Status of ATLAS and upgrade plans

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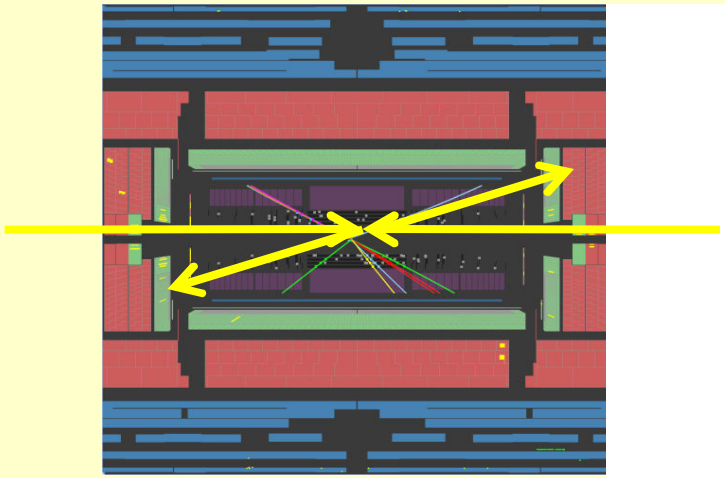
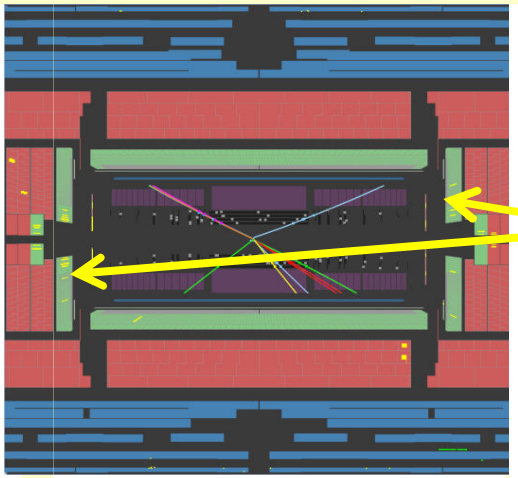
CERN-KEK Committee, 4th meeting

Candidate
Collision Event

First 900GeV Collisions
were successfully recorded
on 23/Nov/2009

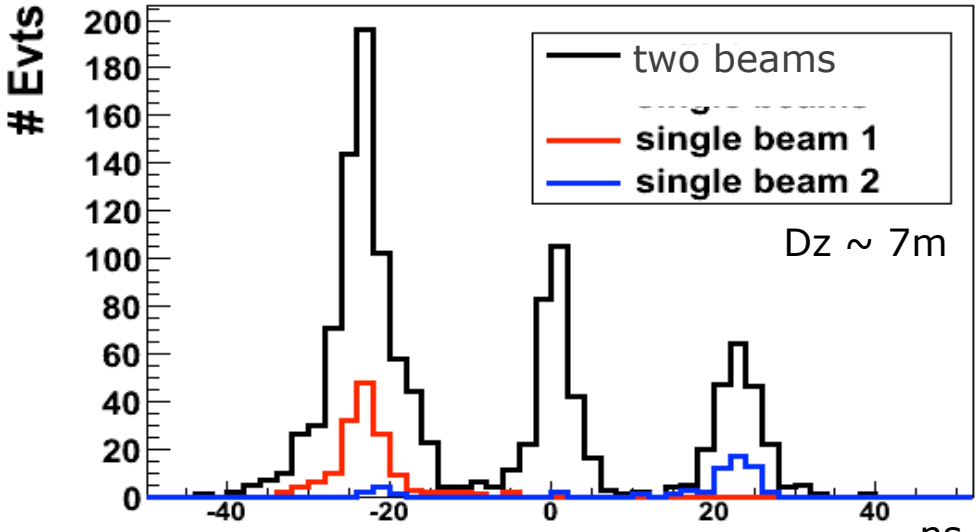
How can we convince ourselves that these are collision events?
-> Timing (at the initial period)



