1506.03751>

Run1 – misure con qualche discrepanza...

We also have a few legacy plots to verify with 13 TeV

Seminar – R.Kogler – “Searches with boosted signatures in CMS”

<https://indico.cern.ch/event/388148/>

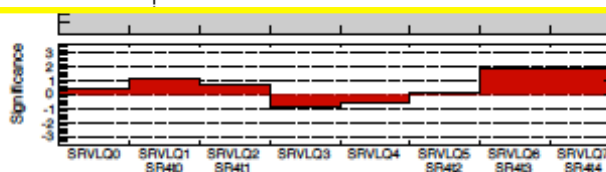
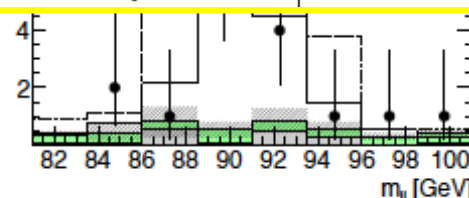


2L(Z) + M_{jet}

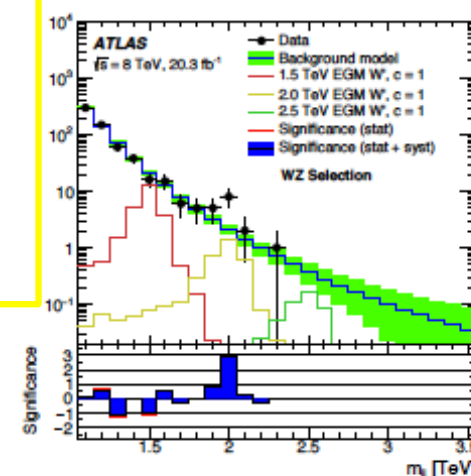
2L(Z) + M_{jet} + M_{jet}

local p-values

	CMS	ATLAS
$V_{jet} V_{jet}$	1.3σ	3.4σ (2.5σ global)
$\ell\ell V_{jet}$	2σ	-
$\ell\nu V_{jet}$	1.2σ	-



Diboson resonance ($VV' \rightarrow JJ$)
<http://arxiv.org/abs/1506.00962>



A few theory papers with ideas:

<http://arxiv.org/abs/1504.02244>

<http://arxiv.org/abs/1506.04435>

<http://arxiv.org/abs/1504.01768>

<http://arxiv.org/abs/1503.04184>

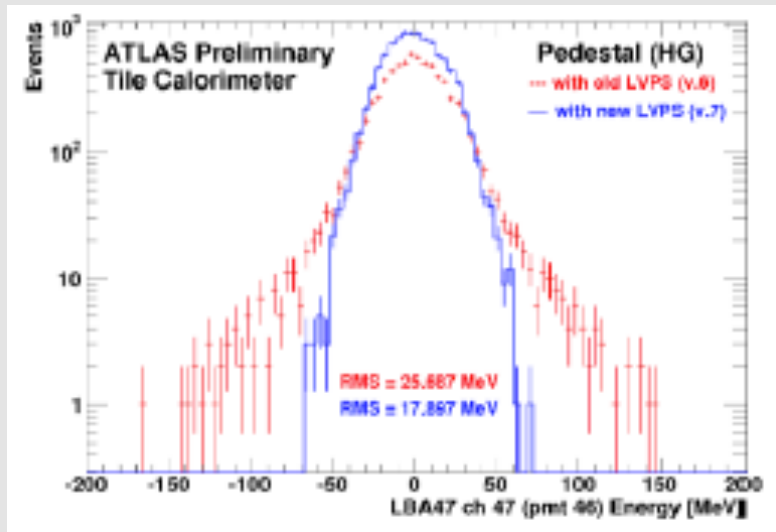
...

A few theory papers with ideas:

Use experience gained in SM for 13 TeV analysis –
semileptonic channel
N.Biesuz, M.Montella, G.Volpi, C.Roda

Rivelatore: presente, futuro vicino e
futuro lontano 😊

TileCal - presente



Lavoro di sostituzione LVPS + lavoro di consolidazione FrontEnd completato

Noise piu' gaussiano e nessun trip osservato fino ad ora !

Situazione considerevolmente migliorata (avevamo 0.6 trip/pb⁻¹)

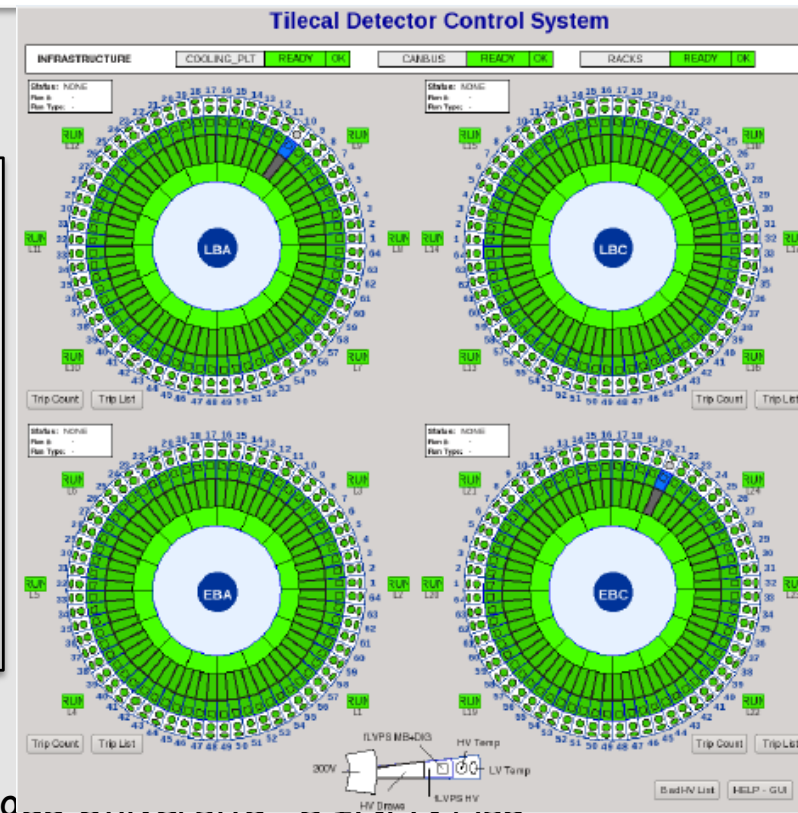
Two modules OFF:

LBA10, EBC21.

- LBA10, lost when we lost access on A side, August 25 th, 2014.

- EBC21 was lost around mid-April. fLVPS motherboard-side not starting.

0.8 % cells masked (all included in MC15)



Dalla presentazione dello scorso anno

LASER II system

S. Leone, F.Scuri

Physics event

Tile and fibers

PMT and optics

Electronics

Cesium

Laser

Charge Injection

Calibration systems

LASER events: prese dati dedicate check/calibration PMT gain + interBunch data. La stabilita` del sistema di distribuzione di luce e` minore di quanto desiderato → al momento si utilizza un sistema relativo di misura di variazione del guadagno.

Miglioramento del sistema rispetto a quello esistente:

- Elettronica di controllo (compatibilita nuovo protocollo di comunicazione LHC e con sistema di controllo del rivelatore)
- Sistema di monitoring (splitter, mixer, filtri e fotodiodi) della trasmissione e distribuzione luce laser ai singoli drawers (fino a 48 canali di read-out)
- Ottica di rinvio ed espansione del fascio laser nella "optics box" (livello -1 della caverna di ATLAS – USA 15)
Responsabilità di Pisa (F.Scuri).

Universit  e LPC
Clermont -Ferrand

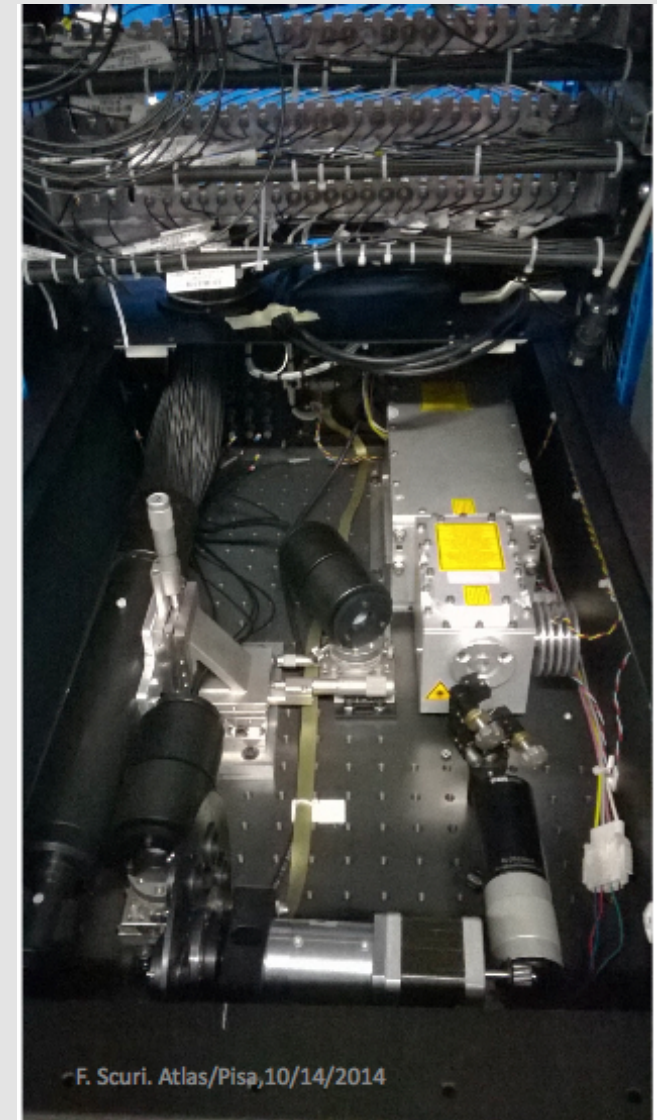
Clermont-Ferrand
INFN - Pisa

INFN-Pisa
Universit  di
Coimbra

LASER II System

S. Leone, F.Scuri

Optic system designed,
implemented and installed
in USA15 from Pisa group
(Sandra, Fabrizio)



