



# Performance of the ATLAS Trigger and DAQ system

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On behalf of the ATLAS Collaboration

## Related EPS posters:

The Control and Configuration of the ATLAS Trigger and Data Acquisition system during data taking activities (R. Bianchi)

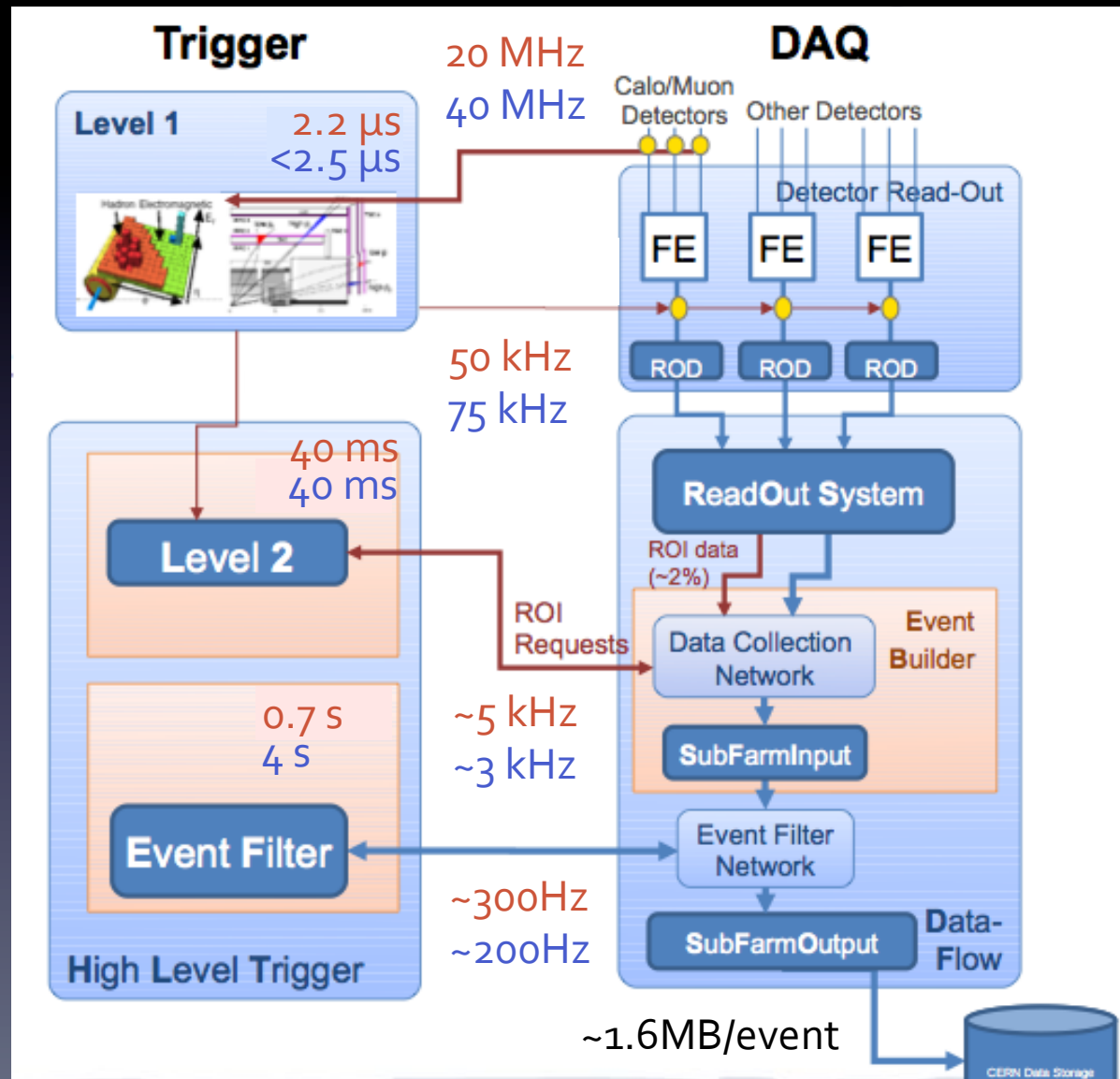
Performance and Calibration of the ATLAS Jet Trigger (J. Miguens)

The ATLAS b-jet trigger (D. Lima)