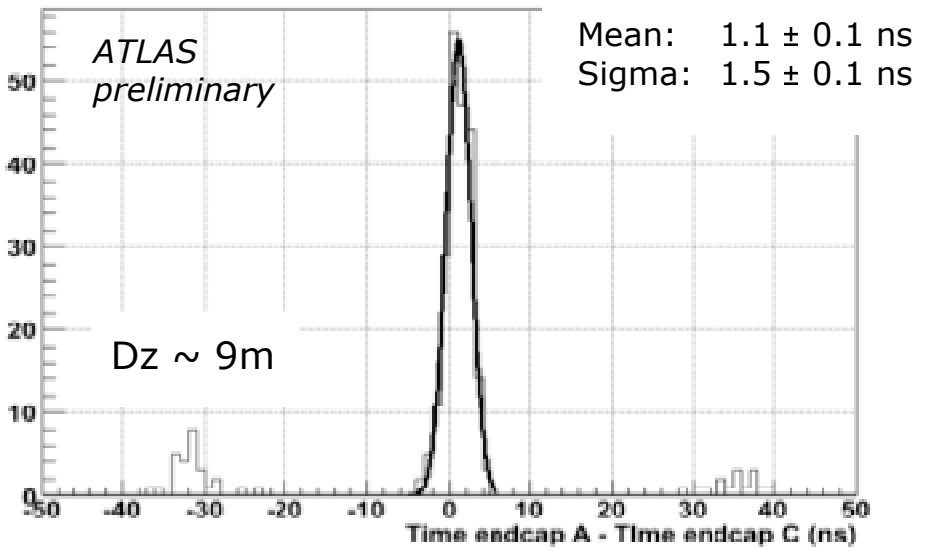


MBTS: Dt(*A* – *C*)

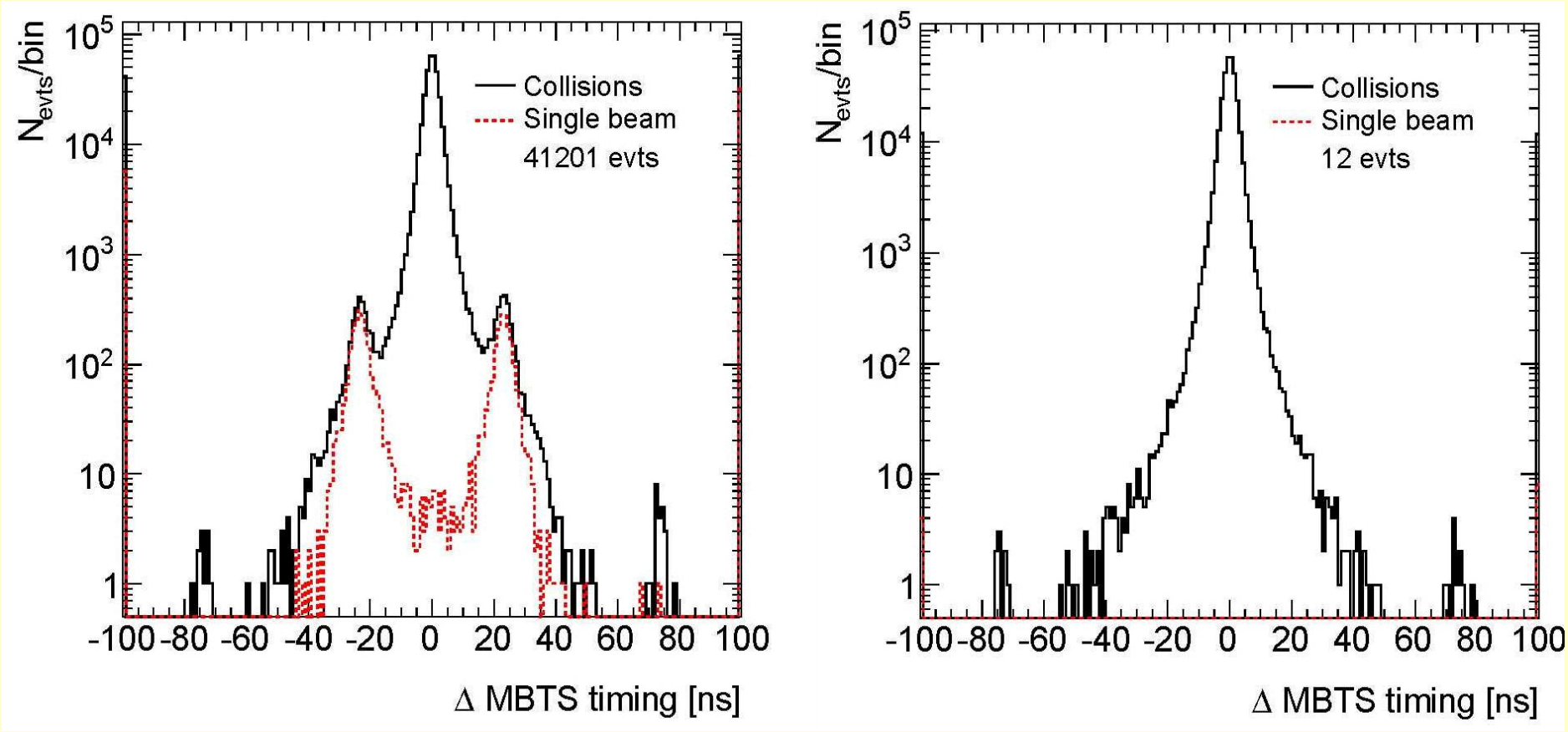
ATLAS preliminary



LAr calorimeter:
Dt(*A* – *C*)

