

ATLAS Tile Calorimeter

TileCal Calib, DQ, DP, Performance and Processing meeting

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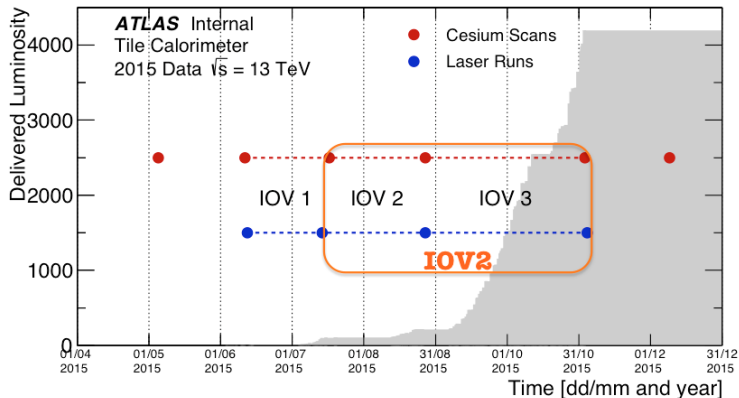
³ATLAS TileCal Group
CERN



30th July 2018

- We checked for the jump in RMS of drift vs time plot which we were getting earlier.
- We checked for the peak at zero in the distribution of ΔPMT for D layer in the Long Barrel.
- We changed the IOVs for comparing Laser and Cesium gain drift.
- We modified the Cesium-Laser comparison plots and distribution plot for f_{Las}/f_{Cs}

Cesium Vs Laser



We don't consider the run from August for the comparison, following the comment from Sasha that the scan from August was not really used for calibration.

Cesium Vs Laser

- We start doing a comparison in 2015, where more scans were performed.
- We are now removing the Cesium point from end of August. So we now defined 2 IOVs covering different data taking periods. Laser runs selected within 1 day of the Cesium scan (**avoided runs right after the scan**).
- Cesium data: **Extracted Cesium constants from COOL DB.**
- Laser data: Combined method using **latest version of the code (new smoothing)**.
- CESIUM (from DB, all with magnetic field)
IOV1: 263962 (11/june) \leftrightarrow 270000 (17/july)
IOV2: 270000 (17/july) \leftrightarrow 284600 (3/nov)
- LASER (new combined method, reference from Giulia)
IOV1: 267534 (12/june) \leftrightarrow 272493 (19/july)
IOV2: 272493 (19/july) \leftrightarrow 284682 (4/nov)

Laser Study

Laser runs in 2015

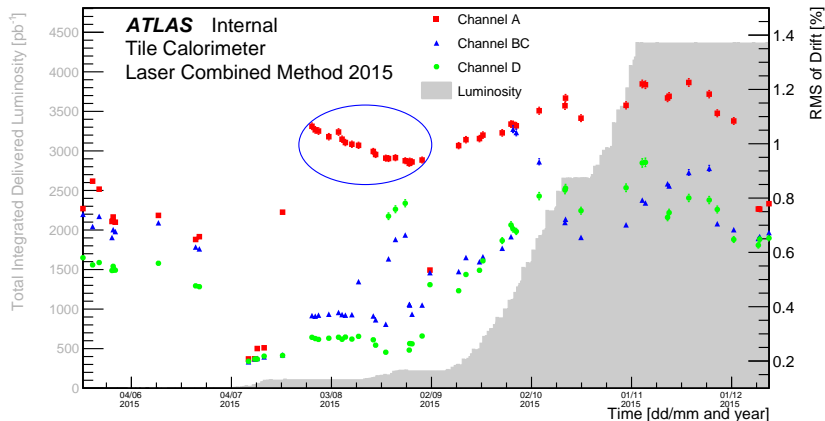
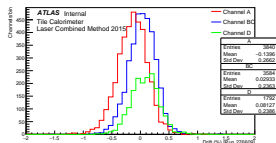


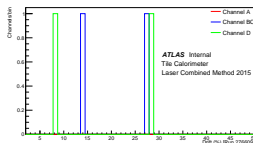
Figure: RMS of the Drift vs Time (Old)

NOTE : We tried to understand the jumps encircled above.

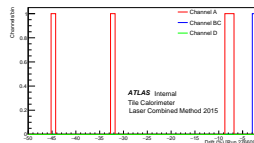
1-D Distributions for Laser runs in 2015



(a) Range : [-5.,+5.]



(b) Range : [+5,50.]



(c) Range : [-50.,-5.]