# The ATLAS TDAQ system

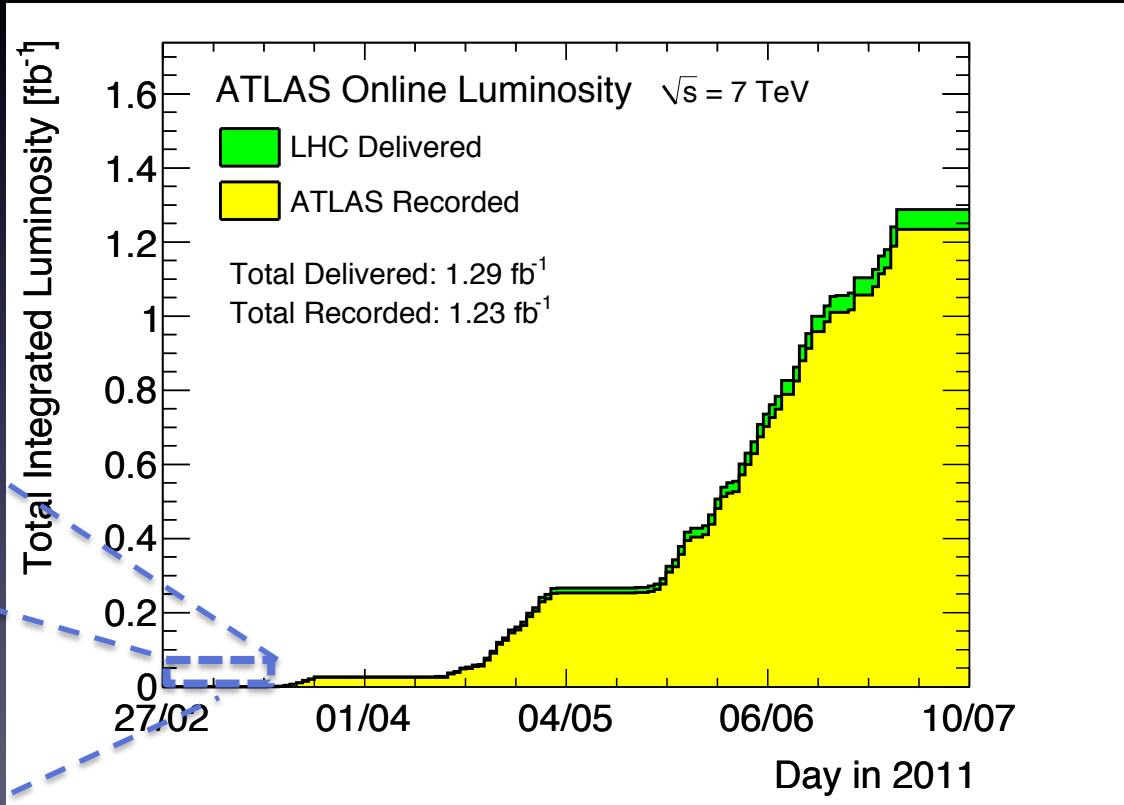
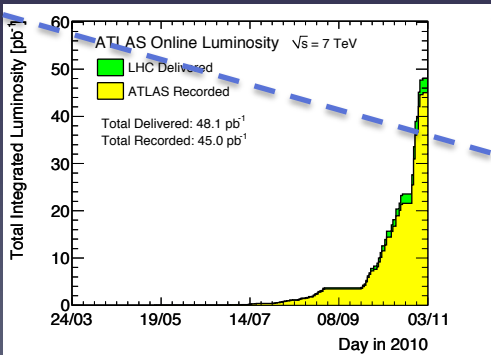
is already  
outperforming  
original design  
expectations

Current rate  
Original design rate



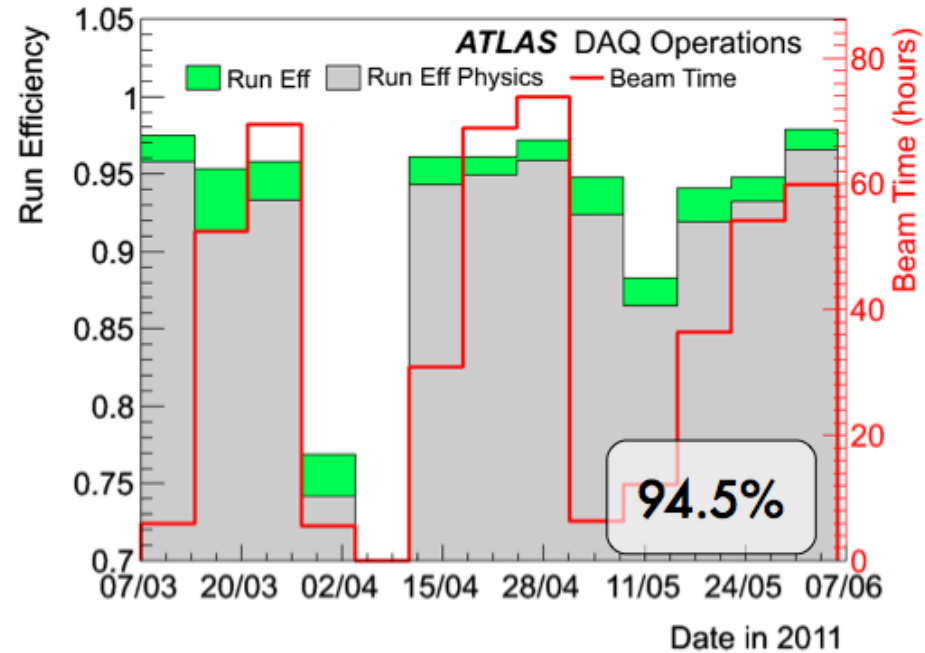
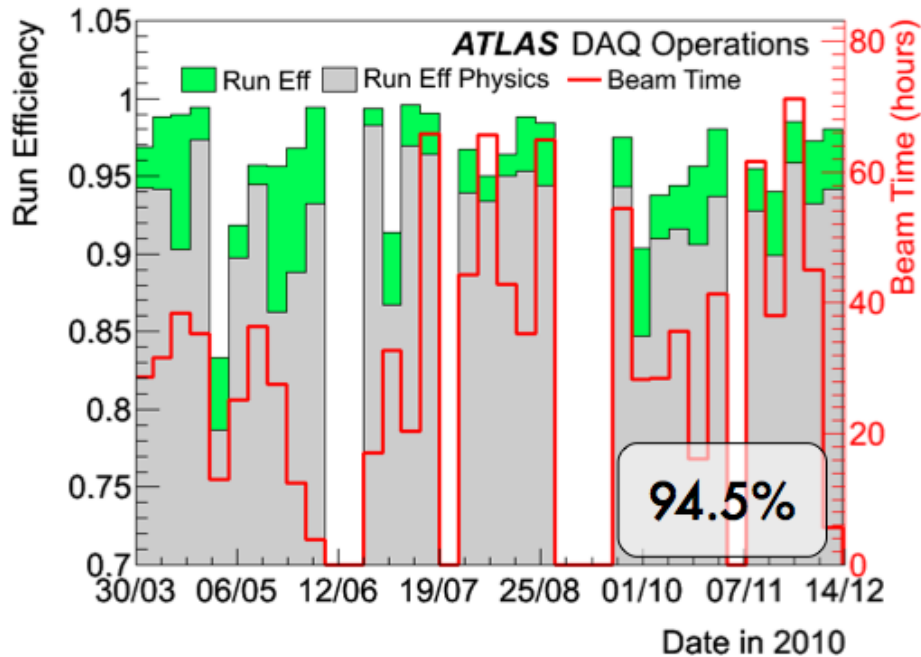
# Despite increasingly demanding LHC conditions

