

Looking ahead at the LHC
Perimeter Institute
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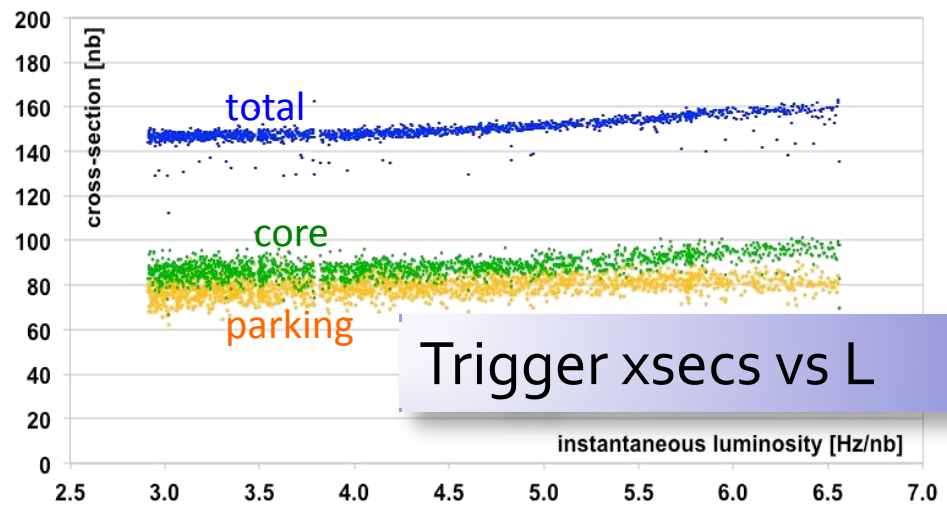
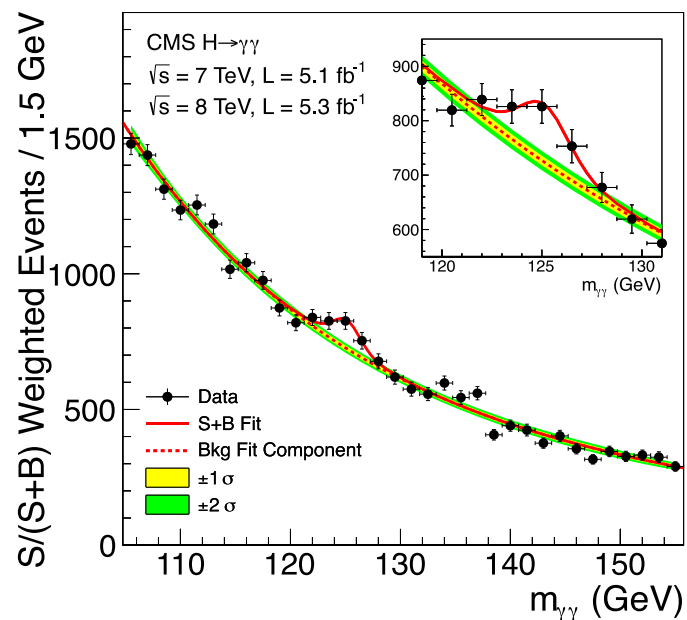
Acknowledgements

- Many thanks to
 - P.I. Director Neil Turok for his support for this meeting
 - Stephanie Mohl for amazing logistics support
 - Philip Schuster and Natalia Toro for an enormous amount of work in organizing the sessions and invitations
 - To all those who came!



The goals

- Take stock of where we are
 - 125.3 GeV boson discovered
 - No signs of new physics
- Get ideas of what we can do next
 - In the very near future, when we can still alter triggers
 - In the mid – term using data we collect now in core (350 Hz) and parked (300 Hz) datasets and consider whether to park even more (300 Hz)
- And a bit about the longer term (in view of upgrades, ESPG and Snowmass)
 - What should we focus on for the 13 TeV running ?
 - What should be the focus of the upgrades?
 - What do we think we can do with an HL-LHC, HE-LHC now that we have more experience with high pileup, for instance?





