# GPS Report 091119

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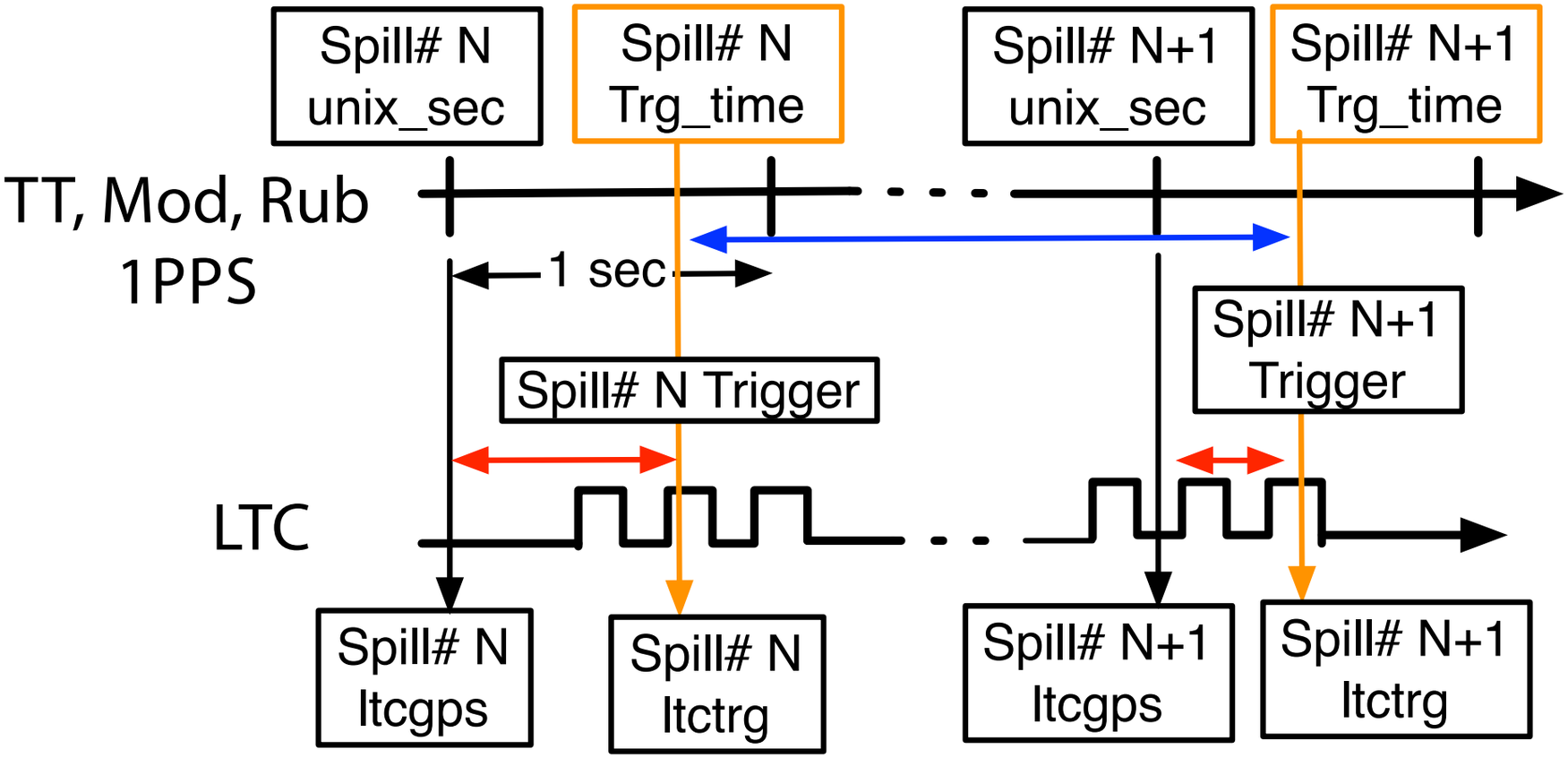
# Motivation

- Discrepancy between GPS1st and GPS2nd in several 100nses ?
  - GPS measurement in SK-side
- GPS Data in Tokai-side should be check

