INTRODUCTION OF NAGOYA ATLAS TEAM

Yasuyuki HORII

Nagoya University

17 Dec. 2015

MEMBERS

(CERN)

Yasuyuki HORII
Assistant professor

Makoto TOMOTO
Associate professor
Team leader

CERN

Kentaro KAWADE
Postdoctoral fellow

Jun WAKABAYASHI
PhD course student

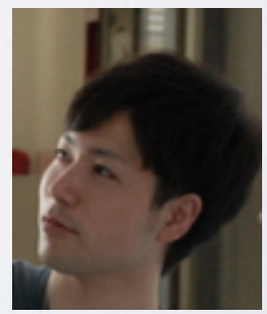
Katsuya YAMAUCHI
PhD course student

CERN

Kouta ONOGI
PhD course student

Yuta SANO
Master course student

Kotoko SHUKUTANI
Master course student



Kenta MIZUKOSHI
Master course student

LIST OF THESES

Master theses

- 2015 Usui, Onogi
- 2013 Yamauchi
- 2011 Shichi, Wakabayashi
- 2010 Itoh, Kishiki
- 2009 Hasegawa
- 2008 Okumura, Takahashi

L1 muon trigger

PhD theses

- 2015 Morvaj

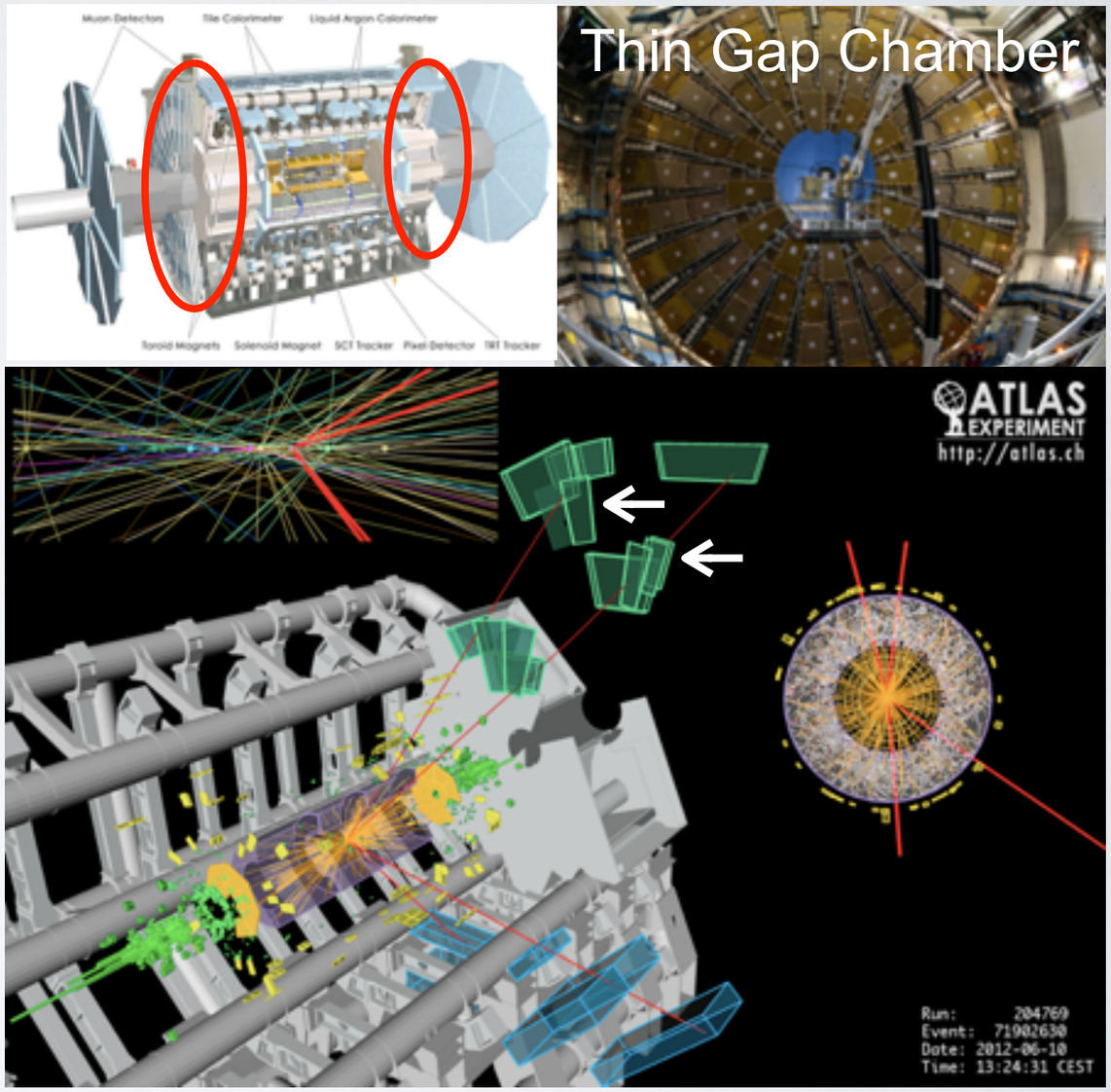
mUED search

- 2013 Hasegawa
- 2012 Okumura, Takahashi

Top quark physics

1. L1 MUON TRIGGER

- Essential contributions to endcap L1 muon trigger:
  - installation,
  - commissioning,
  - operation,
  - maintenance, and
  - upgrades.