Goals (continued)

- Can we come up with an inspirational target (or two)?
 - To help inspire the collaboration, by defining a broader program of work with a clear outcome either way?
 - Higgs: find it or rule it out...
 - E.g. Can we do something similar for naturalness in a meaningful way?
- Finally, can we establish better communication lines with the theoretical community?
 - To be sure we provide the results that are desired and information that is optimally useful?
 - To make sure we take the best advantage of our data-taking.



LHC 2012 - summary

- TS₃ moved to W₃₈ 17th September
- Lost TS₄ (effectively moved to Xmas)
- End of proton run – 06:00 Monday 17th December

Mode	Days left
MD	12
Technical stop	5
Recovery from TS	2
Scrubbing - 25 ns	3
Proton running	~131
Special runs	~5
Ion setup	4
Ion run	24



LHC 2012 Q3/Q4 - update

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	July				Aug				Sep				Scrubbing run (date tbc)	
Wk	27	28	29	30	31	32	33	34	35	36	37	38	39	
Mo	2	9		23	30	6	13	20	27	3	10	17	24	
Tu		Floating MD [48 h]	VdM scans [48 h]					500 m [24 h]	Floating MD [48 h]					
We		90 m [24 h]										TS3		
Th								500 m [24 h]		J. Genevois				
Fr	90 m [24 h]												MD	
Sa														
Su														

Place holders

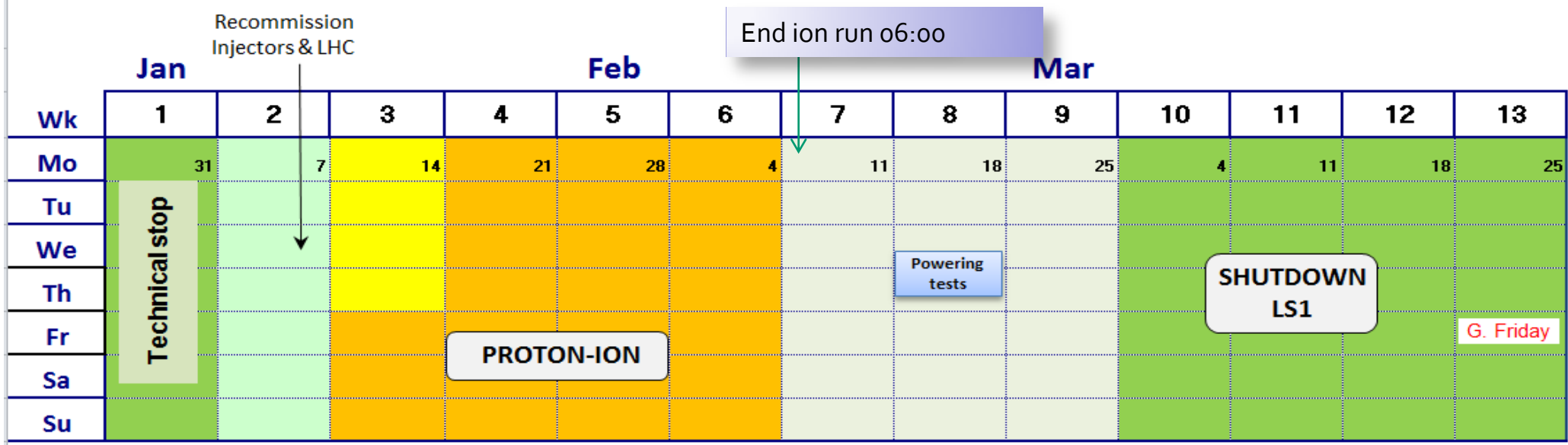
	Oct				Nov				Dec				
Wk	40	41	42	43	44	45	46	47	48	49	50	51	52
Mo	1	8	15	22	29	5	12	19	26	3	10	17	24
Tu													Xmas
We													
Th											MD		
Fr													Christmas technical stop
Sa													
Su													