LASER II System performance

	TDAQ (Oct.27-Dec.5, '14)		Stand-alone (Jan.17-Feb.4,'15)	
	Typical stability (%)	Upper limit (%)	Typical stability (%)	Upper limit(%)
Laser monitors (D0-D1-D2)	0.6	0.6 ^{a)}	0.1	0.4
Filter wheel monit. (D3-D4-D5)	0.5	0.7 ^{a)}	0.7	1.5 ^{b)}
Expander monitors (D6-D7-D8-D9)	0.7	1.0 ^{a)}	0.7	1.5 ^{b)}

^{a)} Only a few intensity/filter configurations studied

^{b)} 1.5% due to one bad filter in the optical line, otherwise 0.7%

Optic line performance
according to requirements !

A second LASER II system is being assembled in a Laboratory on surface to allow:

- Checking problems detected on the detector in the pit;
- to use as source for the development of the new FE electronic for phasell.

Optic system under is a replica of the LASERII system in the pit and is under Pisa responsibility → request for optic material to complete assembly.

All the expertise acquired on TileCal calibration in the LASERII development has allowed F.Scuri to become co-convener for the TileCal calibration

Fasell per TileCal

Il programma di fasell per TileCal richiede di sostituire tutta l'elettronica di FE, PS.

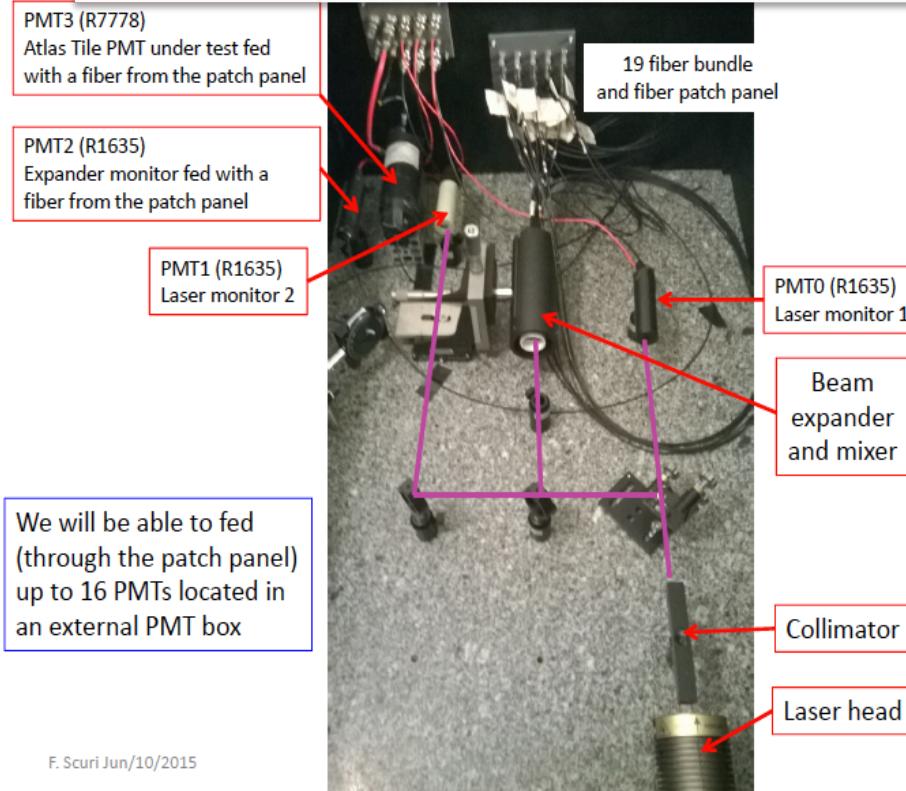
Programma di Pisa – discusso lo scorso anno:

- Studio a lungo termine (stabilità e linearità) dei PMT nelle condizioni di lavoro della fase2;
- Qualificazione partitori attivi;
- Qualificazione dei sistemi 3 (UChicago, CFerrand, Argonne) sistemi di readout FE;

Stato del programma:

- Performances linea ottica misurate a Pisa nel periodo di commissioning appena finito e uguali a quelle ottenute al CERN;
- Tasca di 50keuro nel periodo 2014-2018 approvata dai referees a Maggio 2014.

Test stand in Pisa Lab

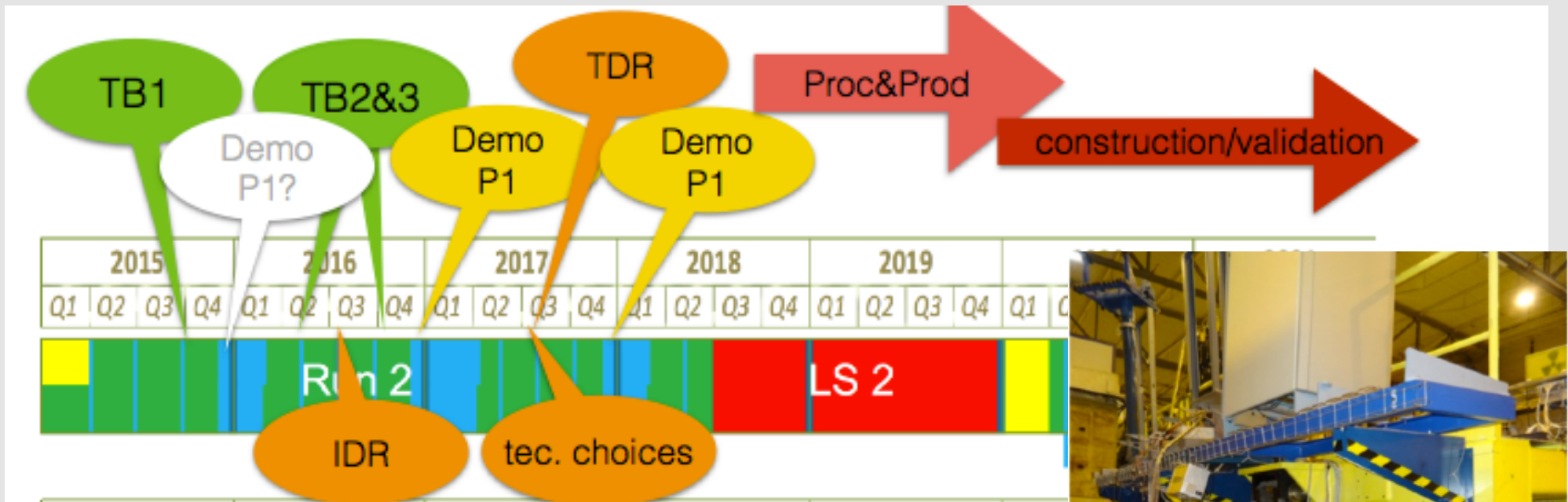


Program: different repetition rates of the laser pulsing to mimic average anode currents:

- @ 2 KHz rep. rate (0.4 μ A max. average anode current) – std conditions
- Varying repetition rates : 2 -200 KHz (0.4 - 40 μ A average current) $\rightarrow$ linearity response of passive and active dividers;
- @ 0.1-1 MHz rep. rate $\rightarrow$ **in 3-4 months integrate LHC-II current;**

Concerns: laser lifetime and stability of the pulse energy $\rightarrow$ request for material

TileCal Fasell: Test beam

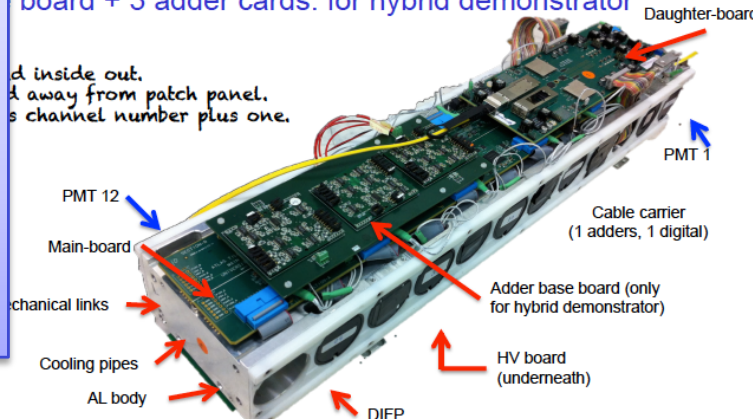


The whole new system for the read-out (FE, Cooling, Mechanics) will be tested in a TB program in 2015-2016

We are requested to participate as part of the FE boards testing group

board + 3 adder cards: for hybrid demonstrator

and inside out.
away from patch panel.
channel number plus one.