# Overview of GPS time caliculation



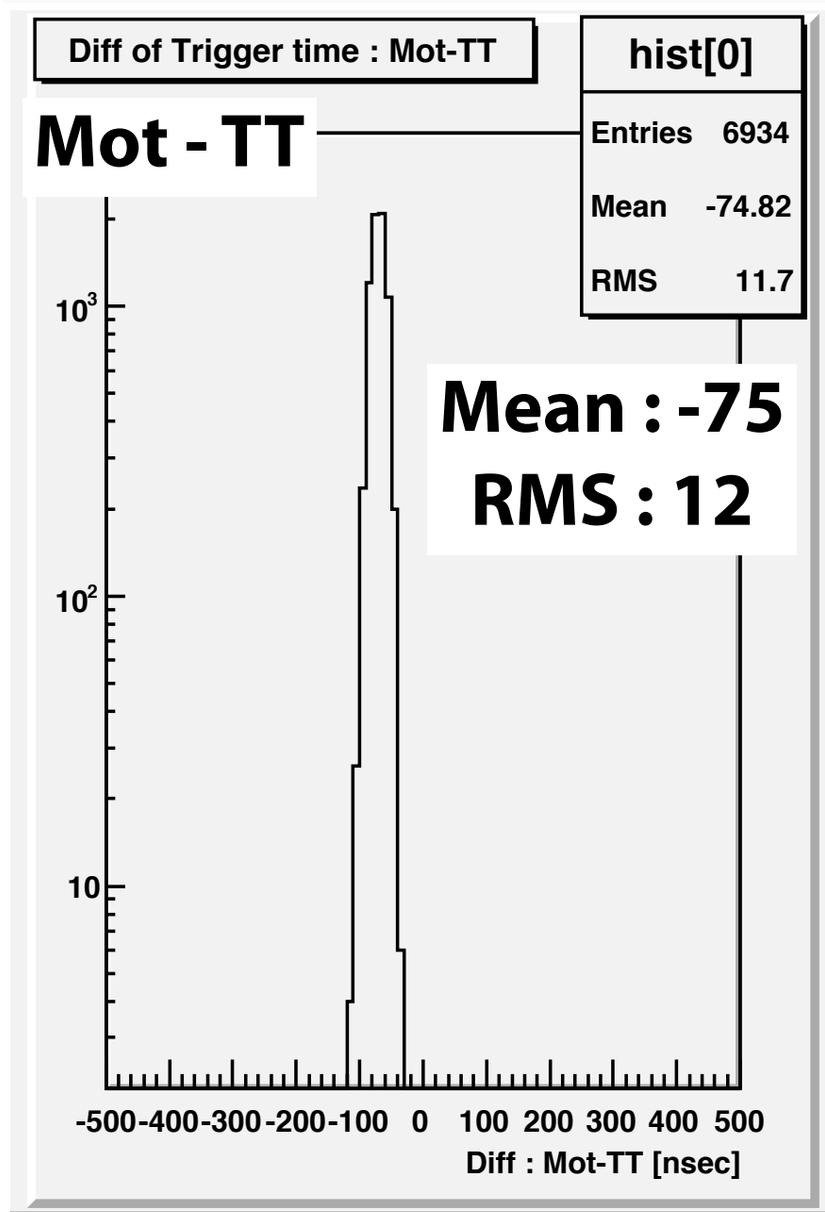

- Trigger time = unix_sec [sec] + (LTC of trigger timing - 1PPS timing) [10nsec]
- Trigger interval : interval time between consecutive spills
- Check points
  - Difference of Trigger time between two modules at the same spill.
  - Difference of Trigger interval between two modules.