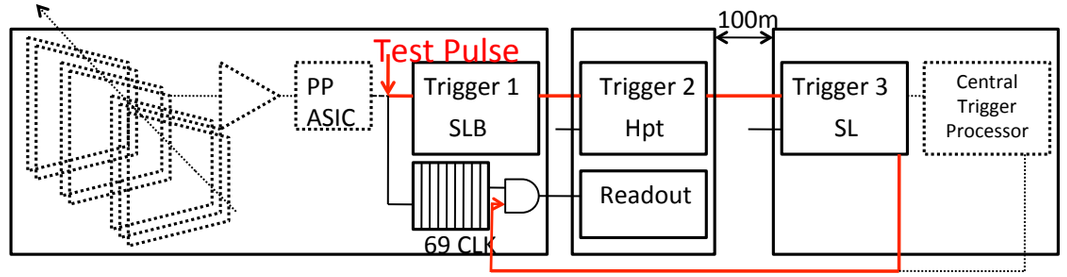
Installation and commissioning

System check before installation

test pulse

cosmic muons

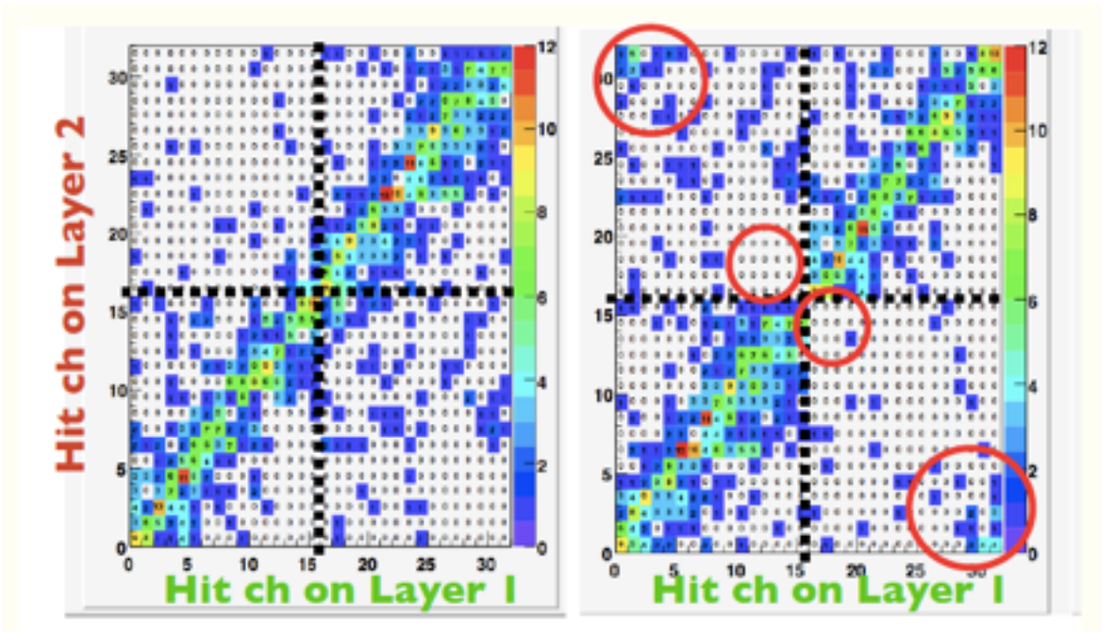
Latency confirmation

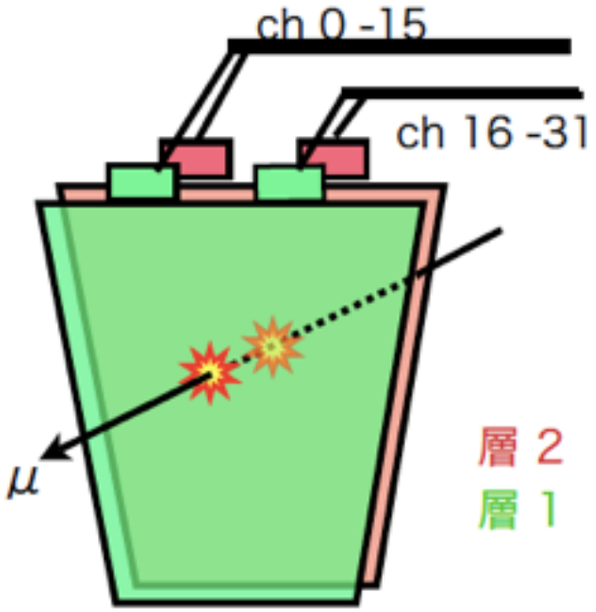


latency measurement: 2.3 us
(requirement: 2.5 us)

Connections of ~10k cables checked with cosmic muons.