Preventivi 2015 - 3 Luglio 2015

C.Roda Università e INFN Pisa

TileCal –Richieste

Fasel

- LaserII optic beam in Lab175 (filtri, beam expander, meccanica di supporto ottica): 5 keuro

FaselI

- Alimentatori bassa tensione 4 canali – 5 keuro
- 1 generatore di forme d'onda 10 keuro

Tecnici per lavoro di maintenance durante lo shutdown (4weeks x 2 tecnici end 2016)

Fast Tracker - FTK

FTK funzionerà alla frequenza di LVL1 (100kHz) e fornirà in circa 100 μ s una ricostruzione completa delle tracce ($p_T > 1$ GeV) all'ingresso del LVL2

Un progetto con una forte impronta pisana:

P. Giannetti - Technical Coordinator

A. Annovi - Project Leader di FTK

M. Piendibene - responsabile dell'AMB

S. Citraro - responsabile della LAMB

P. Luciano – responsabile AM FirmWare

C. Sotiropoulou – responsabile monitoring FirmWare

G. Volpi - responsabile SW



ATLAS

Outstanding Achievement Award

Presented to

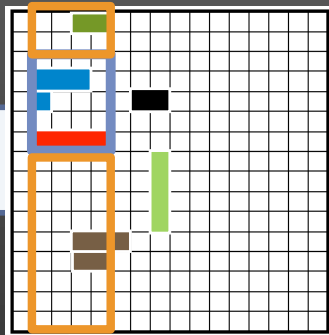
Guido Volpi

For his original, crucial, and extended work on designing
the Fast Tracker system (FTK) and its simulation.

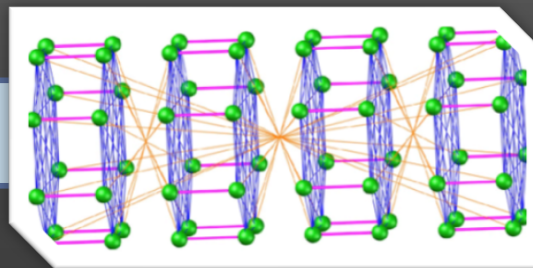
ATLAS Collaboration Week, CERN, June 18, 2015

FTK Algorithms

FTK has a custom clustering algorithm, running on FPGAs



Data are geometrically distributed to the processing units and compared to existing track patterns.



Pattern matching limited to 8 layers: 3 pixels + 5 SCTs. Hits compared at reduced resolution.

Full hits precision restored in good roads. Fits reduced to scalar products.

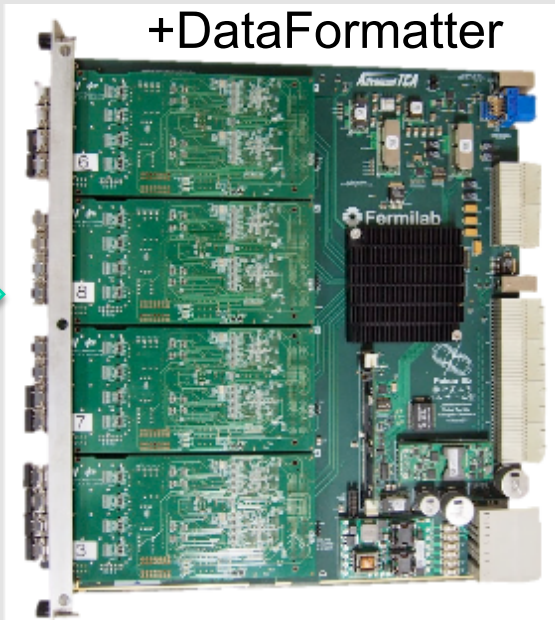
Good 8-layer tracks are extrapolated to additional layers, improving the fit