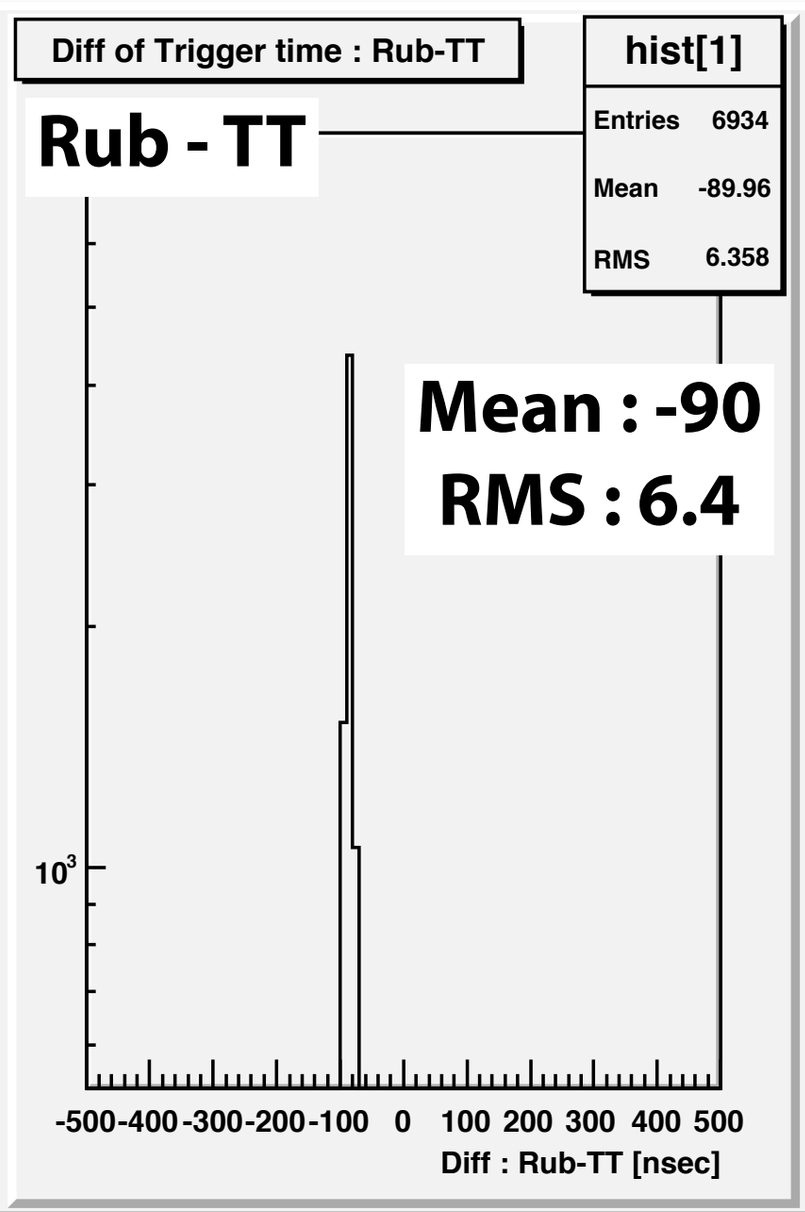
# Data set

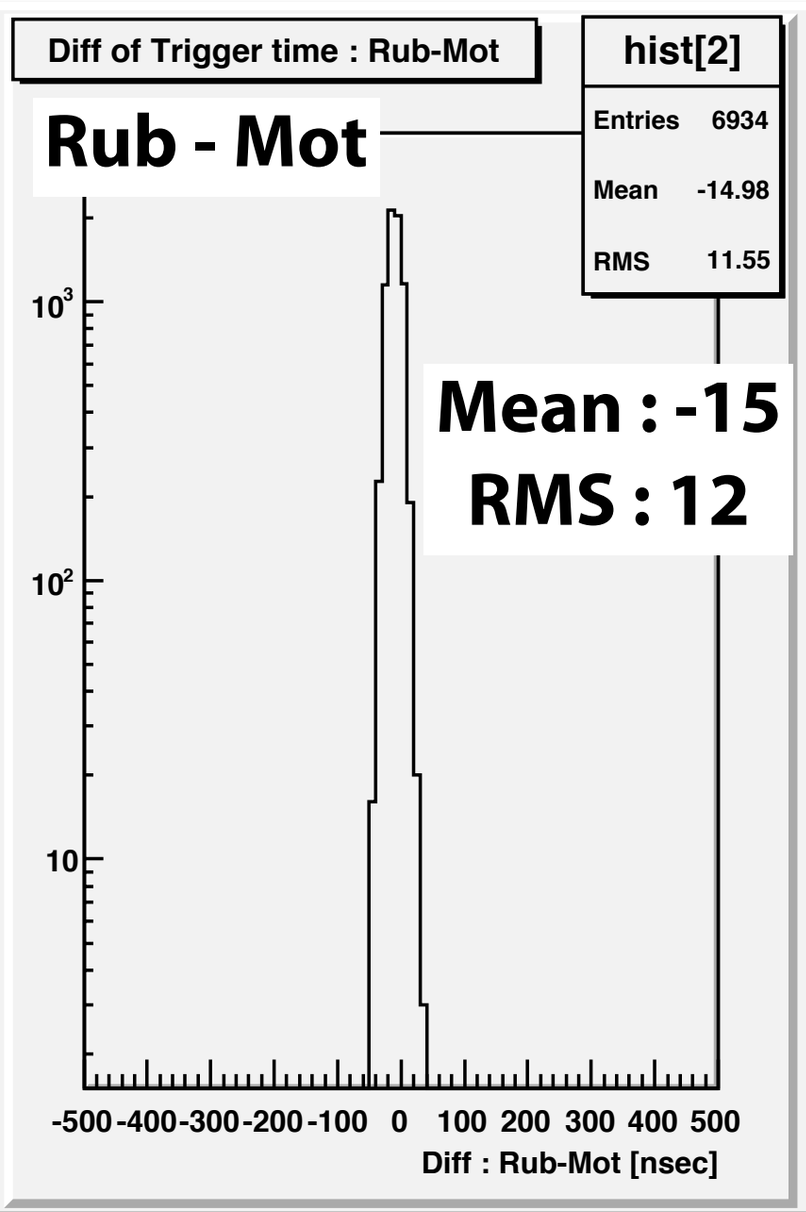
- Data statistics : about 7000 events
  - All data in 11/11 ~ 11/12
  - Trigger cycle : 3.52 sec
  - No Status Error of all GPS modules
  - No miss a trigger