after correction *before correction*

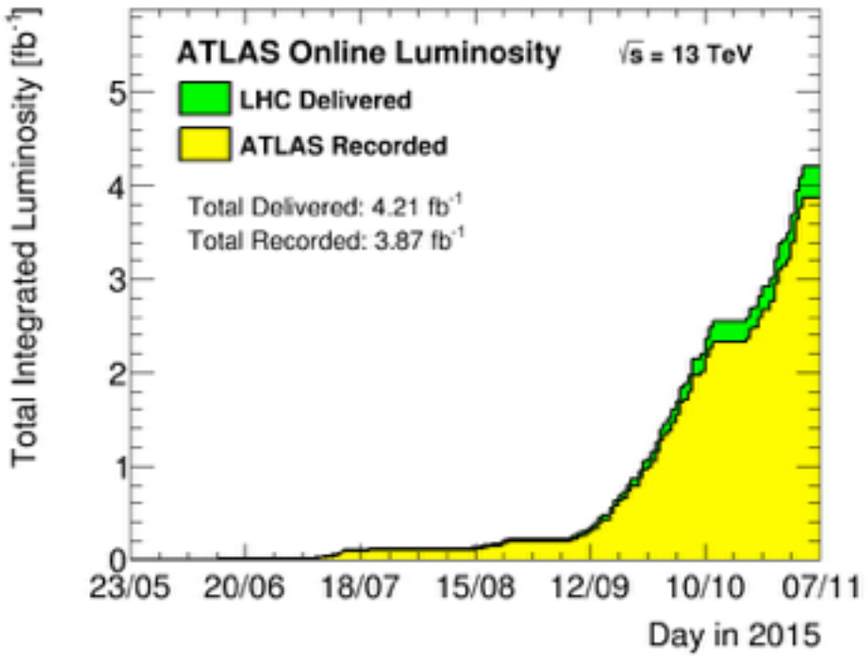




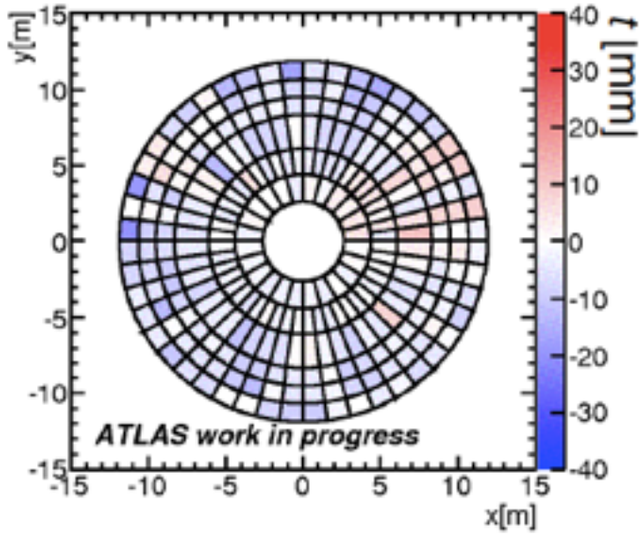
and
many others.

Operation and maintenance

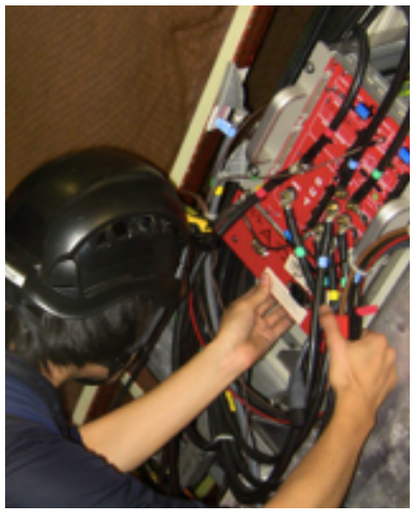
Contributed to data taking.
~8 TGC experts from Nagoya!



TGC alignment by taking MDT as a reference using real data.