$$p_i = \sum_j C_{ij} \cdot x_j + q_i$$

$$\chi^2 = \sum_i \left(\sum_j A_{ij} \cdot x_j + k_i \right)^2$$

From algorithms to boards

32 Input Mezzanine
+DataFormatter



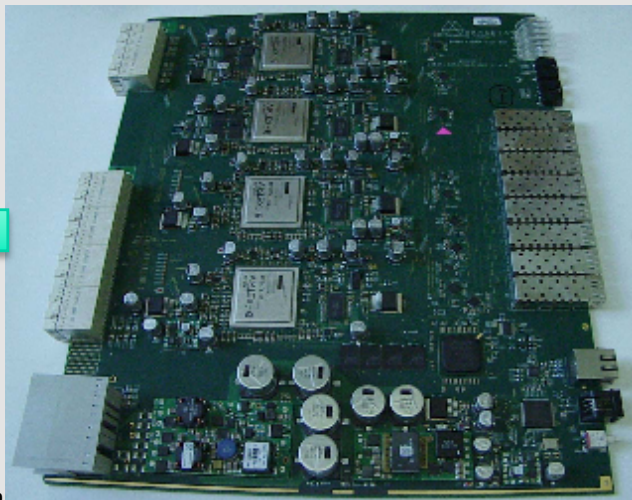
~ 8k ASICs (65nm)
~ 2k FPGAs

128 AMBoard

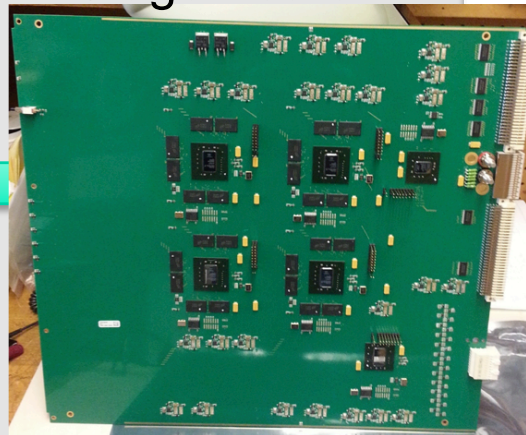


Pisa
responsability

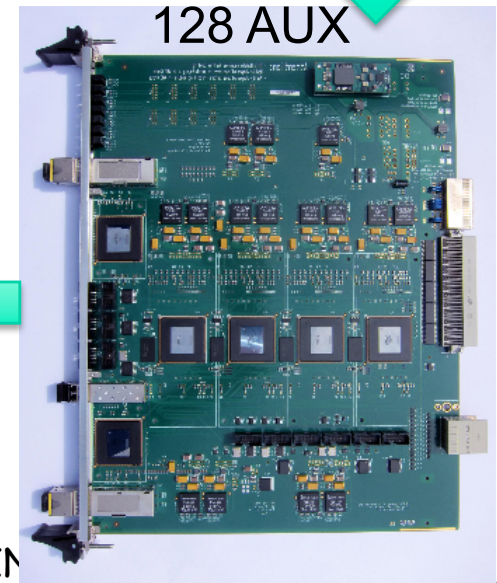
2 FLIC



32 Second
Stage Board



128 AUX



AMBSLP

AMB distributes SSs to 64 AMchips

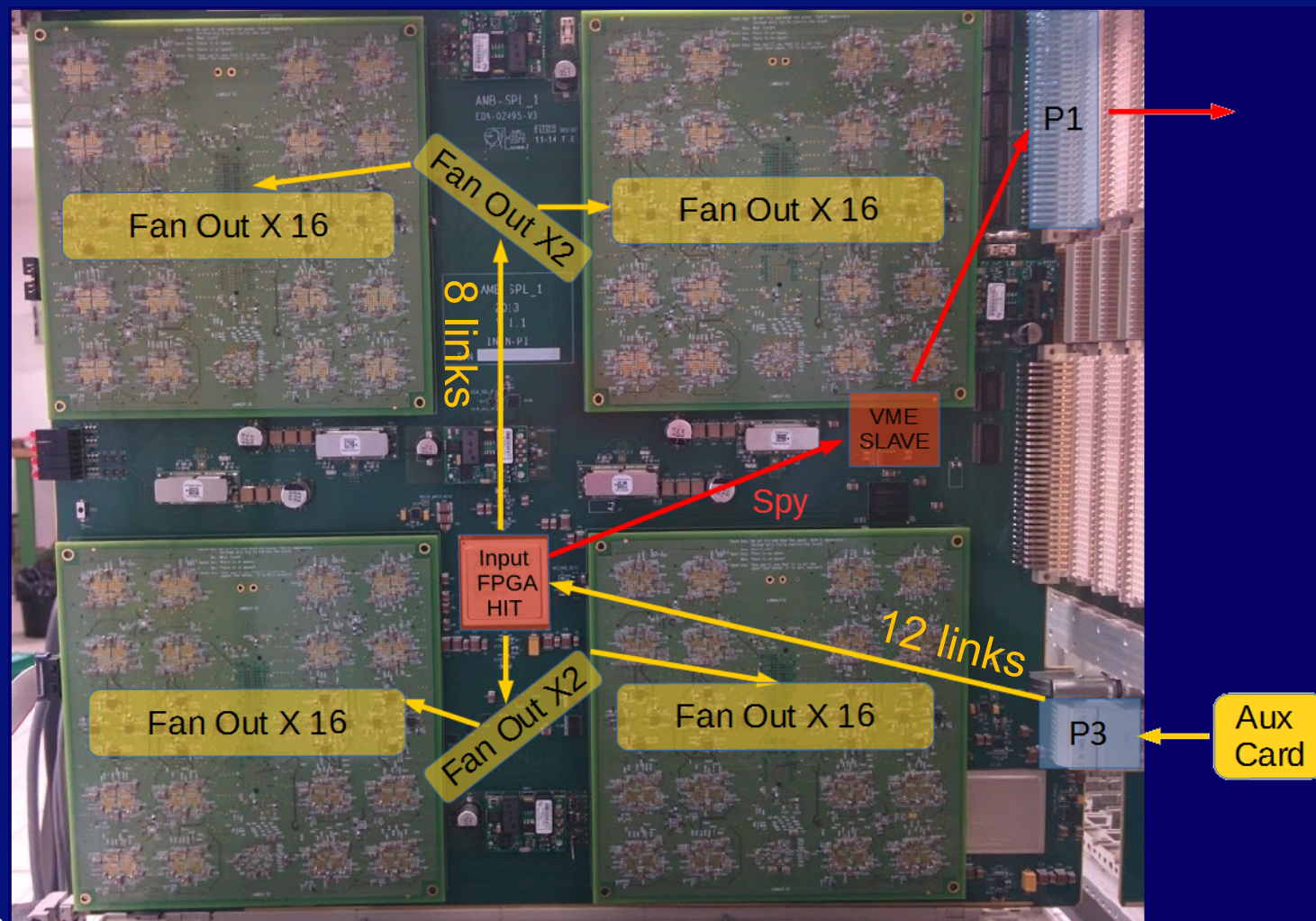
- ~800 Serial Links
@ 2Gb/s

- VME

- Clock
@100MHz

- Supply Voltages:
48 V → 12V →
2,5V
1,8 V
1,2V
1V

Power consumption.
~ 250 Watt



AMBoard e AMChip schedule

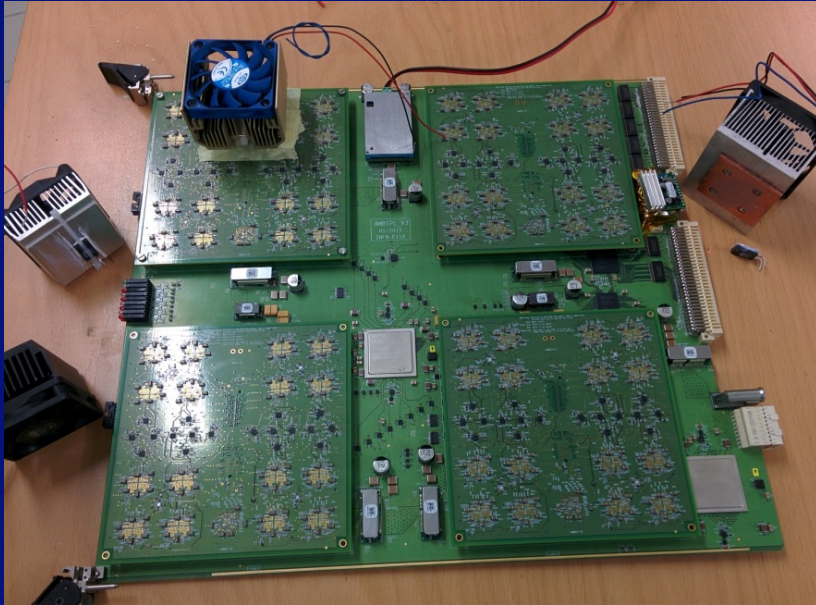
AMchip06 (~11x15 mm² TSMC 65nm)

- Sent to TSMC company for fabrication on June 17
- Last checks at companies on going
- First chip out expected for September-October

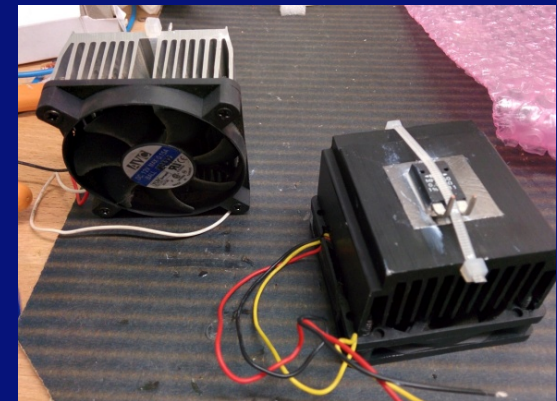
AM board

- Design being prepared without final AM06 in hand
 - Difference w.r. to AM05: higher pattern density, power consumption x64
- Final Design Report held in May
- Cooling measurements this summer
- Preparing final candidate prototype

Power Distribution Stress Test



- Used passive Loads($0.02\ \Omega$) $\rightarrow$ 50 Watt each per LAMB
- 34 Watt Exp. Power (per LAMB with AMchip06)
- Functioning still ok with additional power