Figure: Distribution for Drift for the run 276609 (20 Aug 2015)

Channels showing high drift:

- Channel A: -7%, -33%, -45%
- Channel BC: 14%, 27%
- Channel D: 8%, 28%

1-D Distributions for Laser runs in 2015

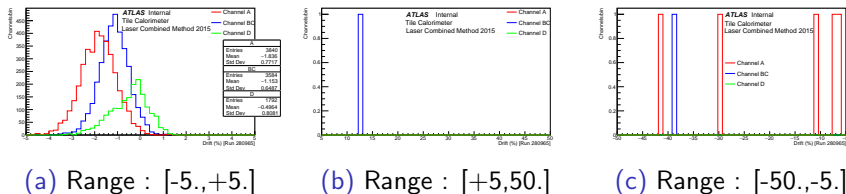


Figure: Distribution for Drift for the run 280965 (4 Oct 2015)

Channels showing high drift:

- Channel A: -7%, -11%, -30%, -43%
- Channel BC: -38%, 13%

Laser runs in 2015

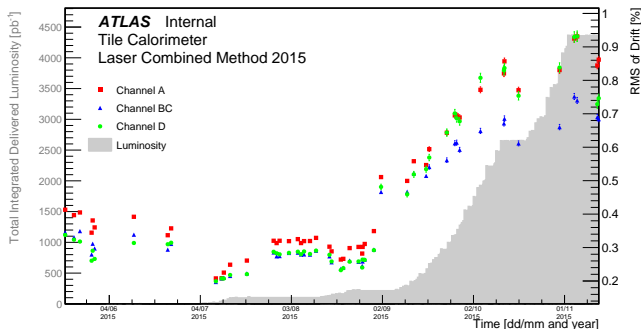
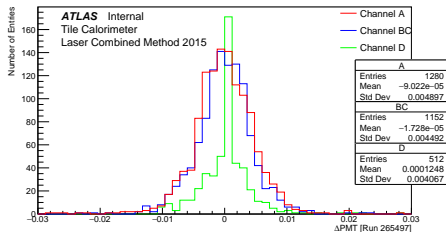


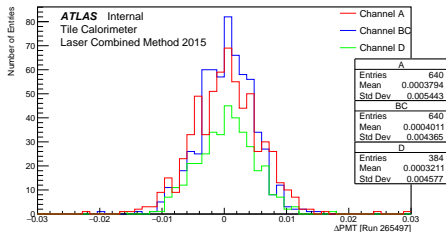
Figure: RMS of the Drift vs Time (New)

We reduced the histogram filling range from $[-50., +50.]$ to $[-5., +5.]$ and it removed the channels showing higher drifts thereby reducing the rms. The plots will improve once we define a gaussian fit instead of just taking the mean from the histogram.

1-D Distributions for Laser runs in 2015 (run 265497)



(a) Long Barrel

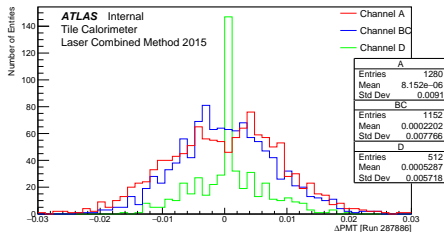


(b) Extended Barrel

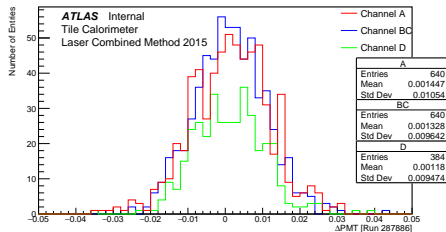
Figure: Distribution of ΔPMT (May 20, 2015) (Old)

NOTE : We tried to understand the peak at zero in D-cells in Long barrel.

1-D Distributions for Laser runs in 2015 (run 287886)



(a) Long Barrel

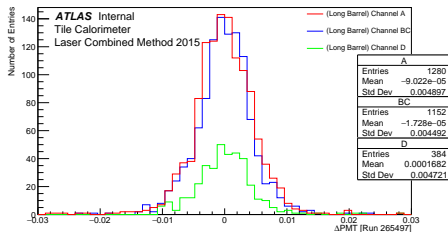


(b) Extended Barrel

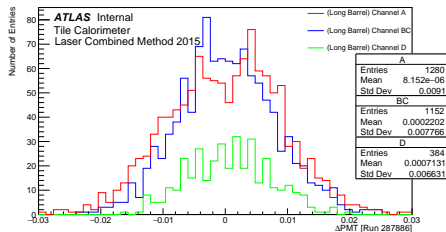
Figure: Distribution of ΔPMT (Dec 12, 2015) (Old)

NOTE : We tried to understand the peak at zero in D-cells in Long barrel.