Maintenance during shutdown.
Replacement of cables, fans, …

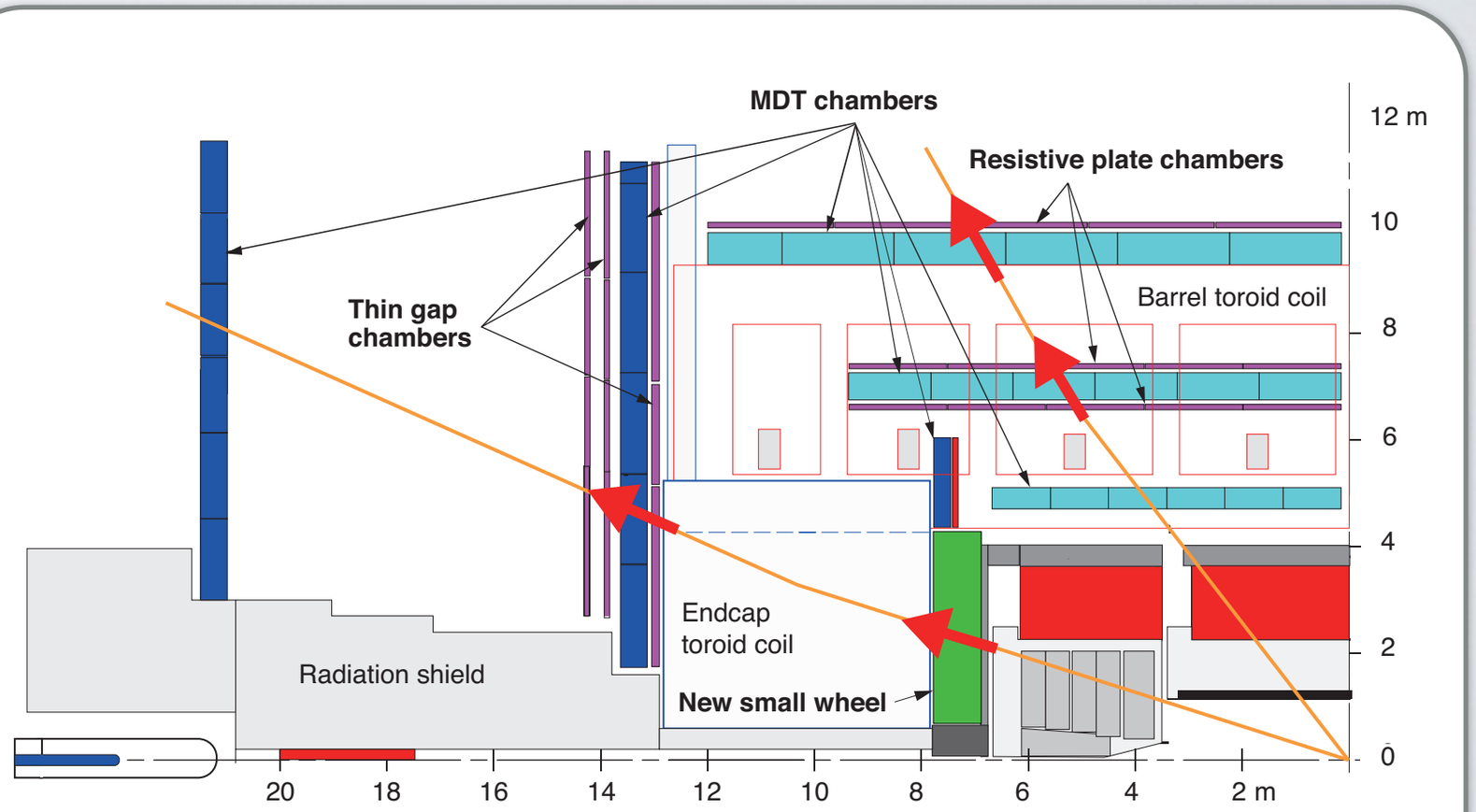


Upgrade

Expected luminosity at High-Luminosity LHC: 5 x 10^{34} $cm^{-2}s^{-1}$.
To cope with higher event rate, L1 muon trigger requires upgrade.

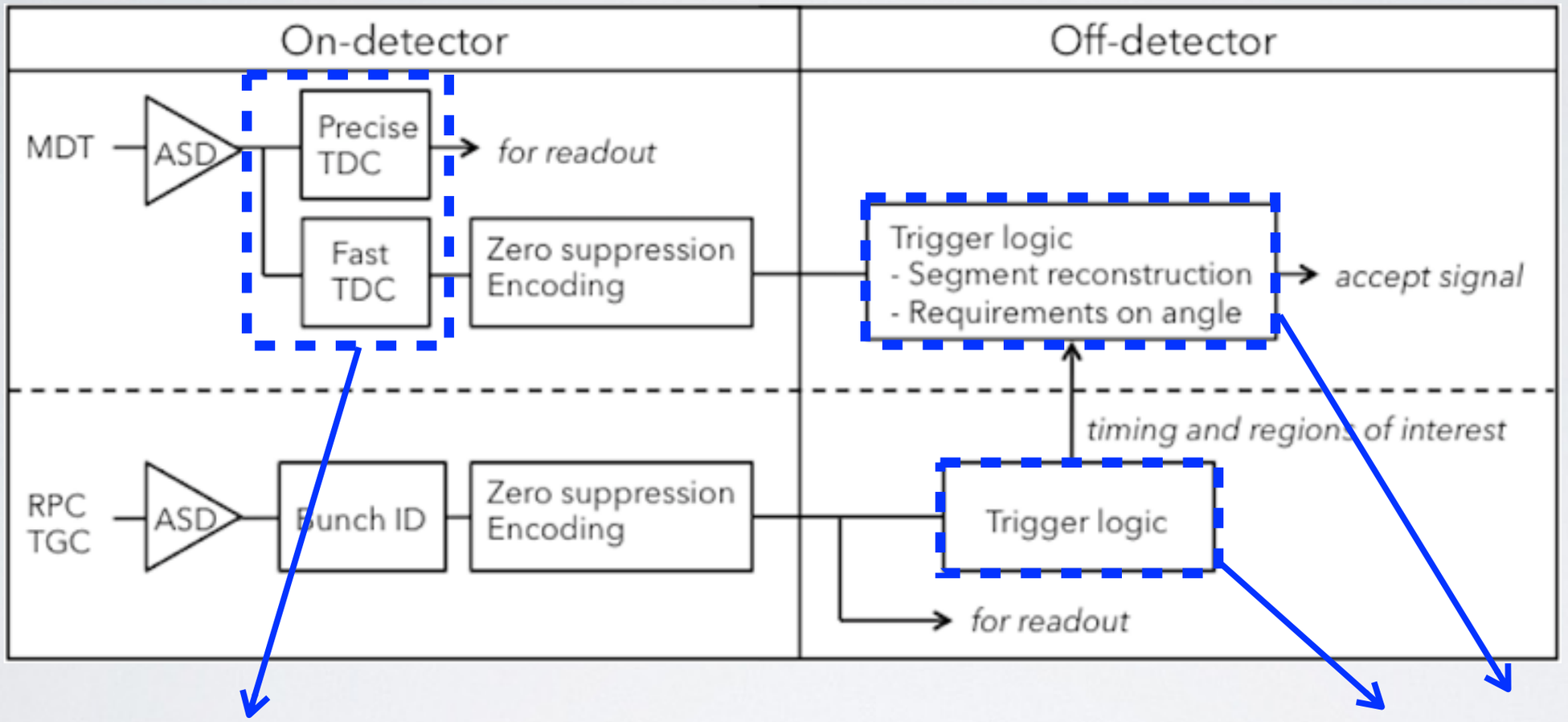
Current scheme:
coincidence-based logic by TGC.