Cooling tests a USA15



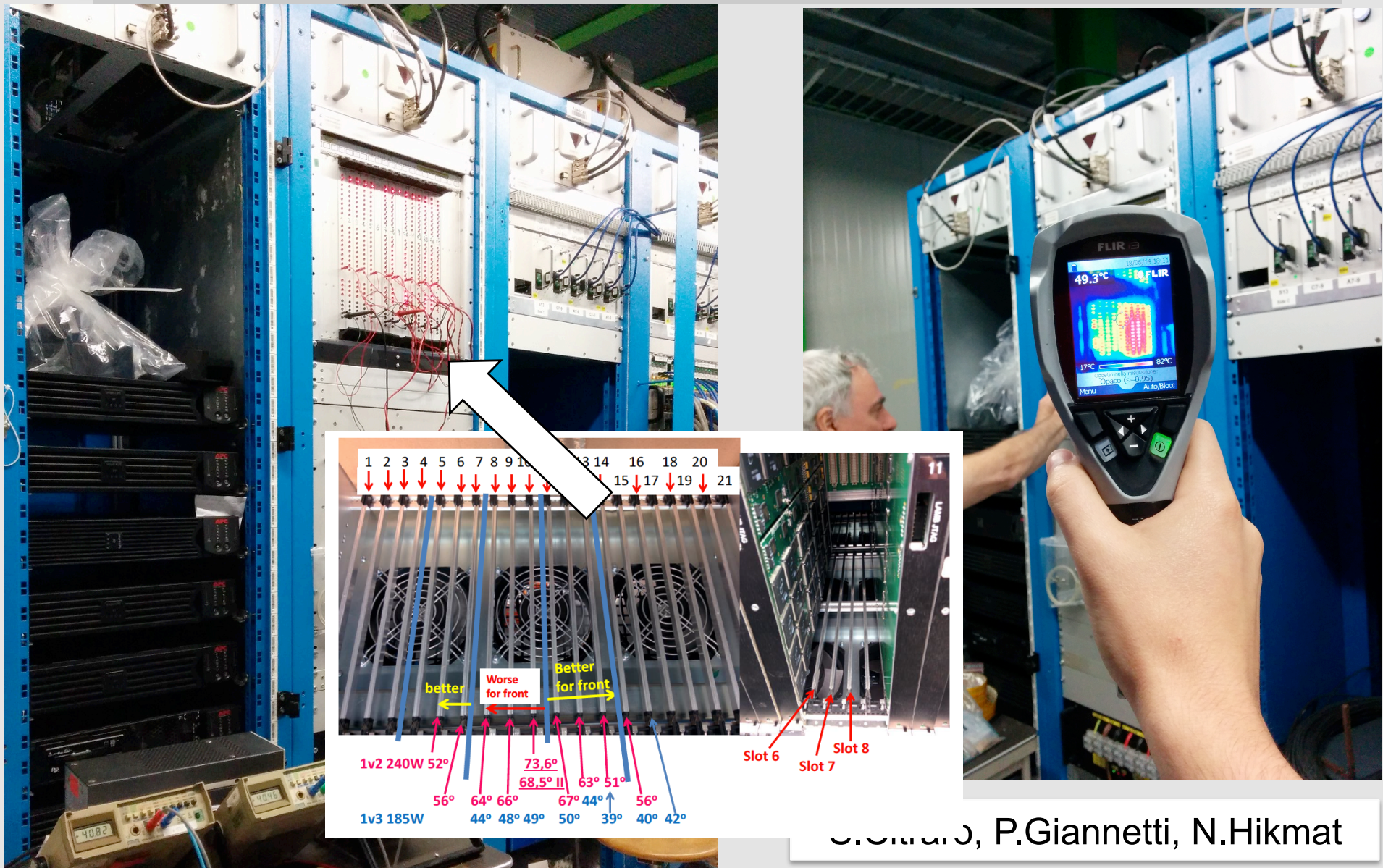
Preventivi 2015 - 3 Luglio 2015



S.Citraro, P.Giannetti, N.Hikmat

C.Roda Università e INFN Pisa

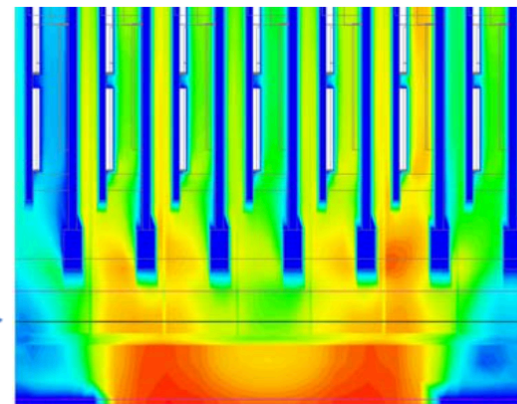
Cooling tests a USA15



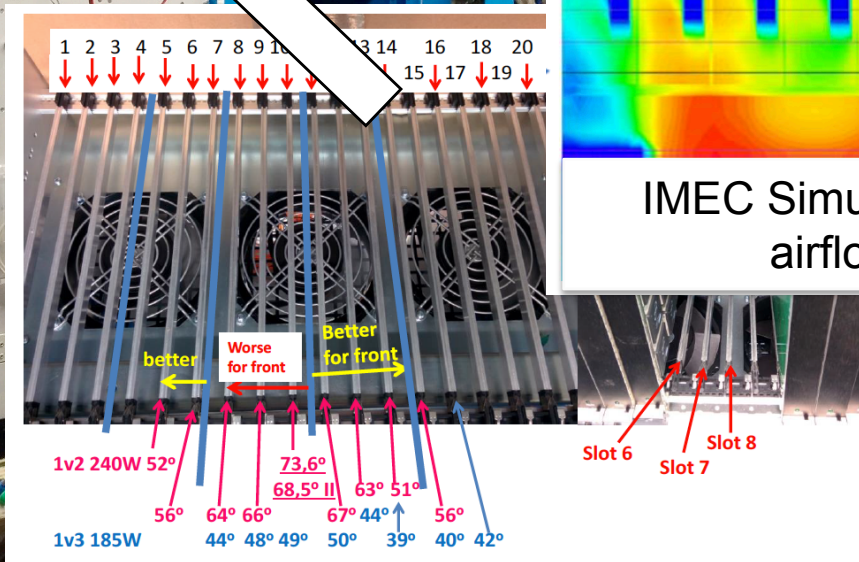
C. Roda, P. Giannetti, N. Hikmat

Cooling tests a USA15

Simulation is very important since AMBoard prototype is being developed without AMChip06 in Hands
Simulation is not consistent with measurements



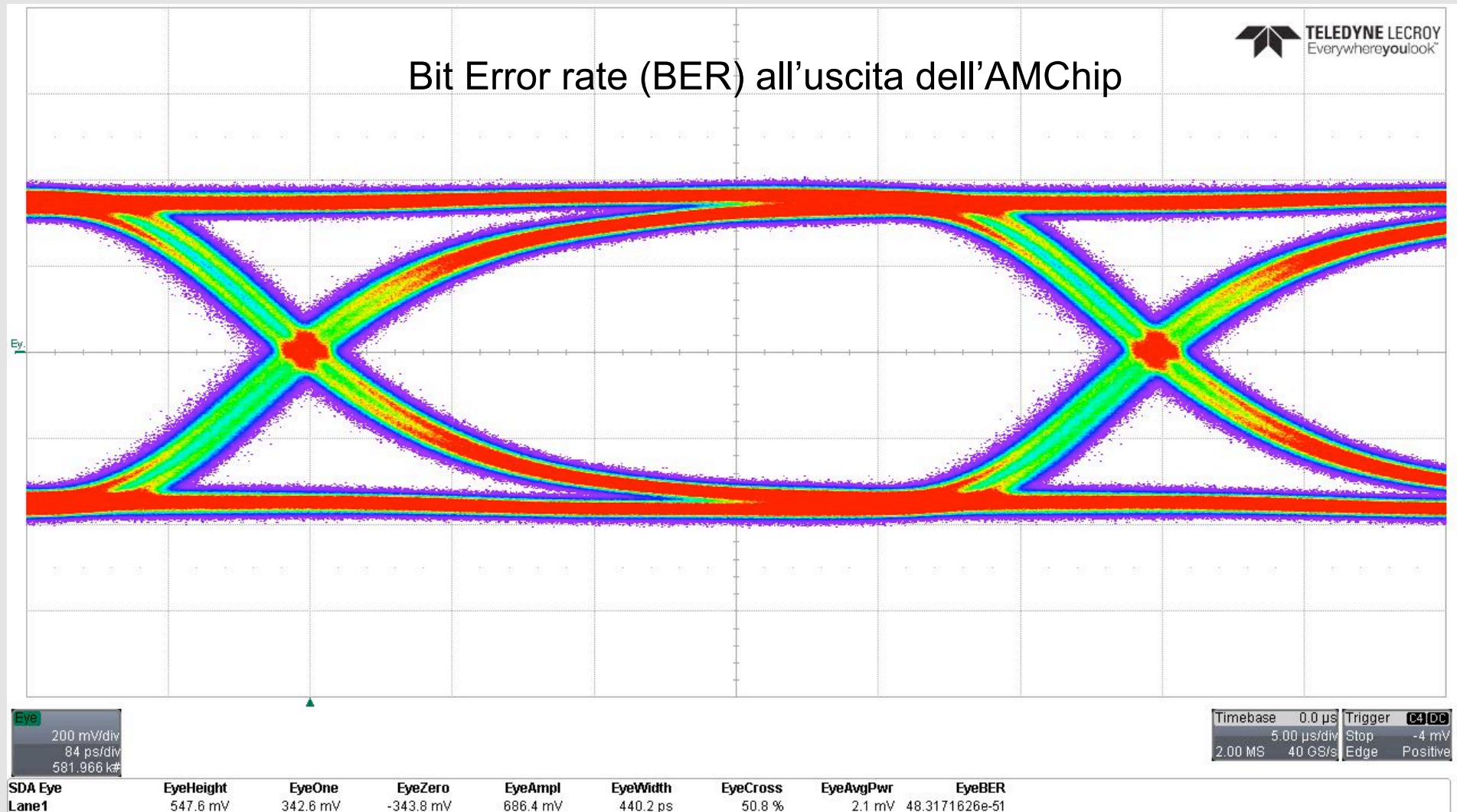
IMEC Simulation of airflow



C. Roda, P. Giannetti, N. Hikmat

Test sull'integrità` del segnale

S.Citraro, P.Giannetti, N.Hikmat



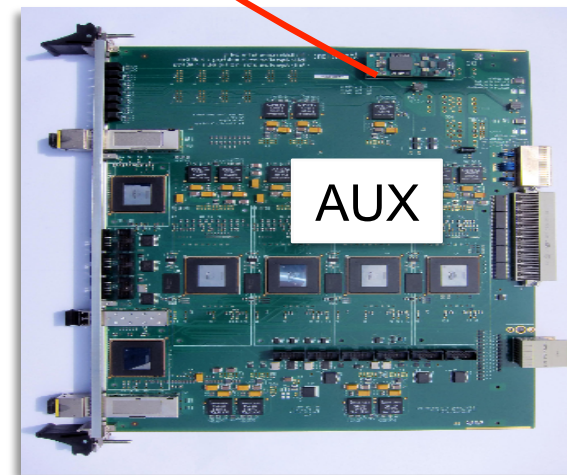
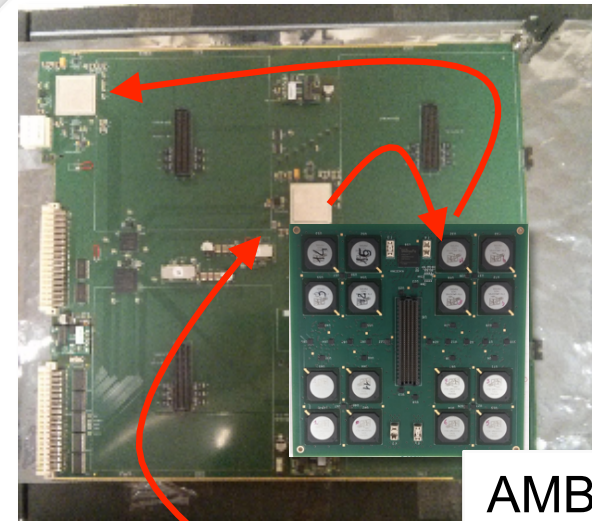
Test piu` complessi: funzionalita`