2010 (pp)	2011
7TeV	7TeV
233 bunches	1380 bunches
>75 bunch spcg	50ns bunch spcg
Average $\mu=2$	Average $\mu\sim 7$
$10^{32}\text{cm}^{-2}\text{s}^{-2}$	$>10^{33}\text{cm}^{-2}\text{s}^{-2}$



# ...ATLAS data taking efficiency has been kept very high

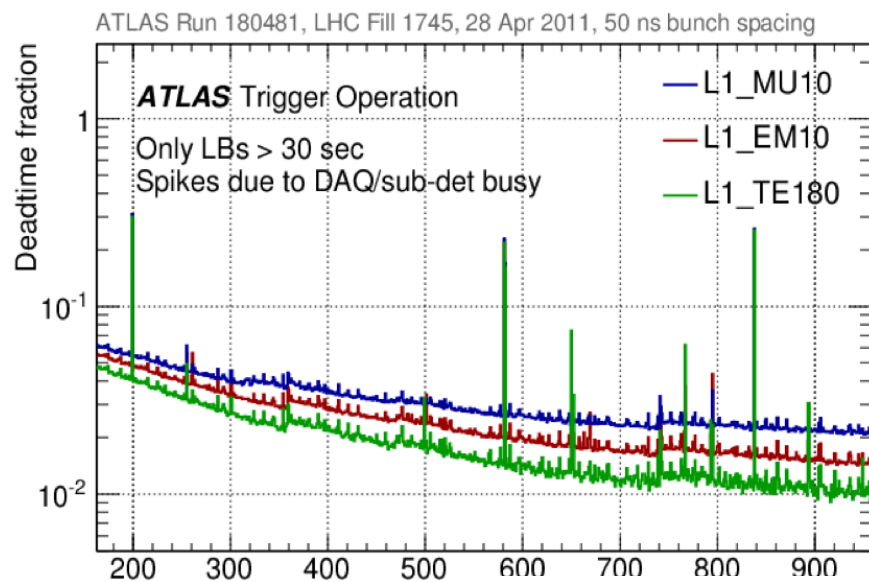
## consistently over time



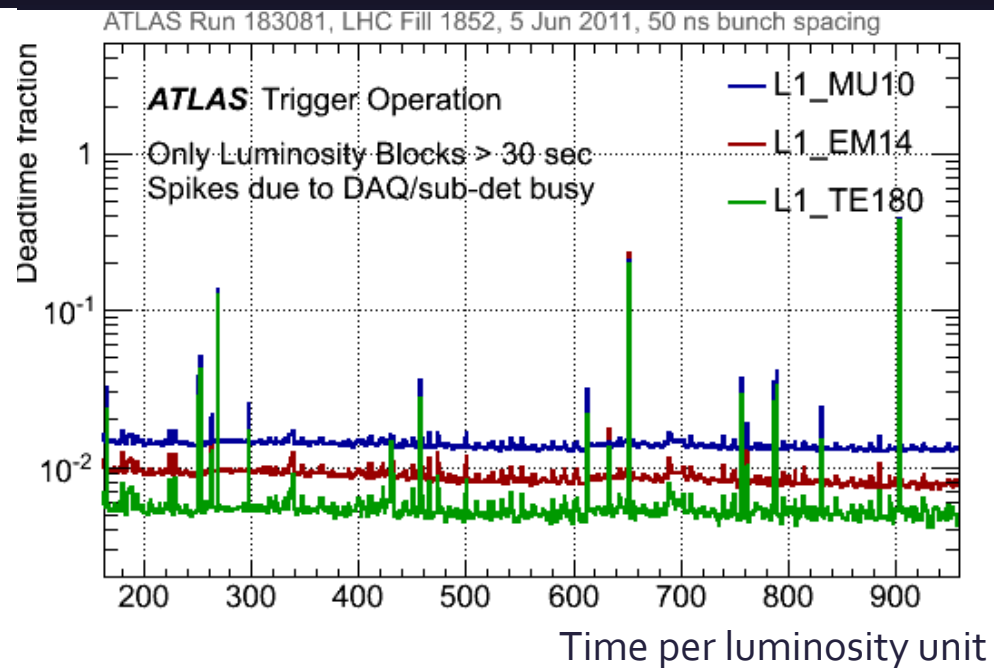
# ...by minimising deadtime

by changing the calorimeter noise threshold to reduce processing time, for example