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From - Mike Lamont: 11-07-2012



la



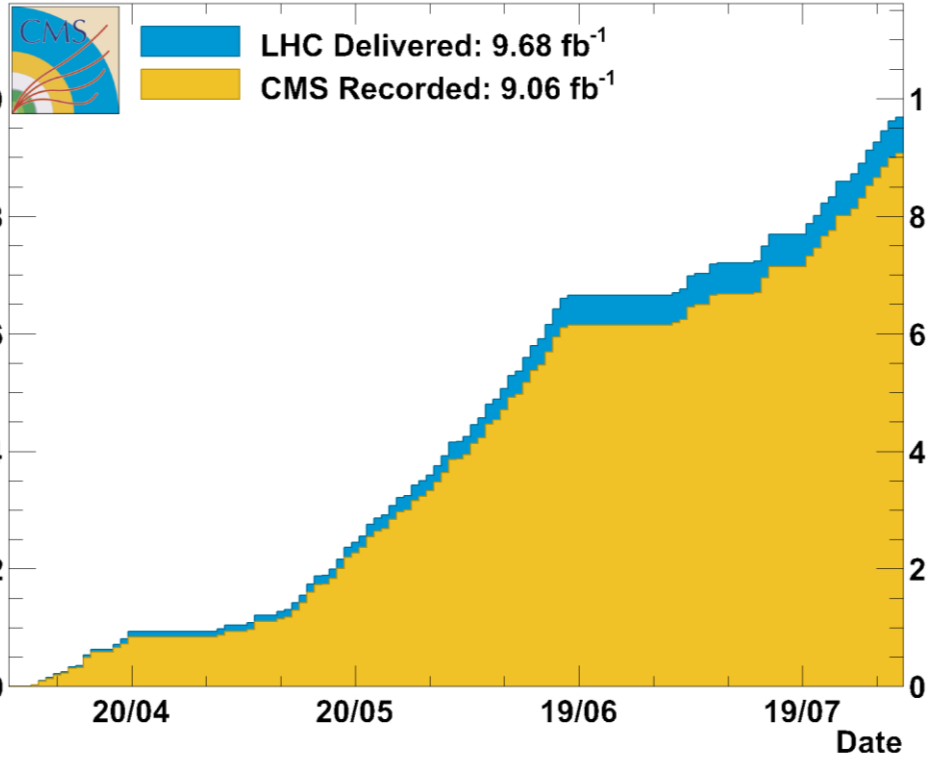
- Minimum interventions before and during Xmas stop
- Need both protons and lead (i.e. ion source, LINAC3, LEIR in addition...)
- Non-LHC physics is not foreseen – flat line complex when beam not needed
- Should foresee doing maximum p-A preparation before Christmas (pilot run, aperture measurements, test squeeze...)