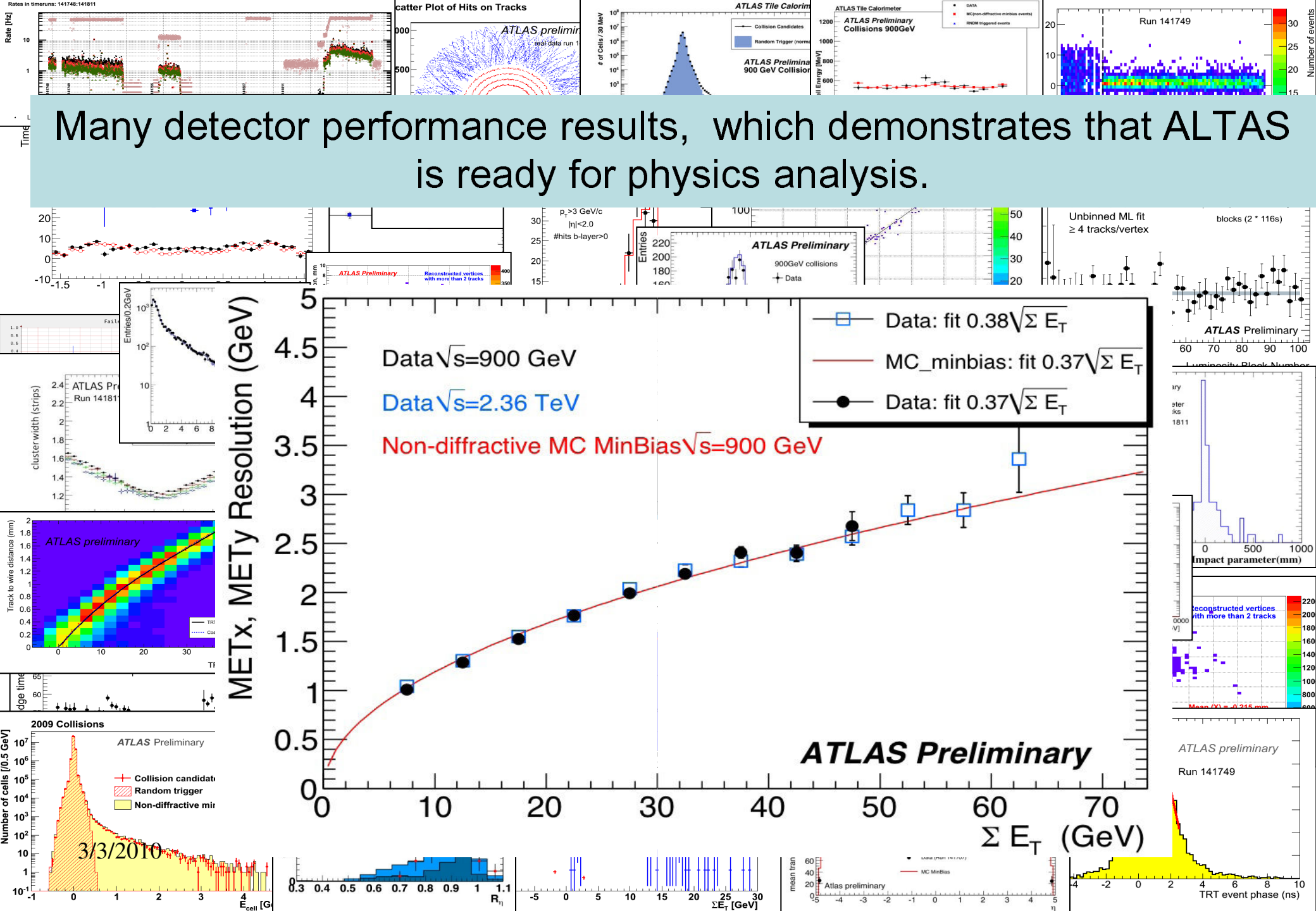


Background is negligible after cleaning selections



Data sample used in the charged particle Multiplicity measurements (shown later)

Many detector performance results, which demonstrates that ALTAS is ready for physics analysis.