Scheme for HL-LHC:
tracking-based logic by TGC and additional logic by MDT.

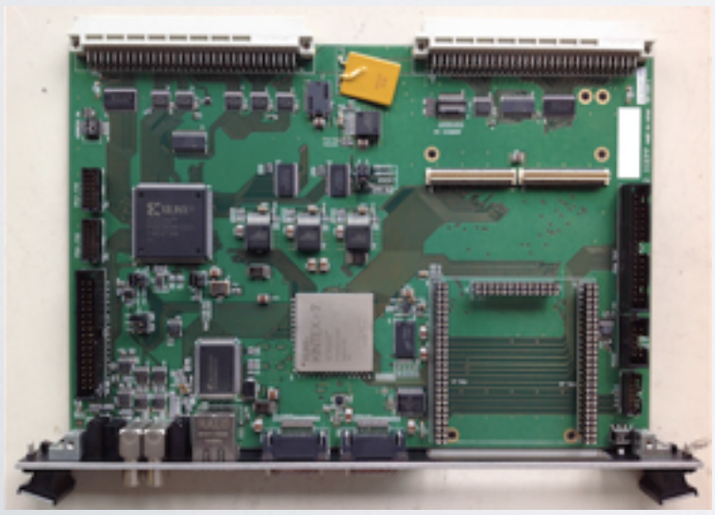


Deflection angle between two segments will be employed. Smaller angle: higher p_T.

Upgrade (continued)



Establishment of logic. Performance estimation.

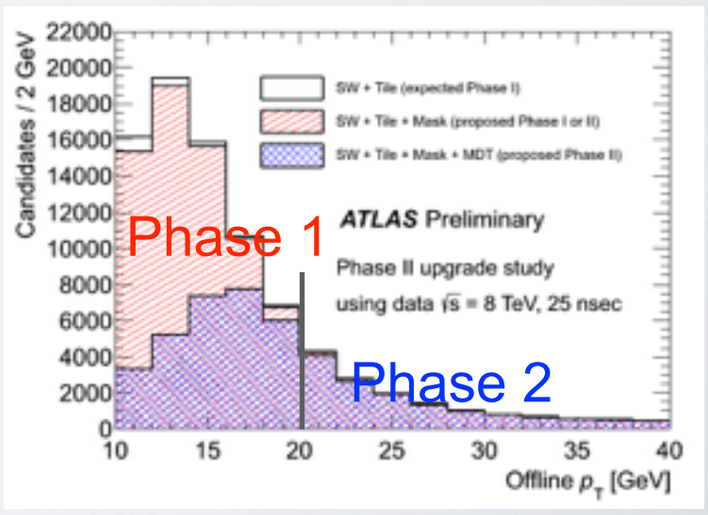


TDC based on FPGA.

Binning: 0.78 and 12.5 ns.