A. Annovi, N. Biesuz, G. Volpi, P. Giannetti

- Test con eventi simulazione semplificati
 - AUX → AMBoard → AMChip05 → AMBoard
 - Test con serie di hit → singola Road
- Risultato: Confronto bit-bit con simulazione non si osservano discrepanze

Progetto PRA (S. Donati) di 40keuro

Attivita multidisciplinare: utilizzo di Memorie associative per l'analisi veloce di immagini (WP5 in IAPP)



FTK schedule

- **1st step** combination of **production & prototypes boards**
- **2nd and 3rd steps** all boards from production except AM board

Success
oriented

	IM	DF	AUX	AMB	AM ver.	SSB	FLIC	Milestones	Expected
1st	4→16	1→4	1	1	05	1	1	Included in TDAQ	09/2015
2nd	128	32	16	1	05	1	2	Included in TDAQ	11/2015
3rd	128	32	16	1	06	8	2	Included in TDAQ	12/2015
4rd	128	32	16	16	06	8	2	Full barrel (mu=40)	03/2016
5th	128	32	32	32	06	16	2	Full detector (mu=40)	09/2016
Final	128	32	128	128	06	32	2	TDR Specs	2018 / Lumi driven

Plan for the rest of 2015 is to:

- Commission full Input and Output (all IMs, DFs and FLICs)
- Commission full I/O plus a AUX-AMB-SSB processing slice

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Richiesta Finanziamenti FTK

- Richiesta: 150 keuro core per produzione AMB (meta` del costo di produzione AMB)
- Richiesta: ultimi aggiustamenti con primi tests ed arrivo AM06 → 4 keuro

Richiesta alla sezione

Il prossimo anno il lavoro si concentrerà su:

- Completamento/Ottimizzazione FirmWare e SW AMBoard
- Test produzione AMBoard a Pisa
- Commissioning del rivelatore

21 m.u. sviluppo/test produzione elettronica FTK 9
mu Beccherle, 12 mu Piendibene

Composizione del gruppo

Totale FTE: 18.7 - (*) non conteggiati

Totale persone: 22

Nome	Ruolo	ATLAS	RD_FASE2	H-TEAM	EU-FTK	IMPART
A. Annovi	ric	0.7	0.3	0	0	0
R. Beccherle	tecnologo	0.33	0.2	0	0	0
F. Bertolucci	assegno/PRA	1	0	0	0	0
M. Calvetti	laureando (*)	1	0	0	0	0
V. Cavasinni	po	0.43	0.4	0.17	0	0
T. Del Prete	dr (*)	1	0	0	0	0
G. Chiarelli	dr	1	0	0	0	0
S. Citraro	dott/ing	0.3	0.3	0	0	0.4
M. Dell'Orso	po	0.43	0.2	0.17	0.2	0
S. Donati	ru	0.23	0	0.17	0.3	0
P. Giannetti	dr	0.23	0.1	0.17	0.5	0
S. Gkaitatzis	Borsista/EU-FTK	0	0	0	0.5	0
H. Nasimi	laureando (*)	1	0	0	0	0
S. Leone	pr	0.5	0.5	0	0	0
P. Luciano	dott/ing	0	0.2	0	0	0.8
M. Montella	laureando (*)	1	0	0	0	0
N. Biesuz	dott	0.7	0		0	0.3
M. Piendibene	tec	0	0	0	0.58	0.42
C. Roda	pa	0.38	0.2	0.17	0.25	0
F. Scuri	pr	0.3	0.7	0	0	0
C. Sotiropoulou	MCFel/EU-FTK	0	0	0	1	0
M. Spalla	dott	1	0	0	0	0
G. Volpi	Ass/H-TEAM	0	0.2	0	0.8	0

Altro: composizione gruppo

Studenti – situazione attuale:

Laureandi tesi specialistica: 3

dottorandi –Fisica 2, Ingegneria 2

Altri contributi a FTK: IAPP (Auth :C. Gentsos) (Ditta greca Prisma:
Mermikli, Sakellariou)

Altri contributi da:

- V.Giangiobbe, V.Kazanine – Fondi FAI

Responsabilita` in corso

P.Giannetti FTK technical coordinator

A.Annovi FTK PL

G.Volpi responsabile SW

75% of FTK
Management

V.Cavasinni member Publication committee (CB election)

S. Citraro responsabile LAMB

M.Piendibene responsabile AM board

P.Luciano responsabile FW AM board

C. Sotiropoulou responsabile del firmware del Monitoring

C.Roda member of OTP Organization Committee (CB election)

C.Roda WV semileptonic analysis contact

F.Scuri TileCal LASERII optic system responsible

F.Scuri tilecal calibration co-convener

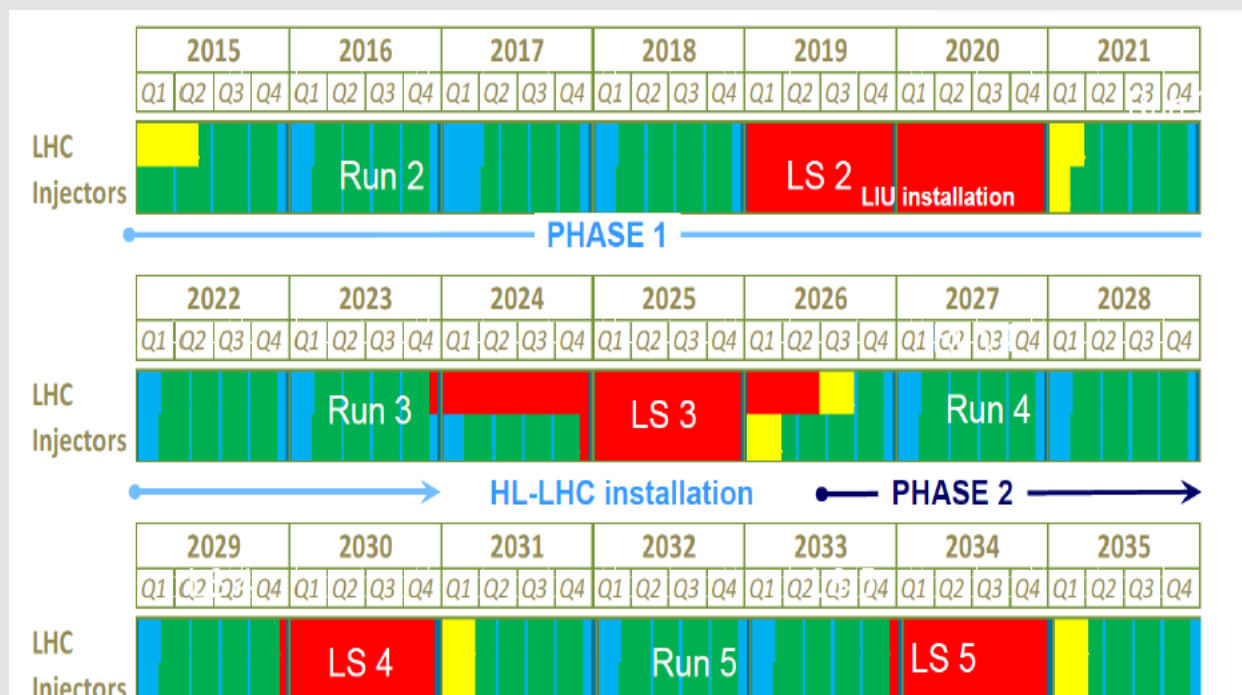
Back up

LHC - longer term schedule

Recently there have been discussions at CERN in the context of the “Medium-Term Plan” (5-year plan, covering 2016-20), which is being discussed this Council week

It is not yet confirmed, but it is likely that:

- The start of LS2 will be delayed by 6 months → end-2018 (from mid-2018)
- LS2 will be extended by 6 months → end of LS2 would be end-2020 (previously end-2019), Run-3 would start in 2021
- Knock-on changes further ahead - LS3 could shift → early-2024 to mid-2026



Dalla presentazione di M.Grassi CSN1

Proposte di finanziamento



		Proposte					
		2014-2017			Fondi Esterni		
		ATL	CMS	Com	ATL	CMS	Com
tracker	3D			108			
	AE		80				
	HV				212		
	BB	37	137	142			
	MOD	31	52	128			
	Mod R0 cooling	25					
		40	40				
	Totali	133	309	378	212	0	0
		820			212		
TrackTrig	WP1-sim			0			0
	WP2-transm			104			0
	WP3-New AM			46			90
	Wp4-packing						210
	Totali	0	0	150	0	0	300
		150			300		
RPC	electrodes		10	20			
	Prototypes	8	8	30			
	front-end	13	5	56			
	eco-gas			36			
	GIF++			20			
	Totali	21	23	162	0	0	0
		206			0		