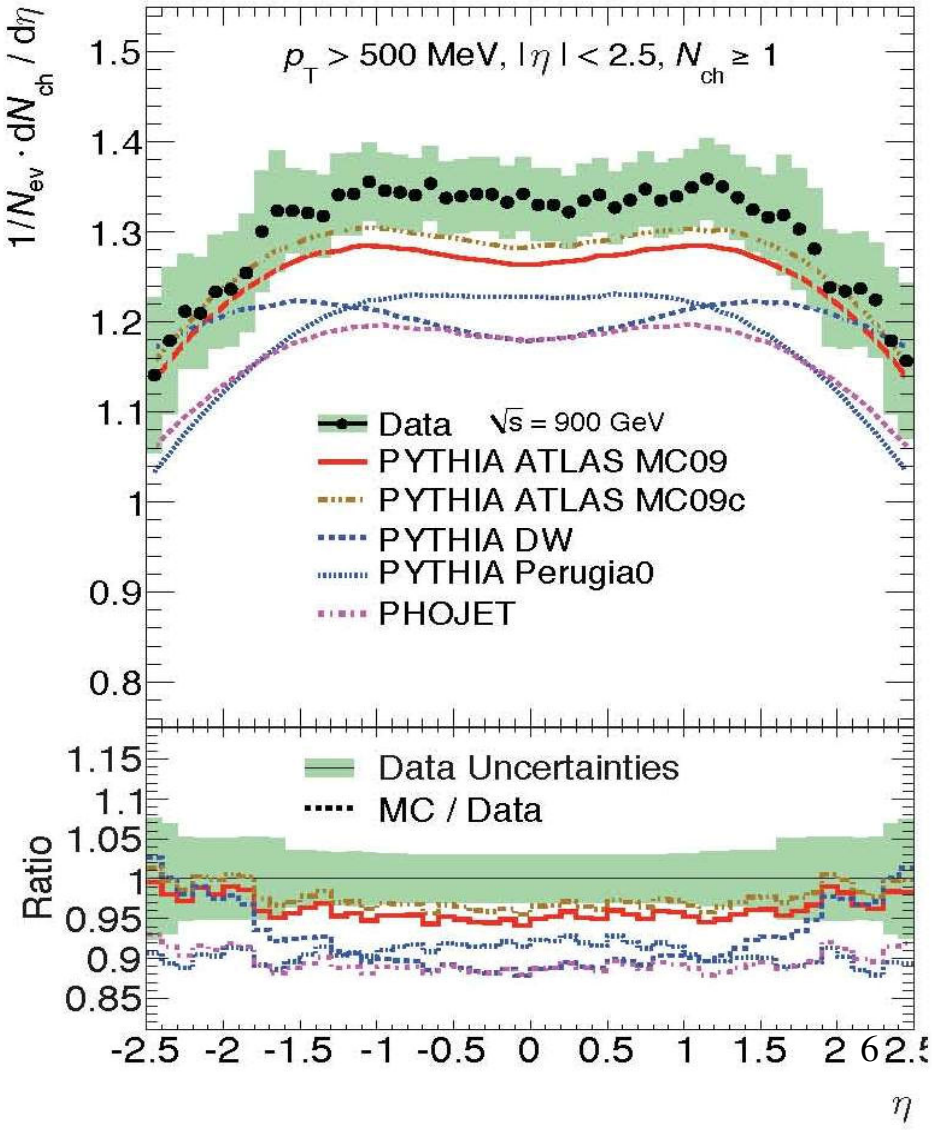


3/3/2010

And ATLAS first physics results!
CERN-PH-EP/2010-004 (15 March 2010), arXiv:1003.3124v1

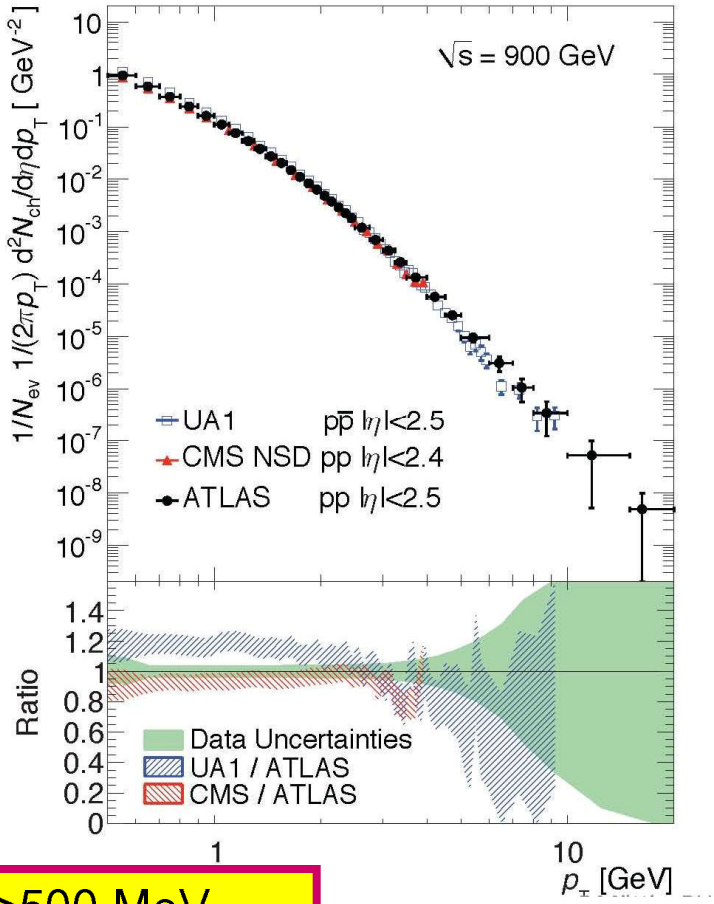
Charged-particle multiplicities in pp interactions at sqrt(s) = 900 GeV measured with the ATLAS detector at the LHC

Charge particle multiplicity
for events
with Nch>0
in |η|<2.5, Pt>500 MeV



1~3 sigma disagreement between data and MCs.