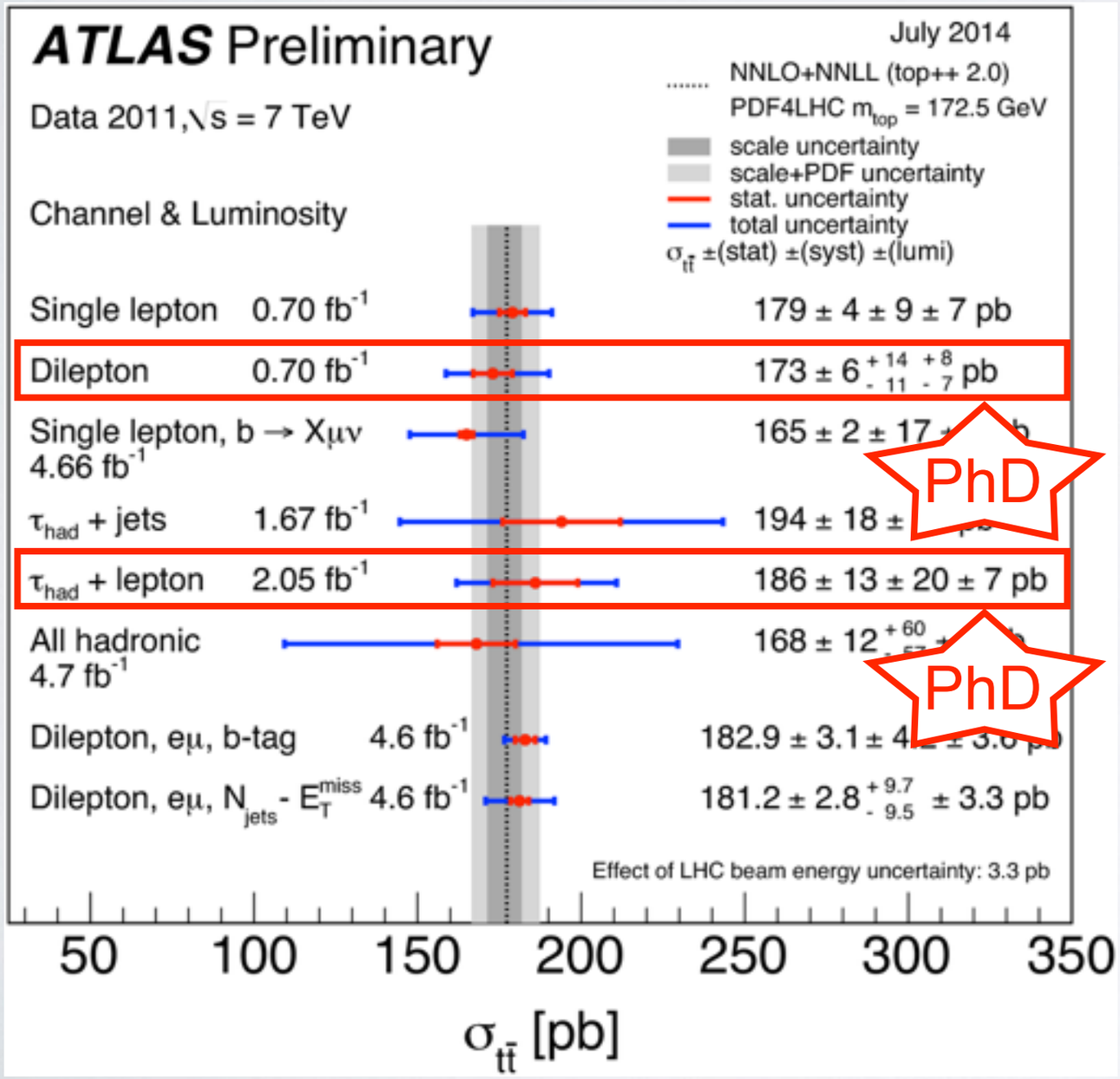
Demonstration ongoing.

Rad-tolerance to be checked.