BIS7/8	16 chambers	40					
	Totali	40	0	0	0	0	0
		40			0		
MUONS	DT	140					
	GEM	15					
	Totali	0	155	0	0	0	0
		155			0		
Lar	DC power	60					
	trigger	43					
	Totali	103	0	0	0	0	0
		103			0		
TileCal	Sviluppo FE	35					
	TEST partitori	15					
	Totali	50	0	0	0	0	0
		50			0		
EndCap	Spacal	150					
	Totali	0	150	0	0	0	0
		150			0		

Grand Total	347	637	690	212	0	300
	1674			512		

Totale 2186 kEu

Dalla presentazione di M.Grassi CSN1

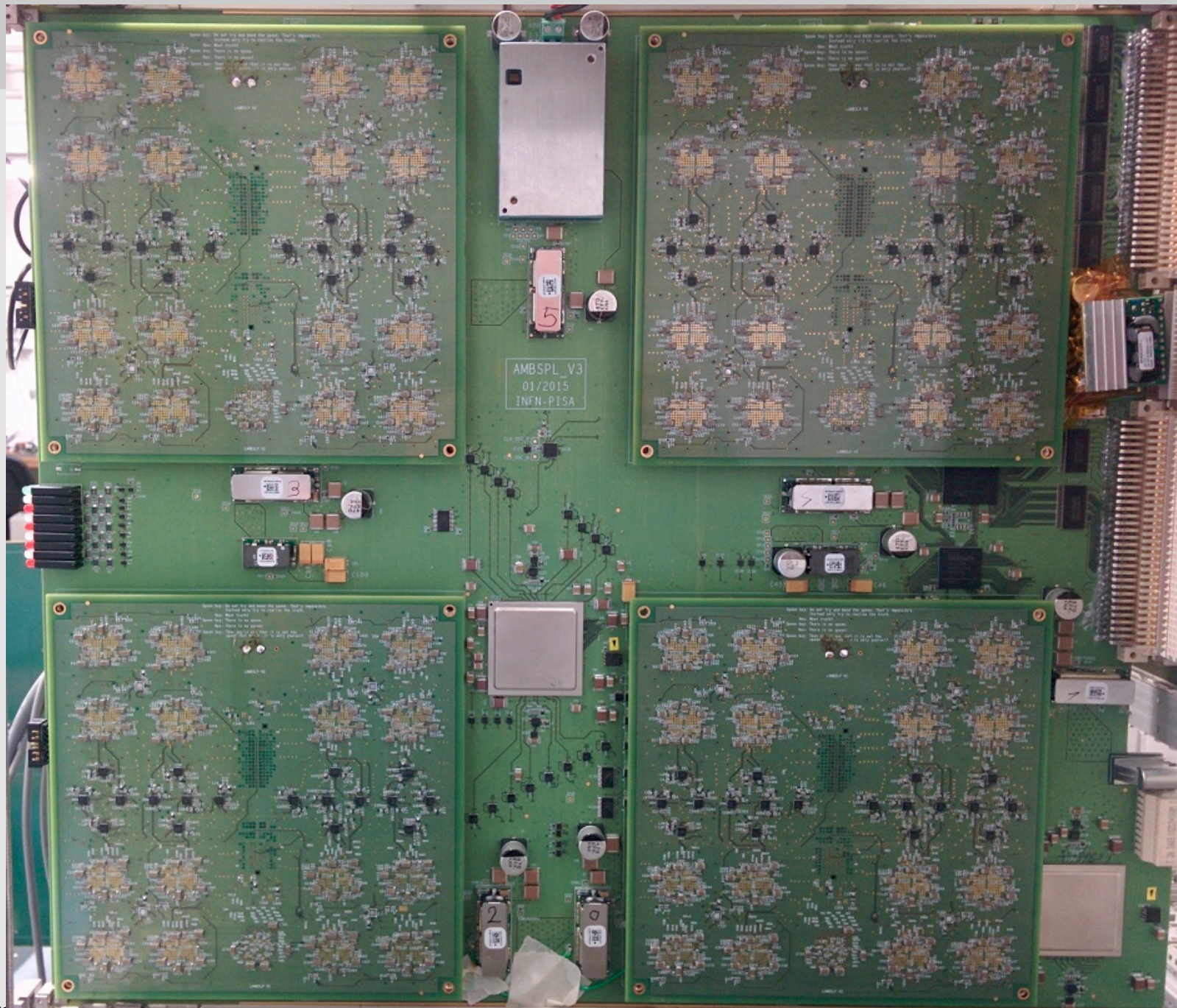
Finanziamenti 2015

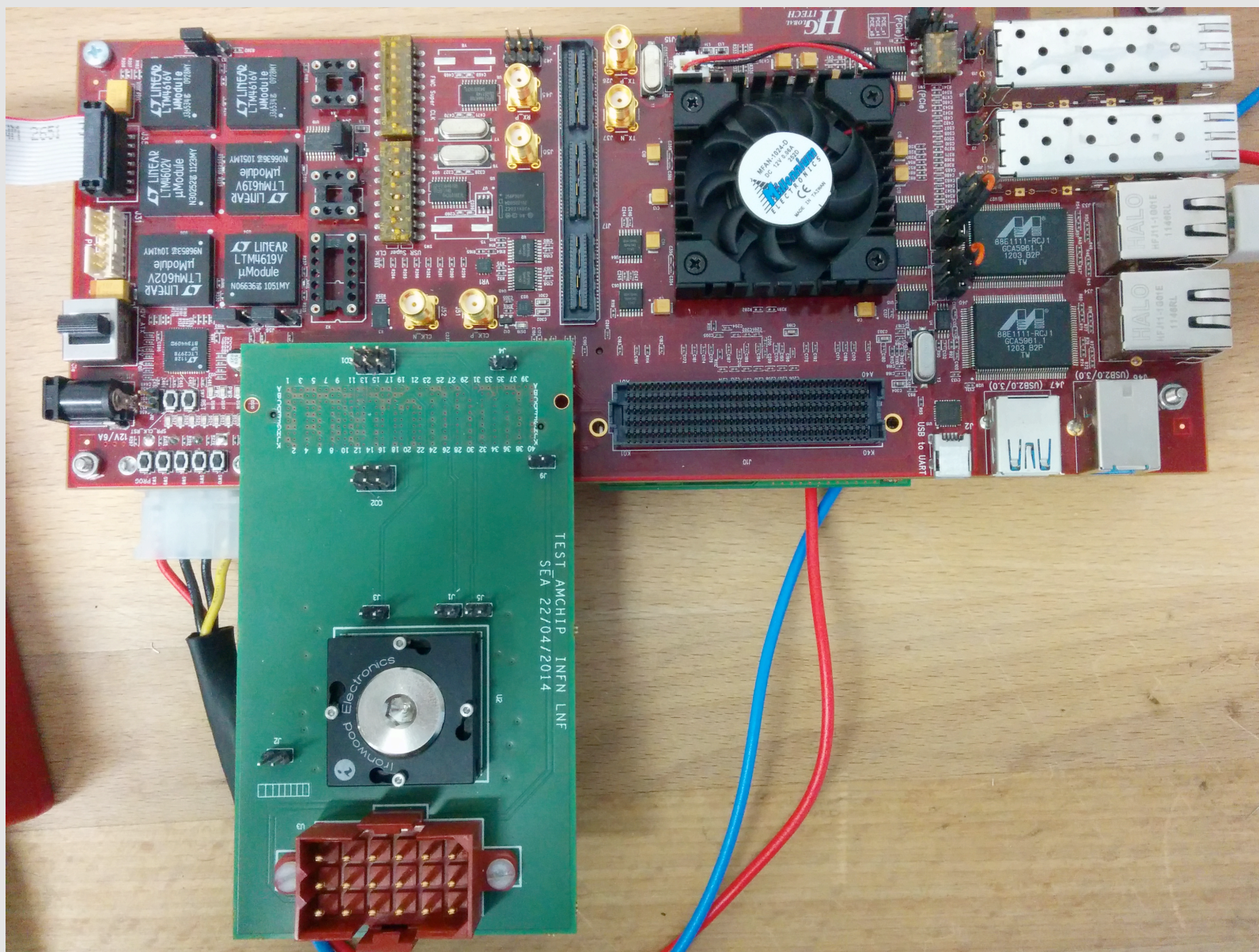


		2015		
		ATL	CMS	Com
tracker	3D	100.5		
	AE			
	HV			
	BB			
	MOD			
	Mod R0			
	cooling			
Totali		150	133.5	107.5
		391		
TrackTrig	WP1-sim			
	WP2-transm			
	WP3-New AM			
	Wp4-packing			
Totali		0	0	115
		115		
RPC	electrodes		10	15
	Prototypes			
	front-end			
	eco-gas			
	GIF++			
Totali		0	15	123
		138		

proposte

BIS7/8	16 chambers			
	Totali	0	0	0
MUONS	DT	11		
	GEM			
	Totali	0	11	0
		11		
Lar	DC power	20		
	trigger	20		
	Totali	40	0	0
		40		
TileCal	Sviluppo FE	15		
	TEST partitori			
	Totali	0	15	0
		15		
EndCap	fibre+pmt	101		
	+proto			
	Totali	0	101	0
		101		
Grand Total		190	275.5	345.5
		811		