With old threshold

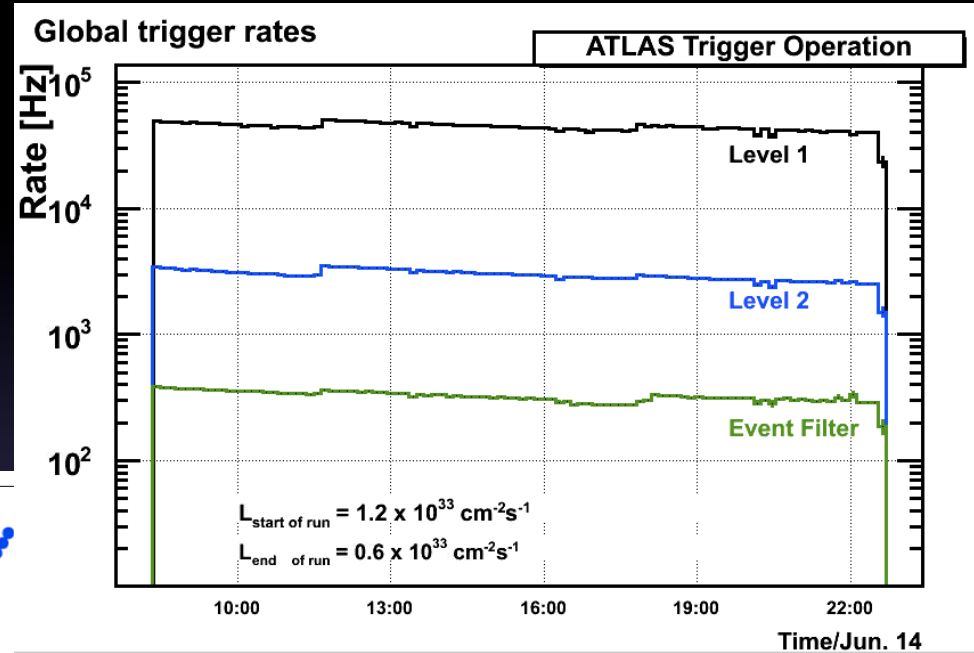
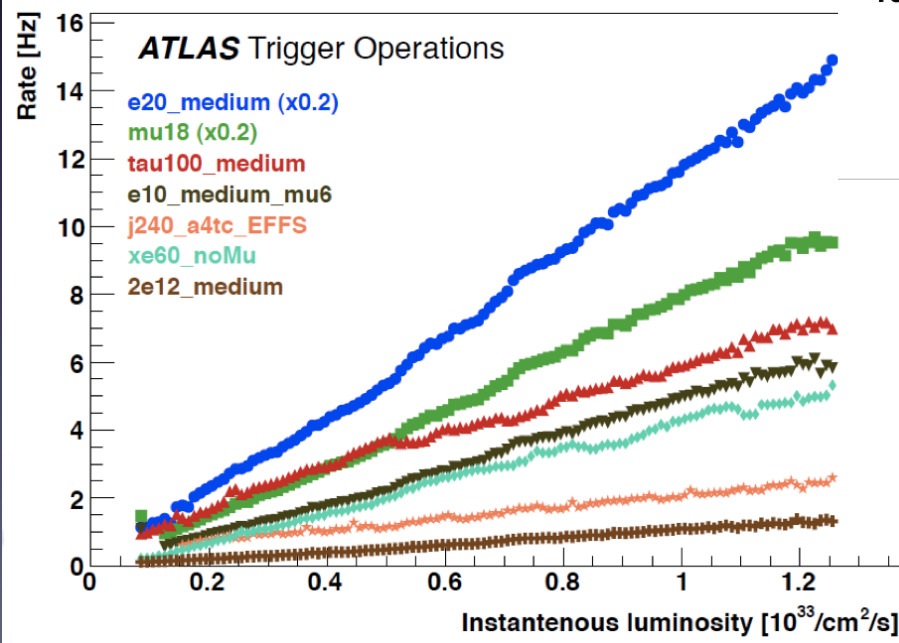