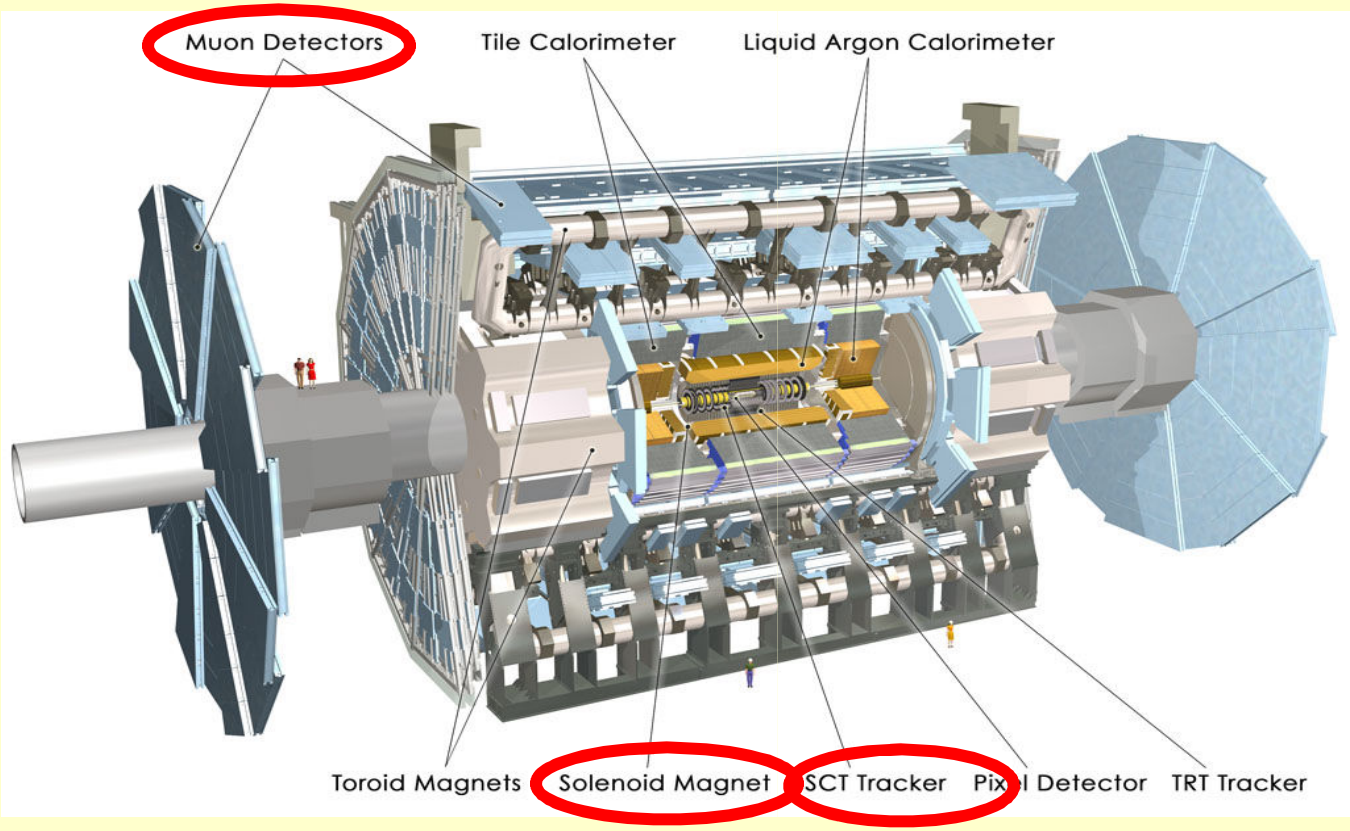
Systematic uncertainty on the number of events, N_{ev}	
Trigger efficiency	$< 0.1\%$
Vertex-reconstruction efficiency	$< 0.1\%$
Track-reconstruction efficiency	1.1%
Different MC tunes	0.4%
Total uncertainty on N_{ev}	1.2%
Systematic uncertainty on $1/N_{ev} \cdot dN/d\eta$ at $\eta = 0$	
Track Reconstruction	4.2%
Trigger and vertex efficiency	$< 0.1\%$
Secondary fraction	0.2%
Total uncertainty on N_{ev}	-1.2%
Total uncertainty on $1/N_{ev} dN/d\eta$ at $\eta = 0$	3.0%



ATLAS average particle density at |η|=0 Pt>500 MeV
1.333 +- 0.003 (stat) +- 0.040 (syst)