# Difference of Trigger time between two modules at the same spill

## in 11/11 ~ 11/12

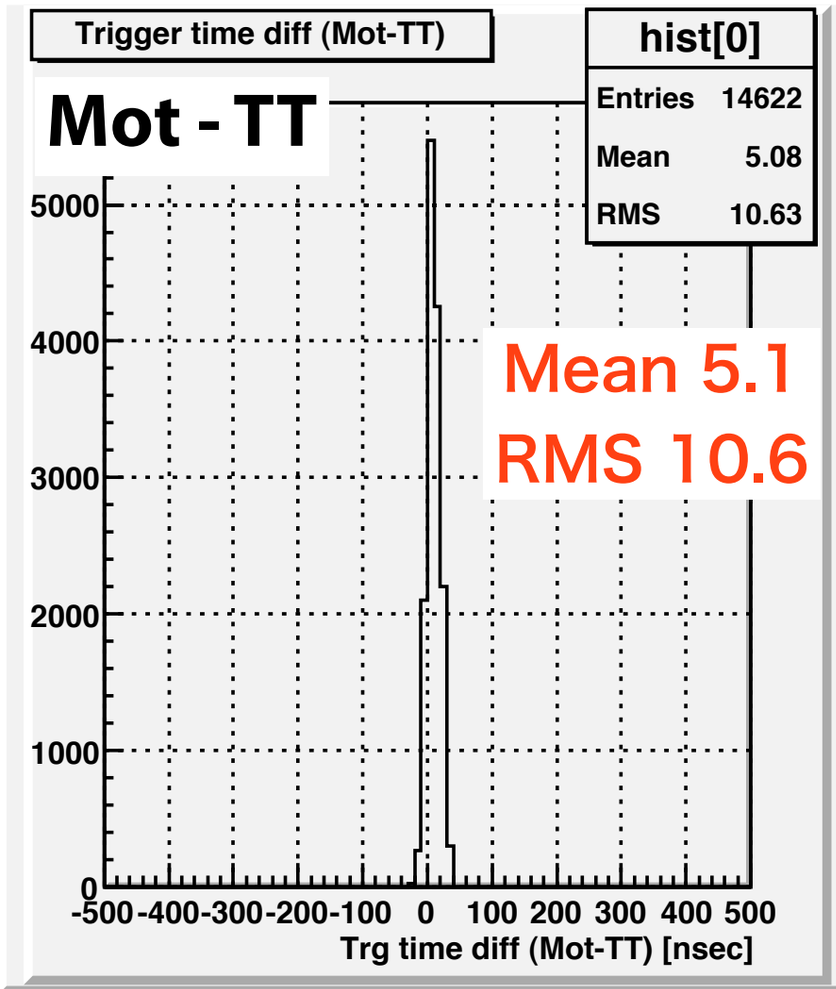


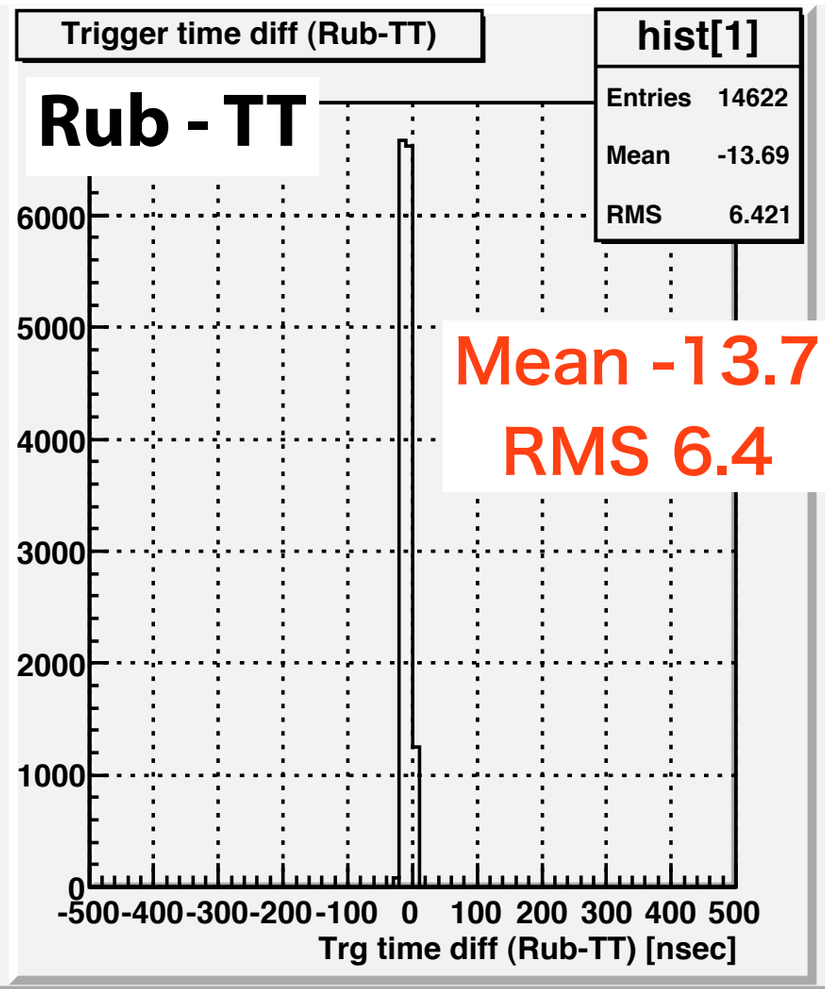



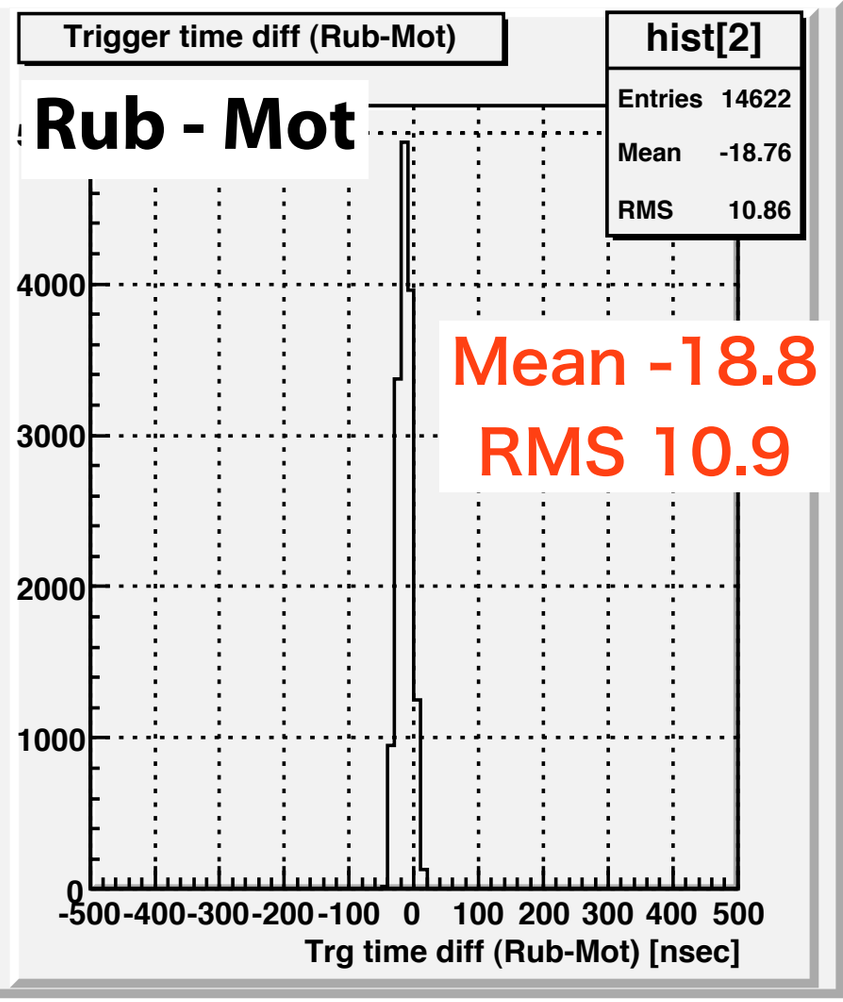



# But, previously ...

## All data in Apr-May beam commissioning (Events : 14622)

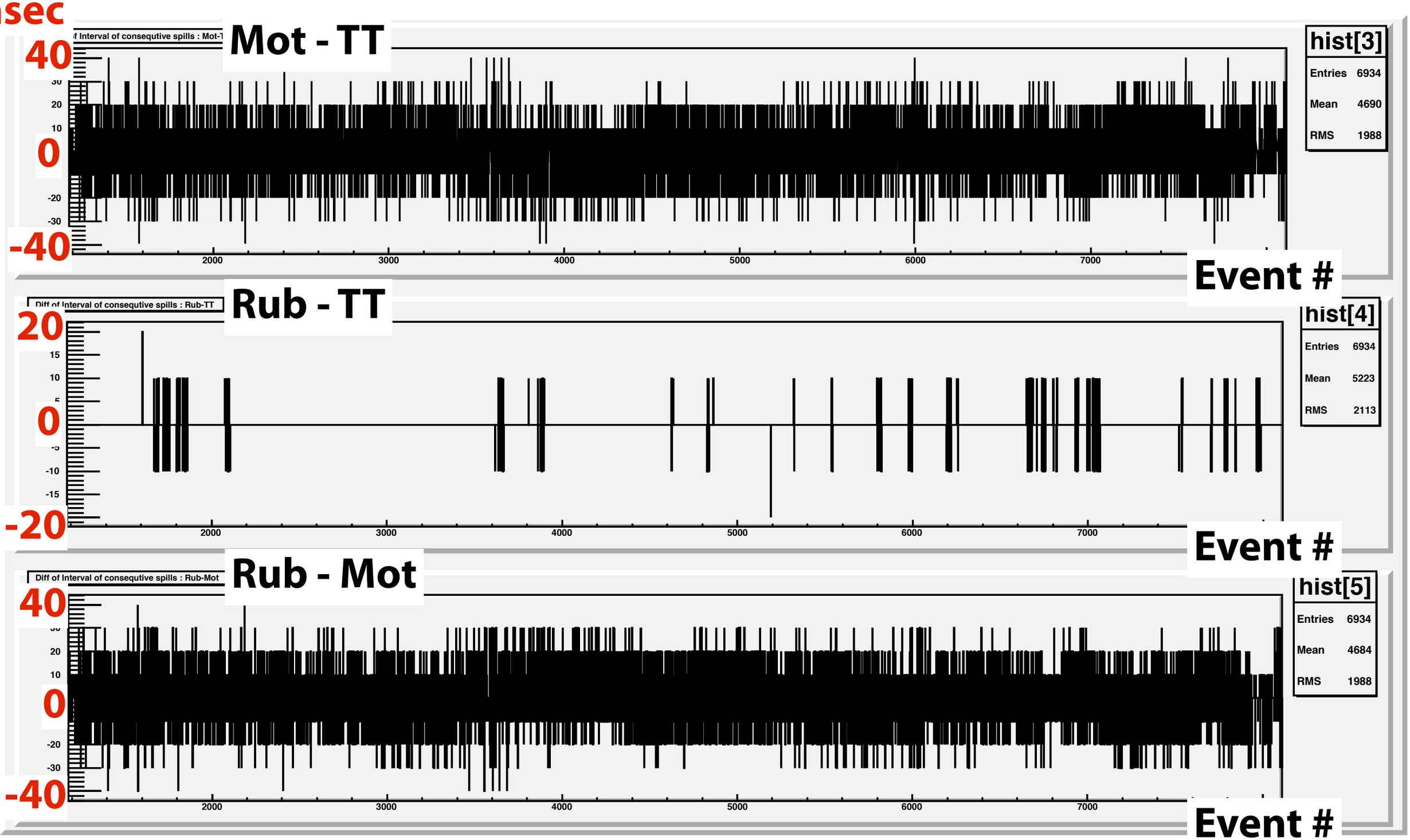



## Mean values have changed !!!

# Difference of Trigger interval between two modules

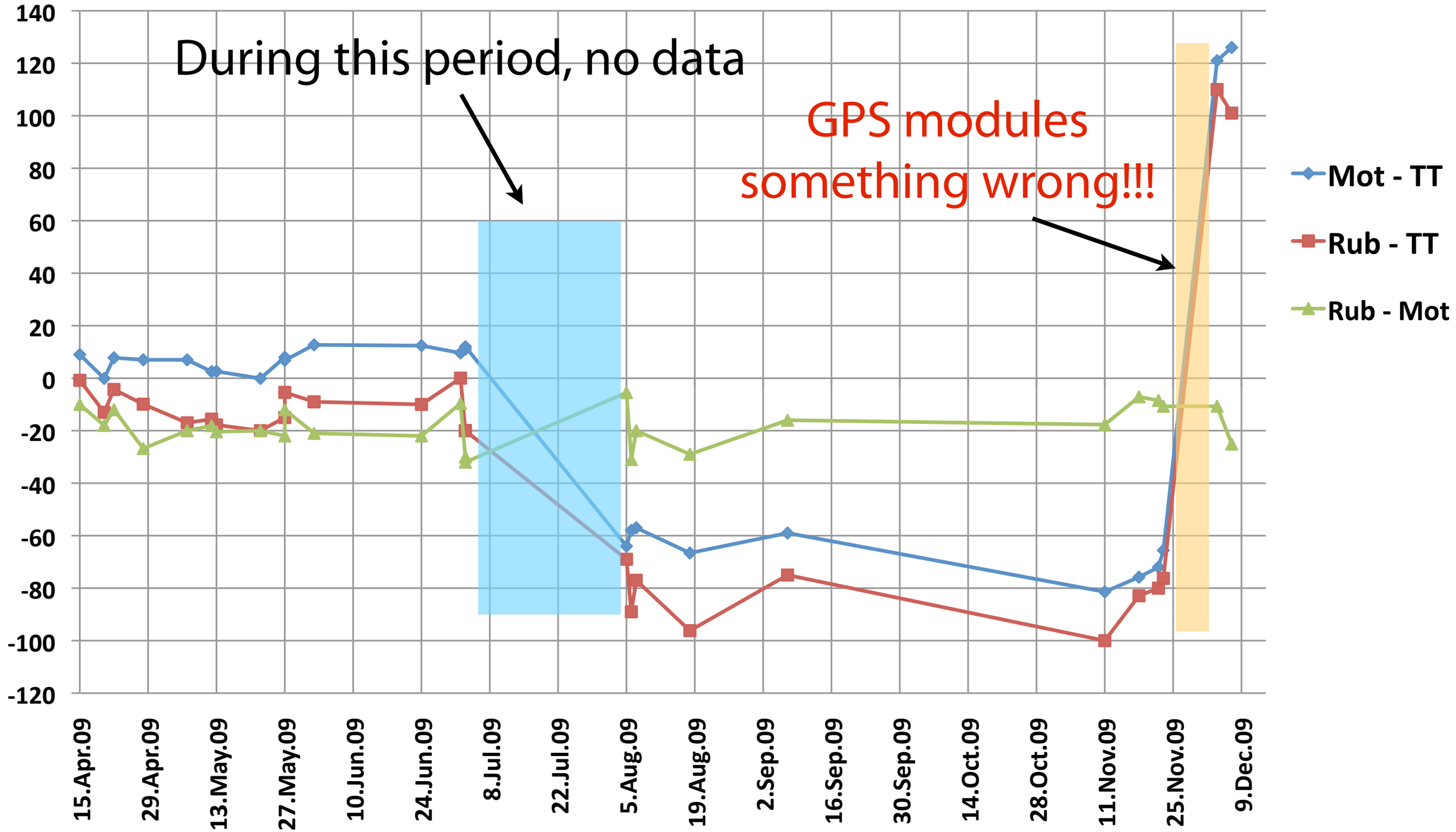



worked stability

# Check the transition of the difference of trigger time

- The value “difference of trigger time between two modules at the same spill” was changing along the season.