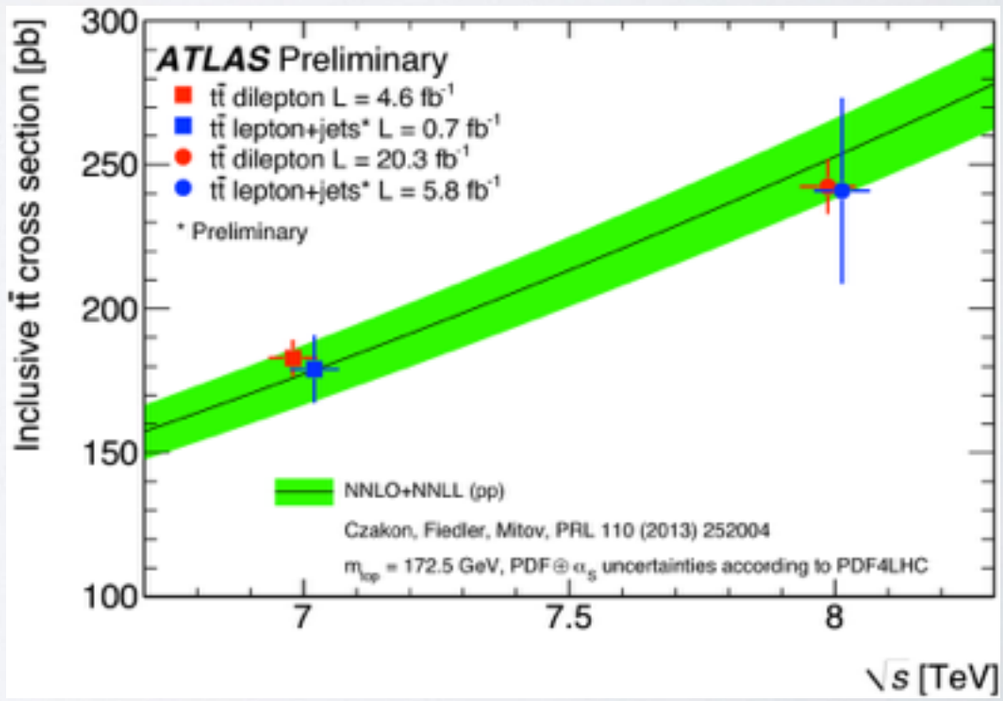


2. PHYSICS ANALYSES

Top quark pair production cross section



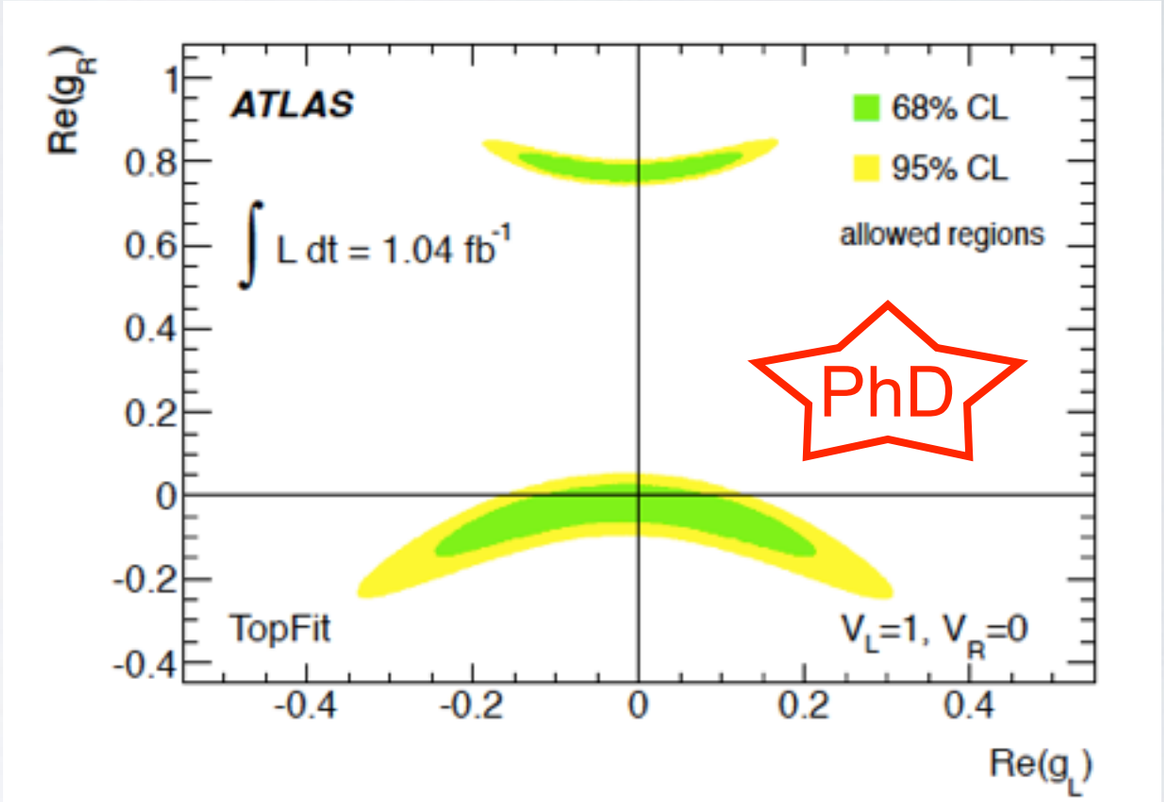
- Initiative in the analyses using 7 TeV data sample.
- The results are consistent with theoretical calculations.



More on top quark physics

Initiative in the measurement of W boson polarization in top quark decays based on a template method using 7 TeV data sample.

$$\mathcal{L} = -\frac{g}{\sqrt{2}}\bar{b}\gamma^{\mu}(V_L P_L + V_R P_R)tW_{\mu}^{-}$$
$$-\frac{g}{\sqrt{2}}\bar{b}\frac{i\sigma^{\mu\nu}q_{\nu}}{m_W}(g_L P_L + g_R P_R)tW_{\mu}^{-} + \text{h.c.}$$

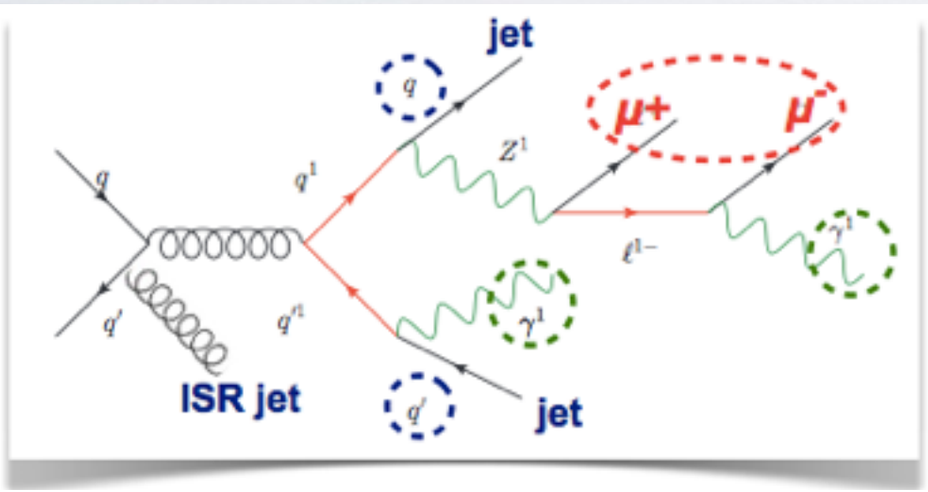


Analysis is ongoing using 8 TeV data sample for the measurement of differential cross section of the top quark pair production depending on invariant mass of the top quark pair!