With new threshold



# ...by keeping rates controlled

over the run



and as luminosity  
increases

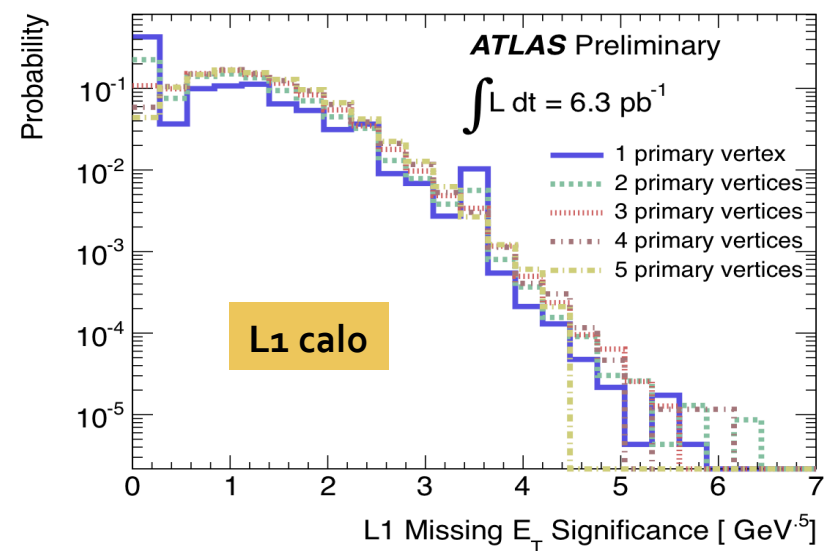
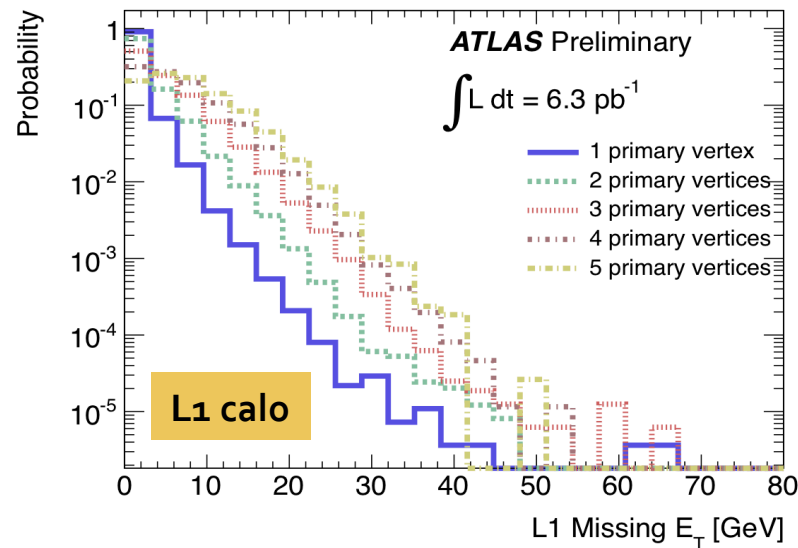
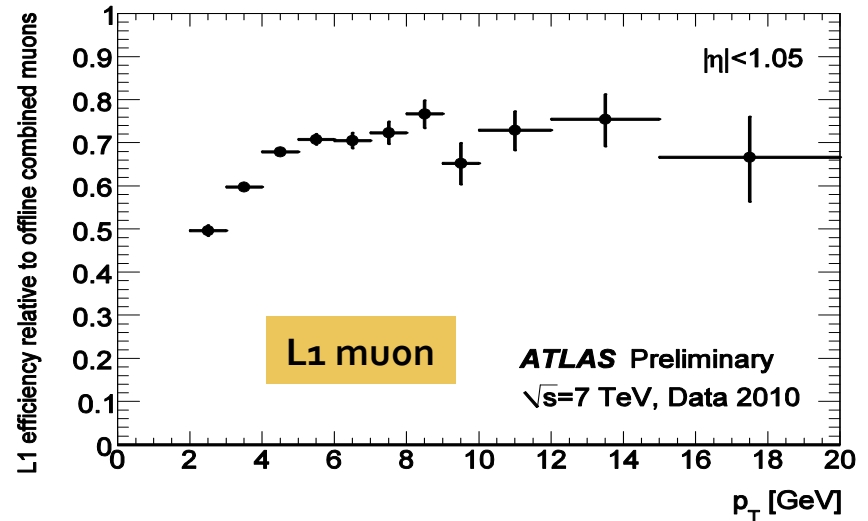
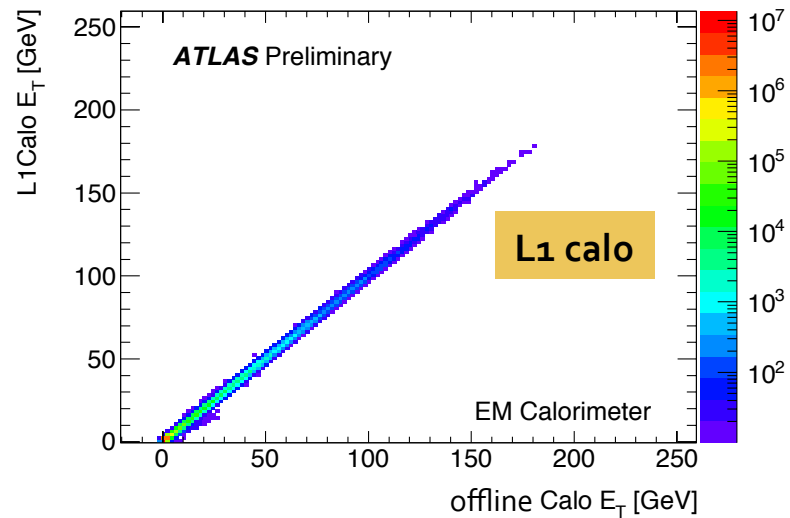
# ....with acceptable thresholds

so that the major trigger in a physics analysis is unprescaled

Trigger Signature	Notation		Level 1 Threshold Settings at $10^{33}$							
	L1	HLT	(prescaled triggers are shown shaded)							
<b>electron</b>	EM	e	3	5	7	10	12	14	16	30
<b>photon</b>	EM	g	3	5	7	10	12	14	16	30
<b>muon</b>	MU	mu	0	6	10	11	15	20		
<b>jet</b>	J	j	10	15	20	30	50	75	175	250
<b>forward jet</b>	FJ	fj	10	30	50	75				
<b>tau</b>	TAU	tau	5	6	8	11	11I	20	30	50
<b>Missing ET</b>	XE	xe	10	20	25	30	35	40	50	60
<b>ET miss Significance</b>	XS	xs	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
<b>Sum Scalar ET</b>	TE	te	20	180	300	400	500	600	700	
<b>Total Jet Energy</b>	JE	je	60	100	140	200				