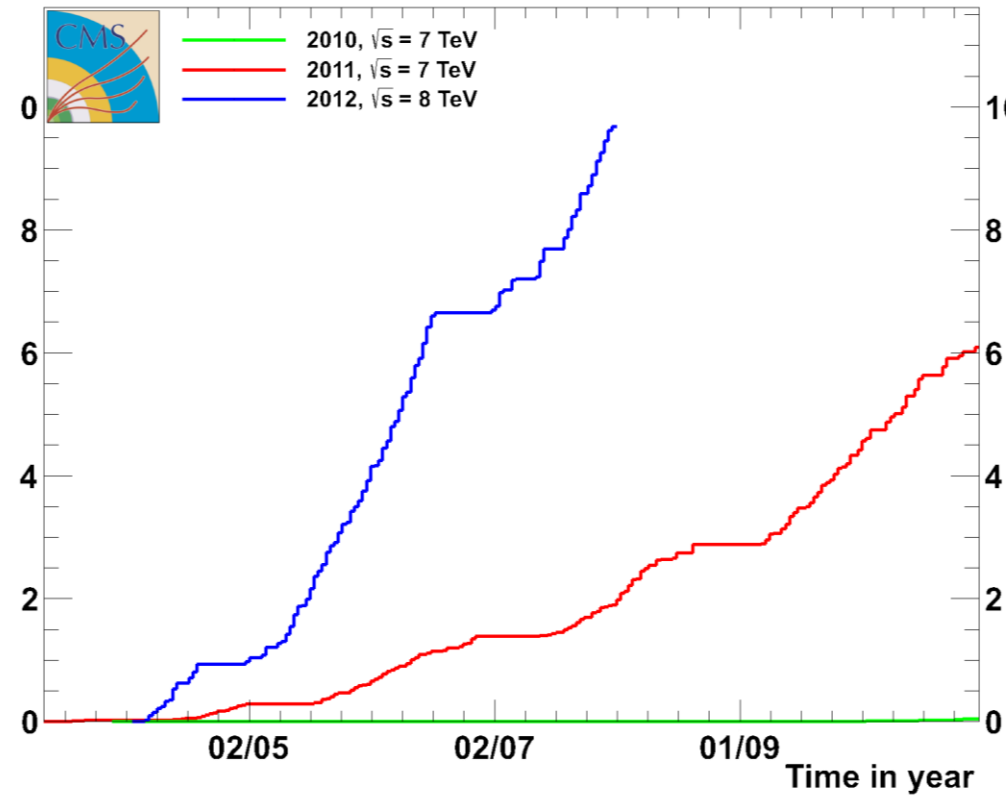
Status of CMS

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CMS Total Integrated Luminosity, 2012, p-p, $\sqrt{s} = 8$ TeV
Data included from 2012-04-04 23:57:30 to 2012-08-01 17:27:37 UTC



CMS Total Integrated Luminosity, p-p



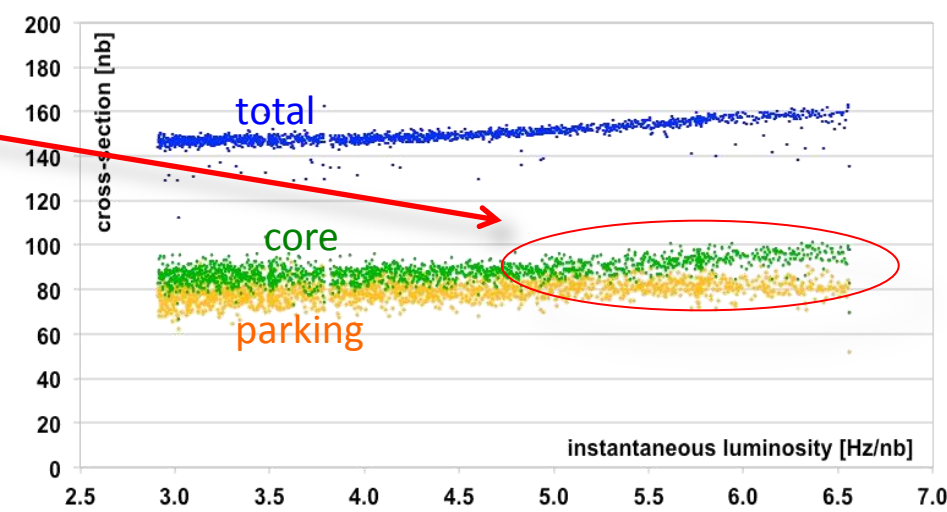
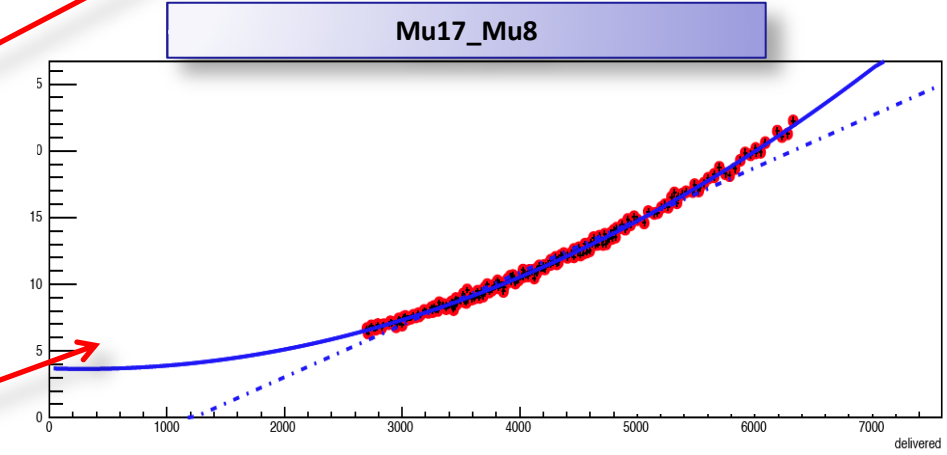
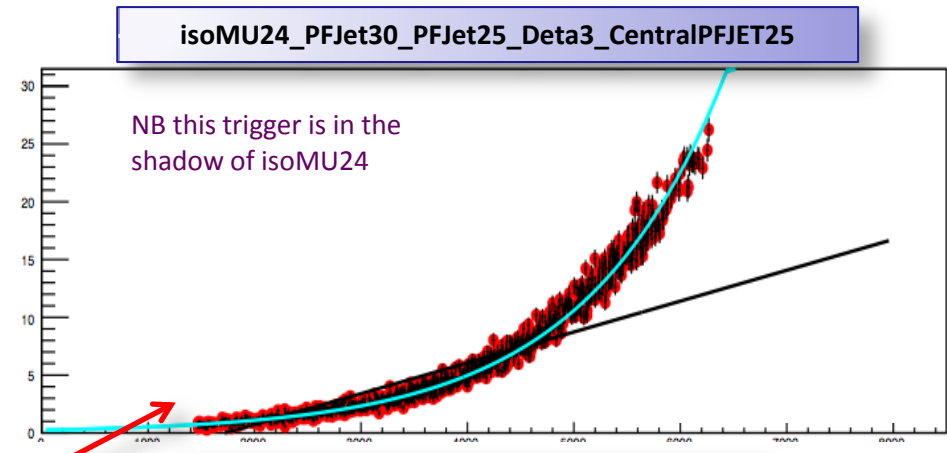
- Near to 10/fb so far in 2012
 - Roughly 1-1.5 per week in steady running period
 - Hoping for at least 25/fb this year