1-D Distributions for Laser runs in 2015



(a) May 20, 2015



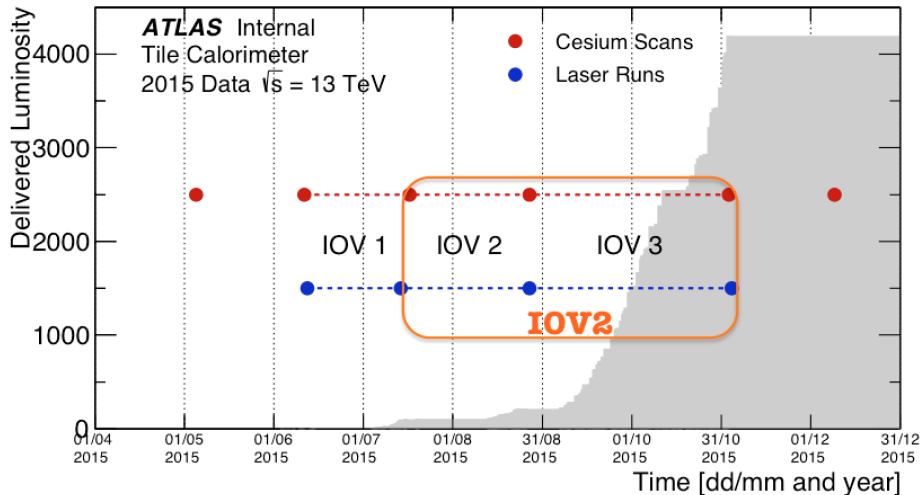
(b) Dec 12, 2015

Figure: Distribution of ΔPMT for Long Barrel (New)

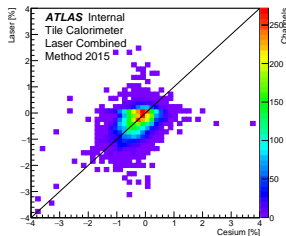
We removed the D_0 cells from the histogram and it removed the peak at zero, which we were getting before.

Comparison against Cesium

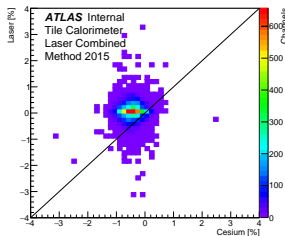
Reminding about the IOV's



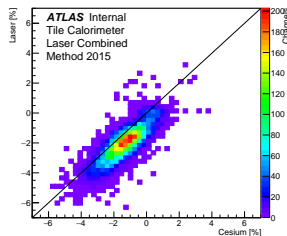
Old plots



(a) IOV 1



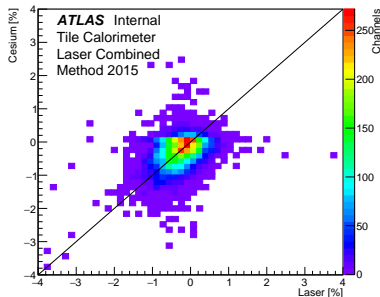
(b) IOV 2



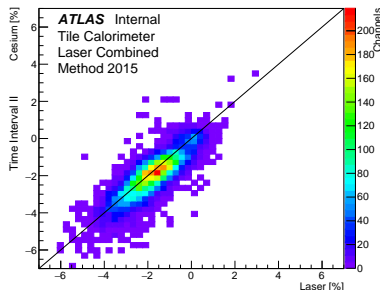
(c) IOV 3

Figure: Cesium vs Laser drift for all instrumented channels

New plots



(a) IOV 1

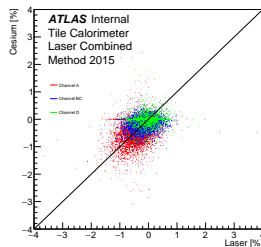


(b) IOV 2

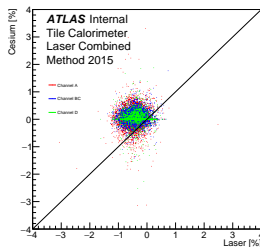
Figure: Cesium vs Laser drift for all instrumented channels