# ...whilst maintaining good performance

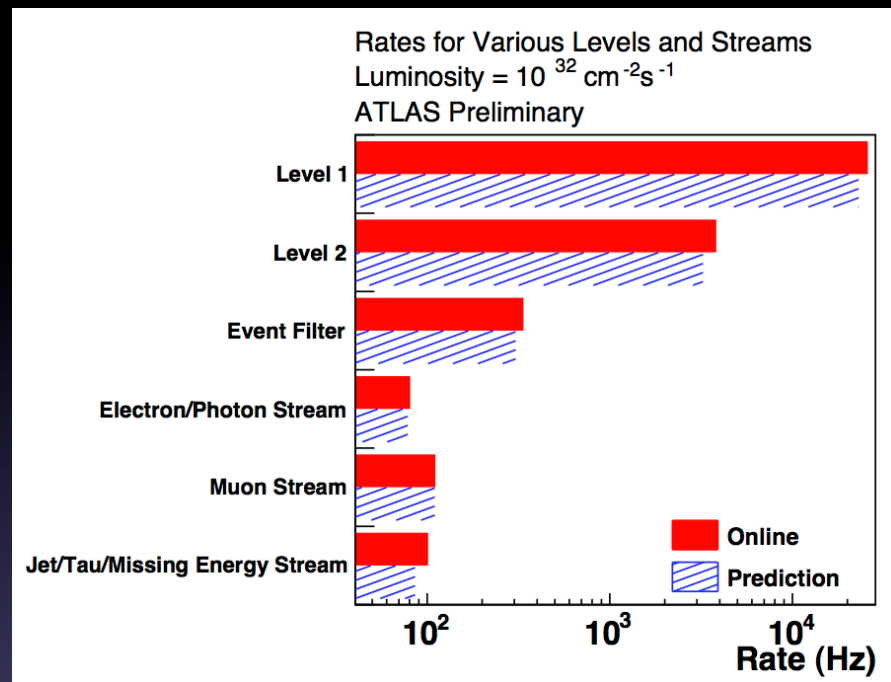
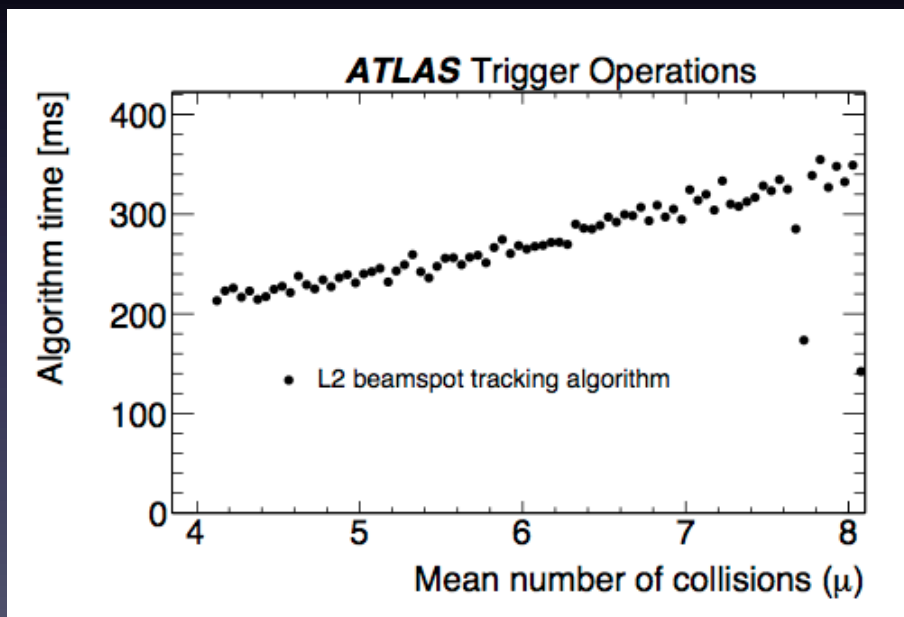
at L1 for example





# We predict from recorded data

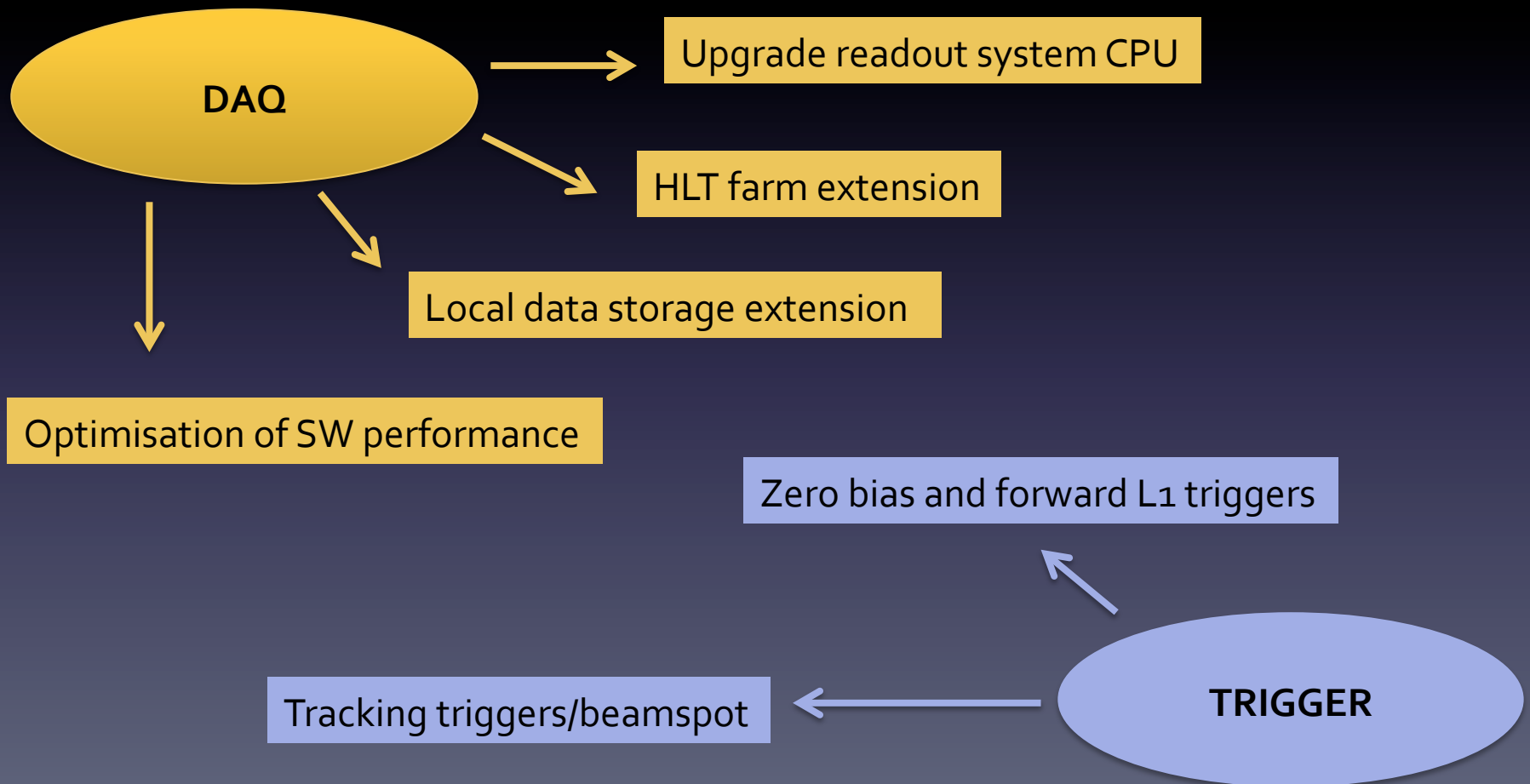
the rates...