Comparison with CMS (with model dependent extrapolation: Pythia-DW)
N_{ND} for |η|<2.4 Pt>500 MeV
ATLAS: 1.241 +- 0.040 (syst)
CMS: 1.202 +- 0.043 (syst) : consistent:

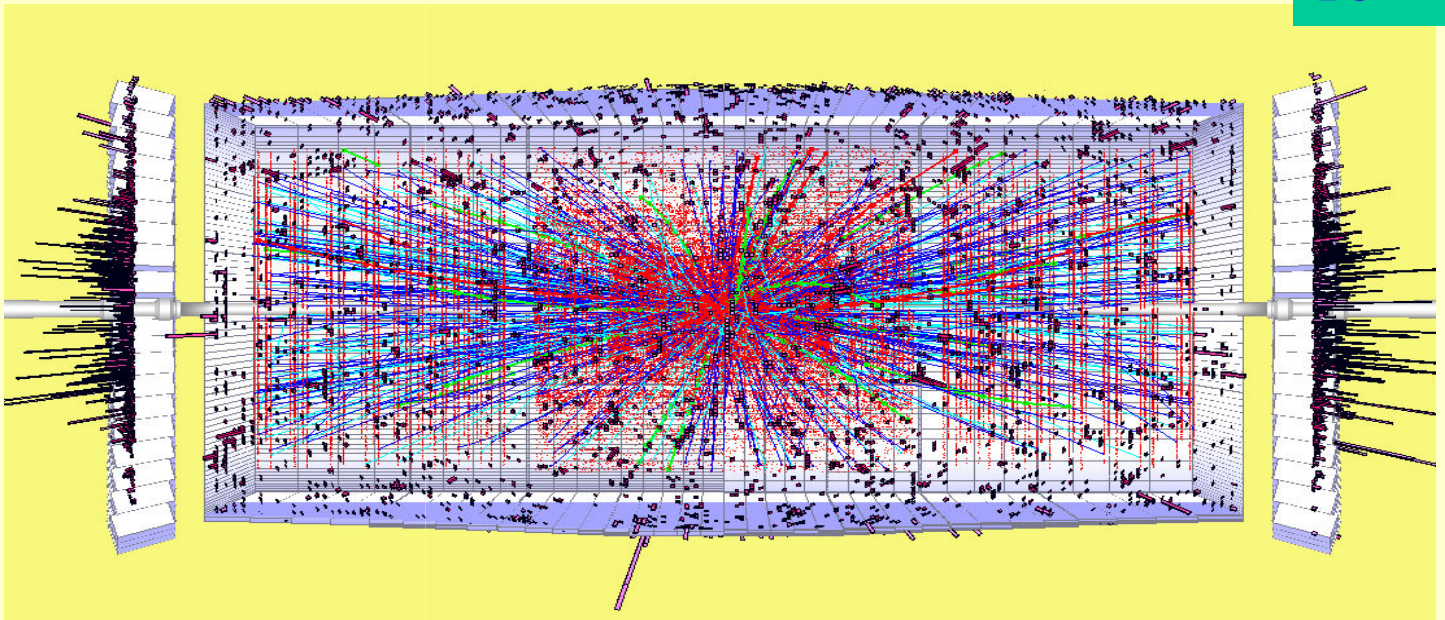
ATLAS Detector: construction and commissioning



- Superconducting Central Solenoid (Japanese contribution:100%)
- Time-to-digital conversion chips for muon drift tubes (100%)
- End-cap muon triggering system (TGC) (~50%)
- Silicon microstrip tracking system (SCT) (~20%)

Detector Upgrade for High Lumi

10^{35}



It is very difficult to handle high luminosity:

We need a good detector performance

and a good trigger performance

ATLAS-Japan activities on upgrade

~monthly video meeting

- Inner Trackers : Strips and Pixel detectors.
  - R&D for rad.-hard pixel/strip sensors KEK, Tsukuba, Osaka
  - Contribution to Pixel Insertable B-layer(IBL) KEK
- Muons
  - Replacements of Inner wheel? (Detector R&D Kobe)
  - Readout latency? KEK
- Triggers
  - How to make a rate reduction for Muon? (KEK, Tokyo)
    - LVL1 triggers with MDT?
    - Muon-CAL matching at LVL1 (EOI to TDAQ)
    - Muon-Inner Track matching at LVL1 (EOI to TDAQ)

      -> Extensive studies with MC.