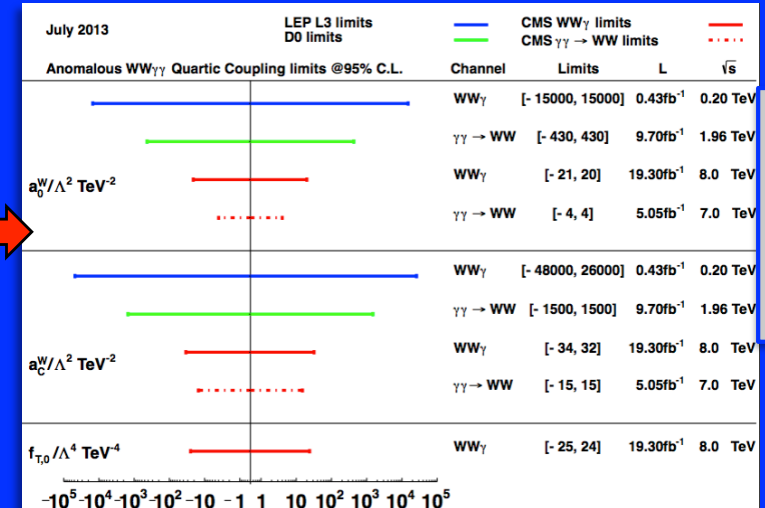
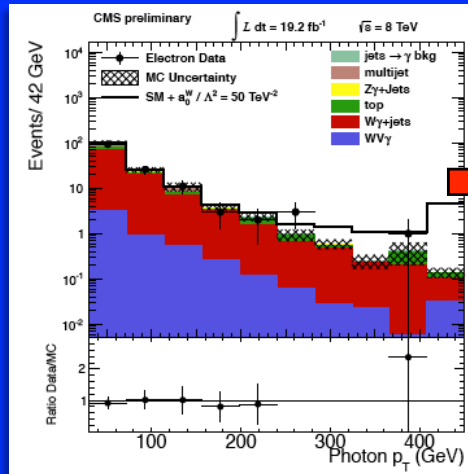




Limits on QGC

$$WV\gamma \rightarrow lv+jj+\gamma \text{ } p_{Tj}, p_{T\gamma} > 30\text{GeV}$$

- Main bkg $W\gamma$ +jet with large uncertainty
- Observed upper limit is $3.4 \times \text{SMc.s}$ at 95%CL
- Large improvement w.r. to previous QGC limits and **first limits** on $f_{T,0}$ ($WW\gamma\gamma$) and κ_0^W, κ_C^W ($WWZ\gamma$)



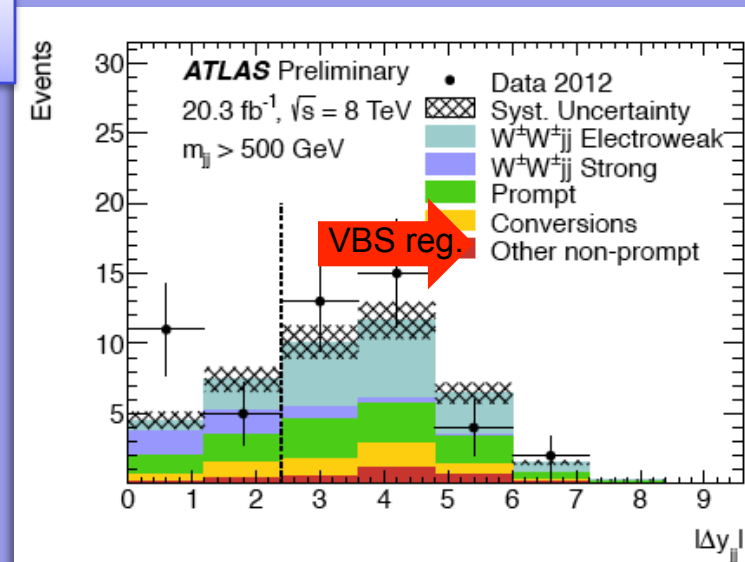
CMS

$$W^\pm W^\pm jj \rightarrow lv+l'v+jj \text{ } p_{Tj} > 30\text{GeV } M_{jj} > 500\text{ GeV}$$

- In same sign WW production the strong production does not dominate over EWK production
- **First evidence of $W^\pm W^\pm jj$ @ 4.5σ (EWK+Strong)** and of EWK $W^\pm W^\pm jj$ @ 3.6σ at 95%CL
 $\sigma = 1.3 \pm 0.4 \pm 0.2 \text{ fb}$ (VBS region)
- **First limits on $\alpha_4 \alpha_5$ QGC parameters:**

$$-0.14 < \alpha_4 < 0.16$$

$$-0.23 < \alpha_5 < 0.24$$



ATLAS

AM board cooling challenges

89 °C +/- uncertainty

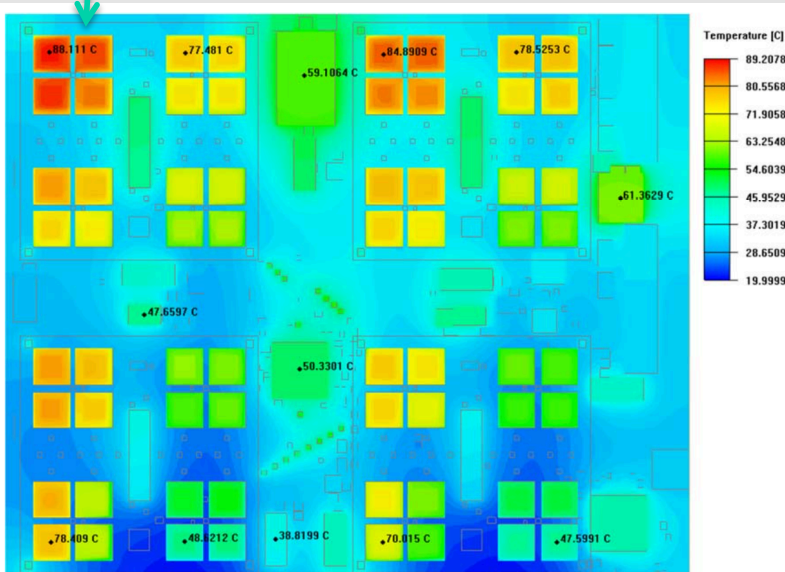


Figure 6: Same view as Figure 1 for input velocity with pwl-profile A with maximum velocity $v_{\text{ymax}} = 4\text{ m/s}$

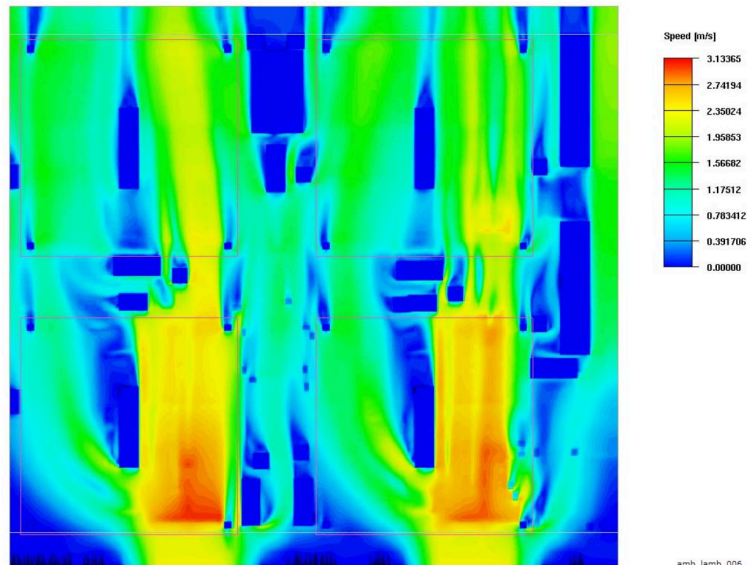


Figure 7: air speed at cross section in the middle of the model (Case A'' 2.4 m/s, see Figure 4)

~250W per board (at peak usage)

- 16 AMB / crate
- 3-6 slots with low airflow (see left figures)
 - 15 slots with better airflow
- Investigating AMB cooling without AMchips in hand
- Cooling measurements using CDF AM chips
- Will re-measure with AMB loaded with AM06

IMEC
simulations

Airflow to different slots