...and system evolution

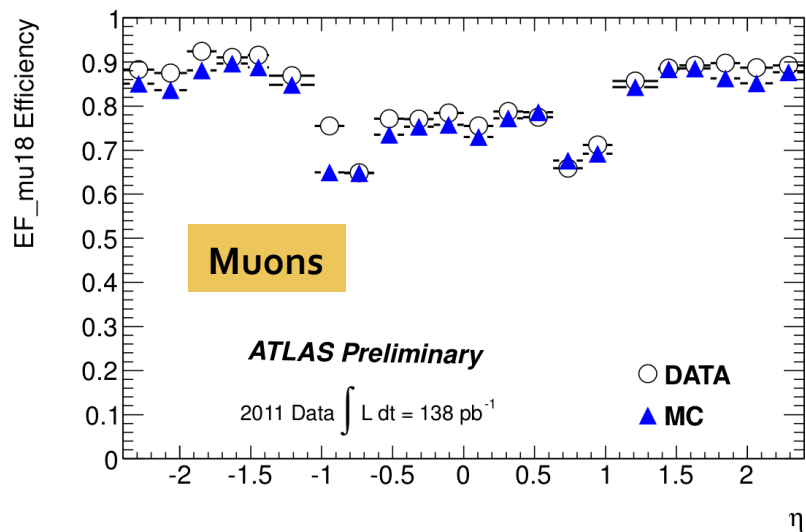
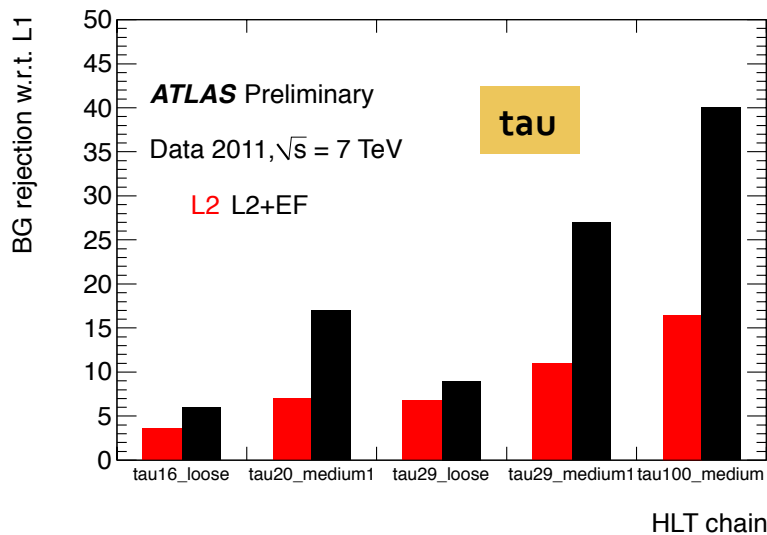
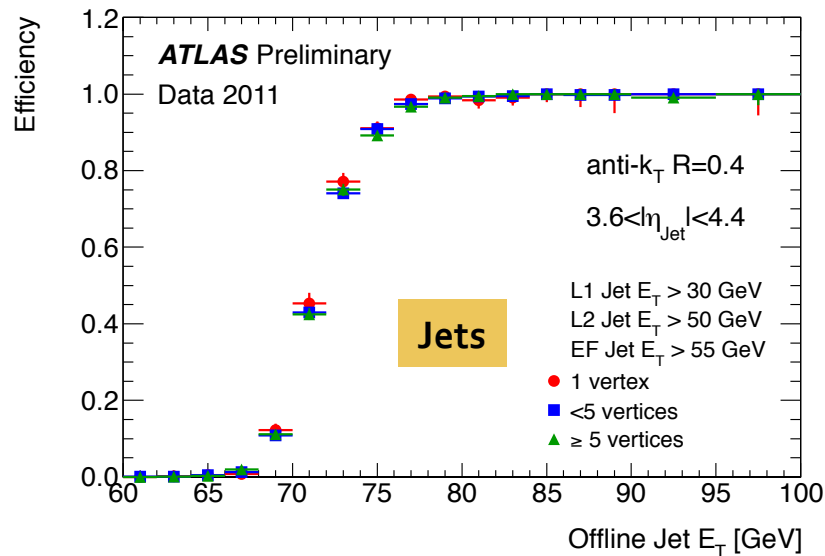
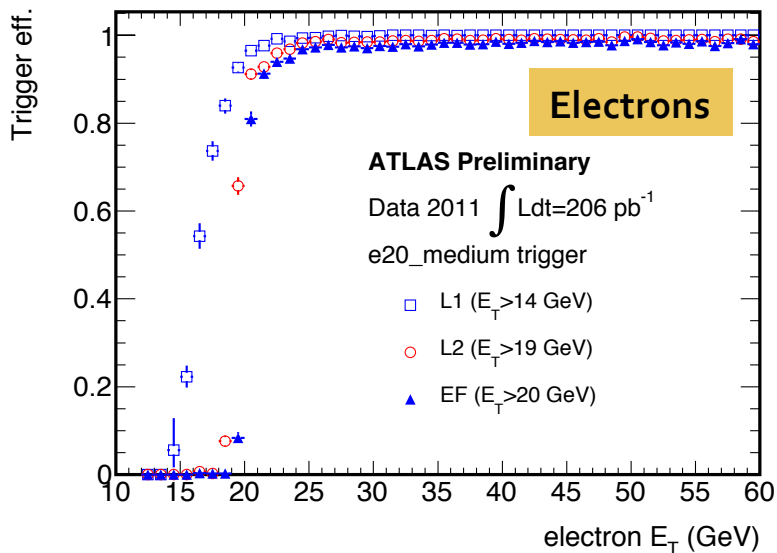
as pileup and luminosity increase