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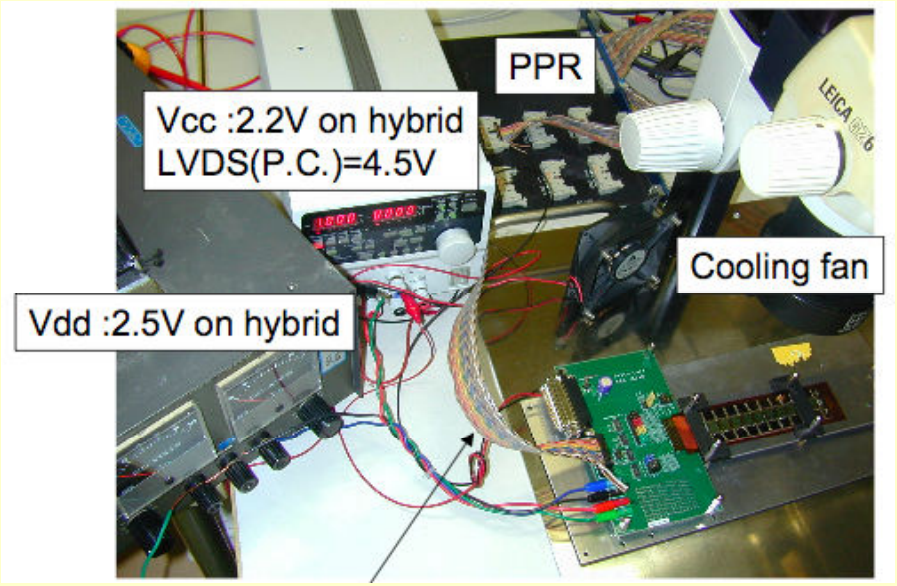
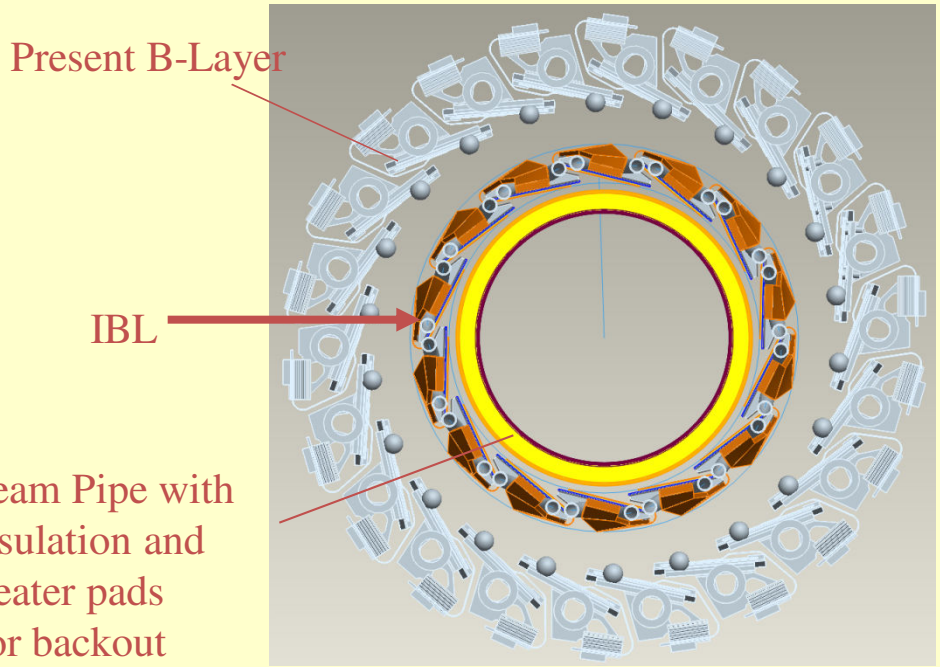


Test of Hybrids for short-strip detectors



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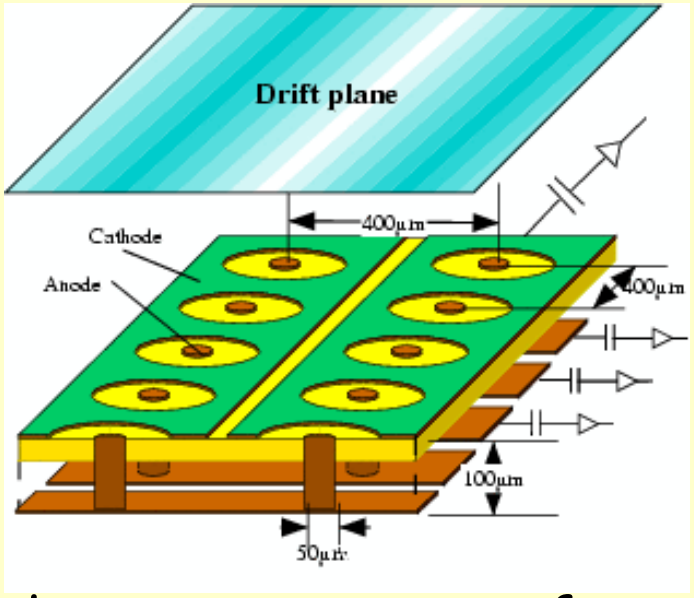
- Muons
  - Replacements of Inner wheels? (Detector R&D Kobe)
  - Readout latency? KEK