Paper draft to be submitted.

Search for minimal universal extra dimensions

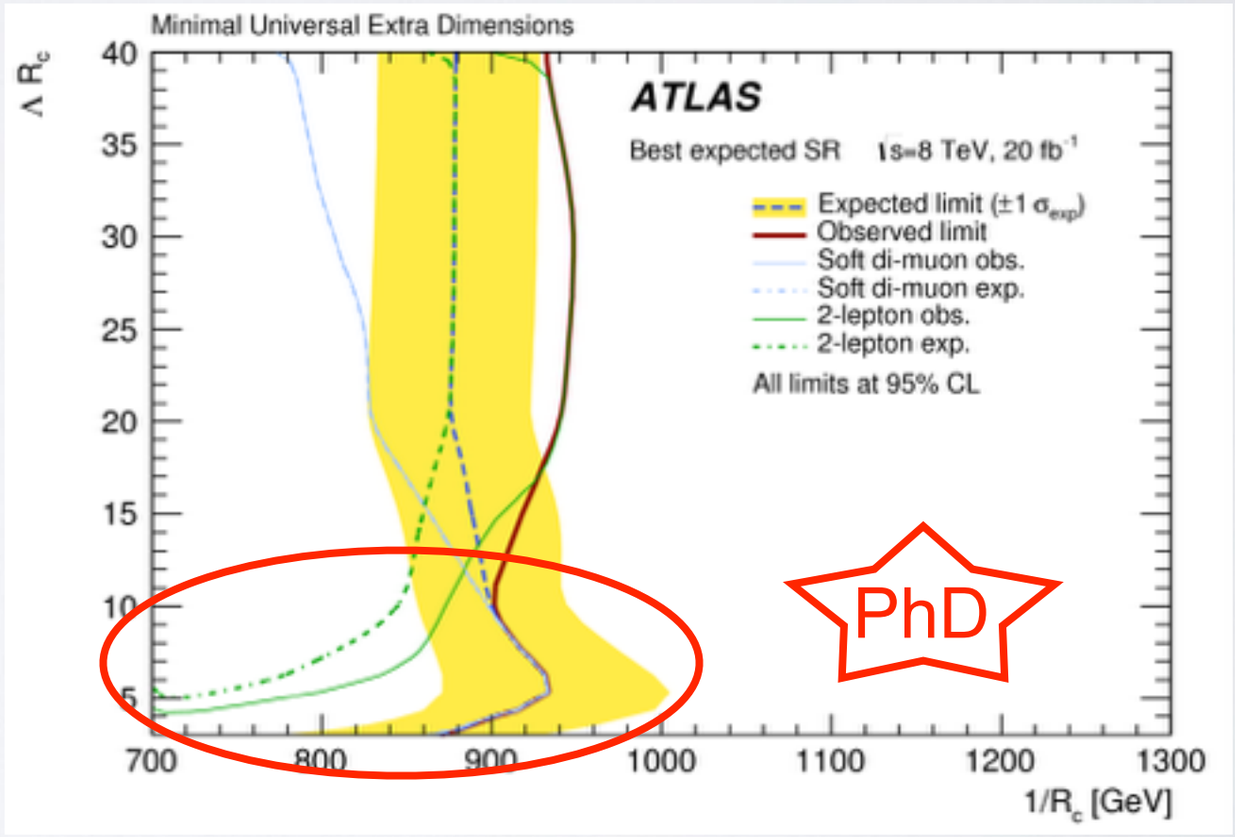
- Optimisation of the event selection for soft di-muon channel,
  6 GeV < muon p_T < 25 GeV, to extend the reach in search for mUED.



➡ Large E_T^{miss}

➡ *2 soft μ*

➡ >= *2 jets,* leading jet often form initial state radiation (ISR) and balancing E_T^{miss}



Physics analyses in Run 2

Yasuyuki HORII
Assistant professor
ttH search, started

Kentaro KAWADE
Postdoctoral fellow
ttW/ttZ, started

Kouta ONOGI
PhD course student
Stop search, started

Yuta SANO
Master course student
H→μτ search, planned

and others…

SUMMARY

- Nagoya ATLAS team contributed to
  - L1 muon trigger: installation, commissioning, operation, and maintenance.
  - Physics analyses: top quark and mUED search.
- Nagoya ATLAS team will contribute to
  - L1 muon trigger: operation, maintenance, and upgrade toward HL-LHC.
  - Physics analyses: top quark, Higgs, SUSY, …