# ...so that we can develop the system accordingly

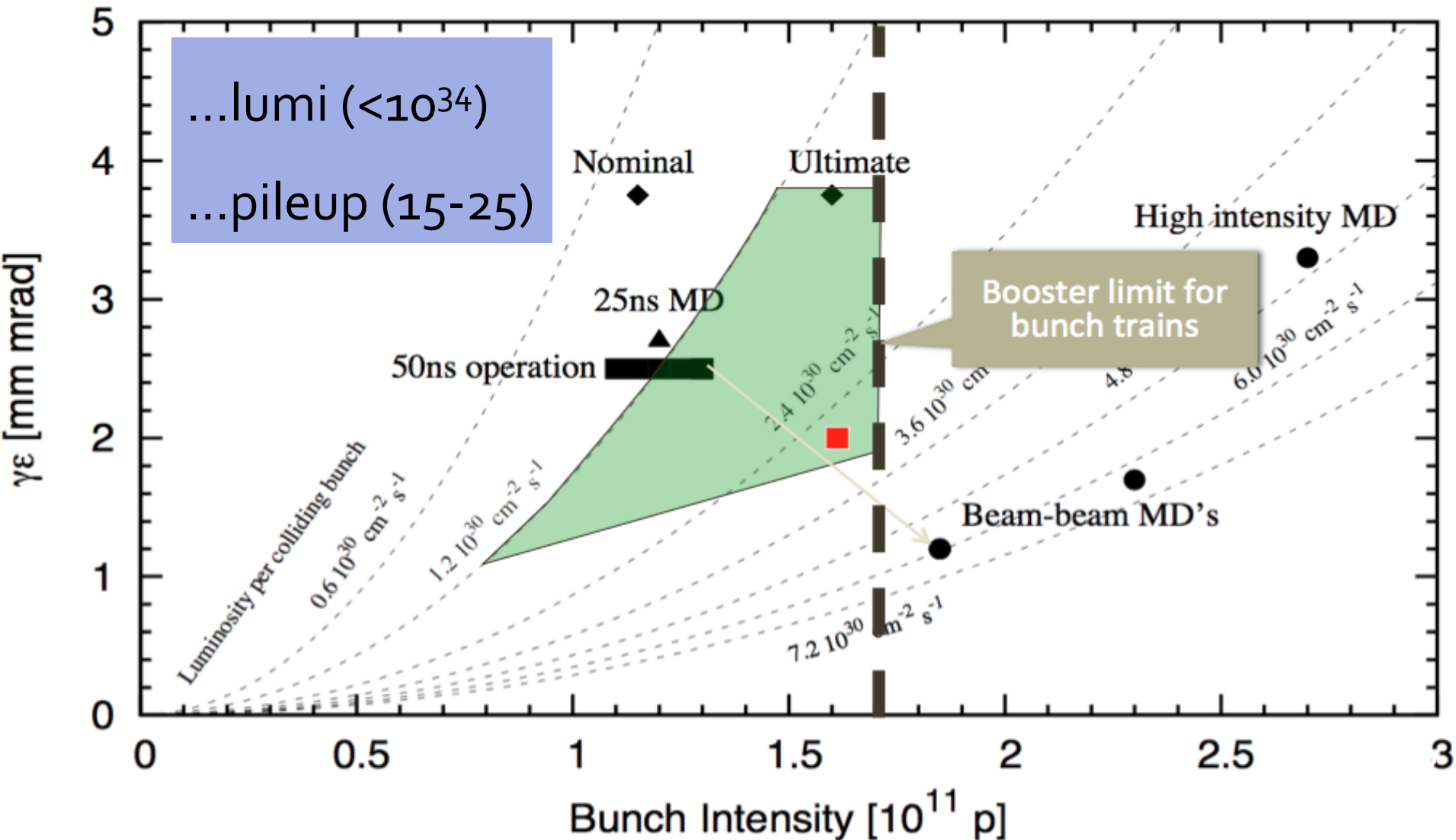


# ...to maintain the excellent performance seen thus far

HLT for example



...and prepare for the further challenges that the LHC will soon provide



# Conclusions

- **Despite increasingly demanding LHC conditions, ATLAS data taking efficiency has been kept high by keeping deadtime low and rates controlled with acceptable thresholds, whilst maintaining good overall performance.**
- **We predict from recorded data the evolution as pileup and luminosity increase, so we can develop the system accordingly to maintain the excellent final performance seen thus far, and prepare for the further challenges that the LHC will soon provide.**