  - The time offset of each modules changed?
  - Check the time dependence of this value.
    - When changed?
  - Check some GPS data of Apr-May (beam commissioning) to Nov.

# Transition of the diff of trigger time




The time offset of Atomic clock not expected to be changed

→ The time offset of TrueTime module seems to be changed

# Detail values

| time | Events | Mean(Mot-TT) | Mean(Rub-TT) | Mean(Rub-Mot) |
|---|---|---|---|---|
| Apr 15, 2009 | 1539 | 9 | -0.8 | -10 |
| Apr 20, 2009 | 1535 | -0.1 | -13 | -18 |
| Apr 22, 2009 | 1515 | 7.8 | -4.3 | -12 |
| Apr 28, 2009 | 109 | 7 | -9.9 | -26.8 |
| May 7, 2009 | 1515 | 7 | -17 | -20 |
| May 12, 2009 | 1515 | 2.5 | -15.6 | -18.1 |
| May 13, 2009 | 1515 | 2.6 | -17.8 | -20.4 |
| May 22, 2009 | 290 | -0.1 | -20 | -20 |
| May 27, 2009 | 1149 | 8 | -15 | -22 |
| May 27, 2009 | 1515 | 6.8 | -5.4 | -12 |
| Jun 2, 2009 | 1515 | 12.7 | -9 | -21 |
| Jun 24, 2009 | 1515 | 12.4 | -10 | -22 |
| Jul 2, 2009 | 298 | 9.6 | 0 | -9.6 |
| Jul 3, 2009 | 134 | 11 | -20 | -30 |
| Jul 3, 2009 | 124 | 12 | -20 | -32 |
| Aug 5, 2009 | 80 | -64 | -69 | -5.5 |
| Aug 6, 2009 | 1347 | -58 | -89 | -31 |
| Aug 7, 2009 | 1515 | -57 | -77 | -20 |
| Aug 18, 2009 | 1515 | -66.6 | -96.2 | -28.98 |
| Sep 7, 2009 | 1515 | -59 | -75 | -16 |
| Nov 11, 2009 | 430 | -81.4 | -100 | -17.7 |
| Nov 18, 2009 | 1515 | -75.8 | -82.9 | -7.1 |
| Nov 22, 2009 | 877 | -72 | -80 | -8.5 |
| Nov 23, 2009 | 279 | -65.6 | -76.3 | -10.7 |
| Dec 4, 2009 | 176 | 121 | 110 | -10.7 |
| Dec 7, 2009 | 458 | 126 | 101 | -25.1 |

changed

changed

# What reasons…?

- Now, we don't find obvious reasons...
  - Cables length not changed.
  - Module configuration not changed.
  - When GPS modules became wrong, all modules (GPS receivers and the VME crate) were restarted.
    - This causes the change of the time offset ?
    - During summer, also some modules were restarted?
- If any idea about this problem ?