Electron Beam test at KEK
in November 2009

μPIC detector: as one of possible candidates

ATLAS-Japan activities on upgrade

- Triggers
  - How to make a rate reduction for Muon? (KEK, Tokyo)
    - Muon-Inner Track matching at LVL1 (EOI to TDAQ)

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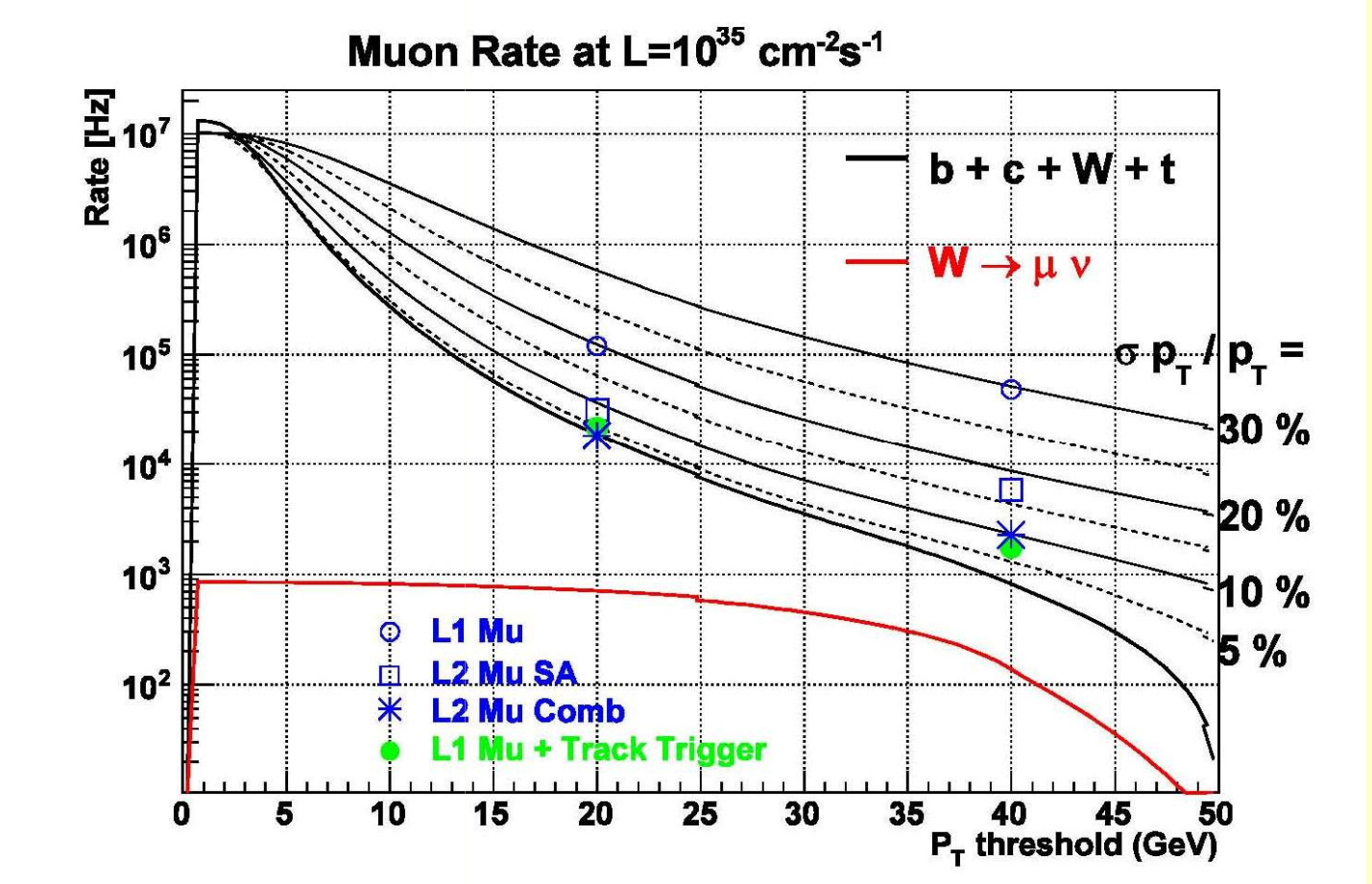

LHC upgrade and KEK/Japan roadmap

- LHC upgrade was only briefly mentioned in the KEK roadmap document (one short section) and is not explicitly listed in the KEK director's 'triangle' roadmap picture.

- In order to expand activities, we (ATLAS-Japan) are asked to show more explicit plans to the Japanese HEP community.
  - This is what we need to promote this year.

Summary

- Japanese group has been taking major roles in the detector construction. (Solenoid, TGC, SCT, MDT frontend electronics)
- The detectors are working well for the first LHC running period.
- R&D studies of ATLAS detector upgrades are in progress for tracker, muon and trigger areas.
- We need to stimulate the LHC upgrade discussion in the Japanese HEP community.

  <- an important step in 2010.