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More from Greg



- V3.0 deployed with
 - 8, 7 and 6E33 columns (only 6E33 used so far)
 - Added support to 5GeV GCT thresholds at L1
- V4.0 is ready with
 - Particle Flow Jet Energy Corrections
 - Should improve PU dependence on some of the triggers using PFJets
 - Few fixes and updates to remove some non linear dependency at high luminosity
 - dZ filter reintroduced on Double Muon triggers, will reduce the overall rate and small PU dependency
 - NB overall the HLT cross-section has already a pretty small PU dependency
- In progress
 - Improve monitoring and validation of the complex, non single-object triggers

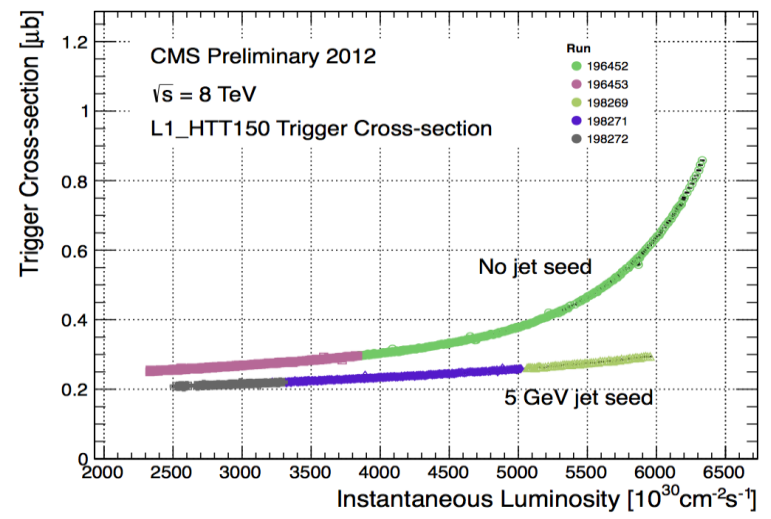




CMS L1 Trigger Status

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- Deployment of the new GCT jet seed threshold has significantly reduced the pile-up dependence of the HTT trigger cross sections
 - Nevertheless, still see high growth for $PU > 50 \dots$ (i.e. $L > E_{34}$)
- The single μ trigger rates have been reduced by $\sim 15\%$ with the new usage of an eta flag in the DT/CSC overlap.
 - Given these improvements, the L1 single muon trigger threshold has been reduced to 12 GeV with $\eta < 2.1$.
- The total L1A rate with the 6E33 prescale column is very similar to that before the Tech. Stop.
- Excellent performance of the L1 triggers shown at ICHEP \rightarrow



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