- Closer to the $y = x$ line for the IOV 2

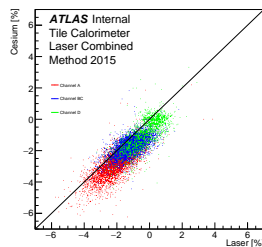
Old plots



(a) IOV 1



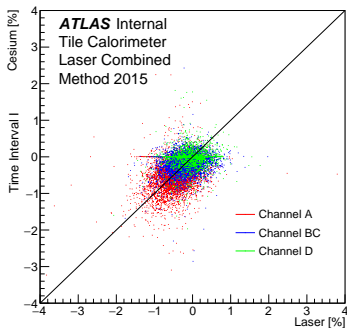
(b) IOV 2



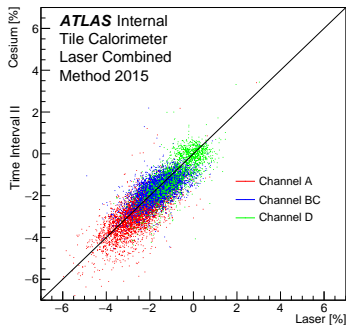
(c) IOV 3

Figure: Cesium vs Laser drift for different types of channels

New plots



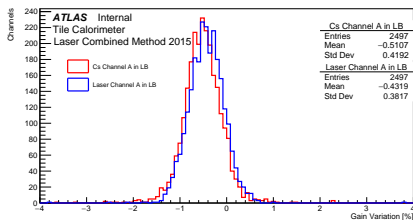
(a) IOV 1



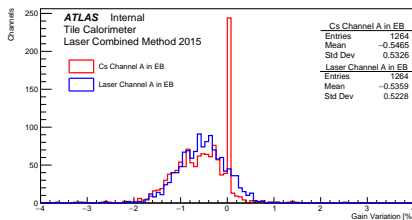
(b) IOV 2

Figure: Cesium vs Laser drift for different types of channels

Cesium vs Laser Scans in 2015



(a) Long Barrel

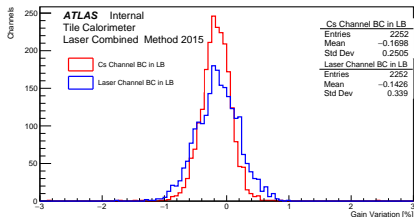


(b) Extended Barrel

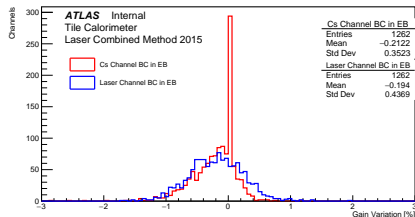
Figure: Laser and Cesium gain variation for A channels IOV 1

- Peak around zero: many channels in the EB have very small Cs drift but not exactly zero

Cesium vs Laser Scans in 2015



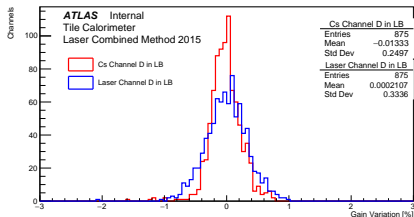
(a) Long Barrel



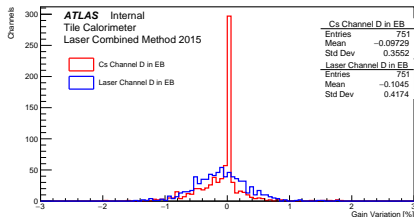
(b) Extended Barrel

Figure: Laser and Cesium gain variation for BC channels IOV 1

Cesium vs Laser Scans in 2015



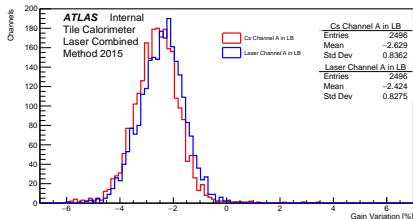
(a) Long Barrel



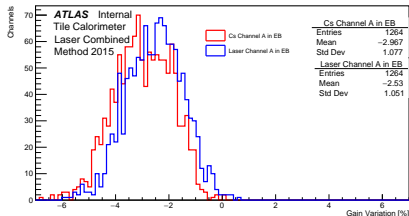
(b) Extended Barrel

Figure: Laser and Cesium gain variation for D channels IOV 1

Cesium vs Laser Scans in 2015



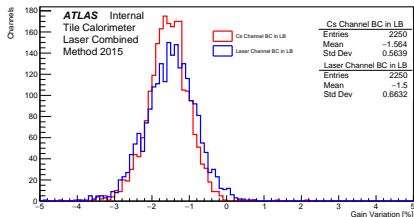
(a) Long Barrel



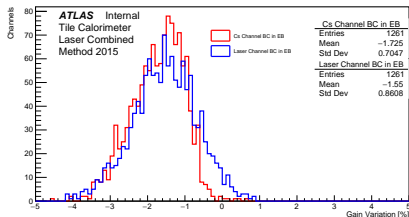
(b) Extended Barrel

Figure: Laser and Cesium gain variation for A channels IOV 2

Cesium vs Laser Scans in 2015



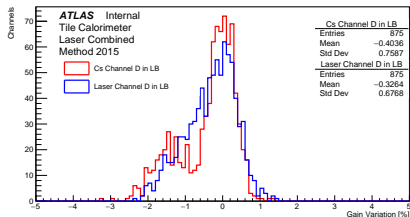
(a) Long Barrel



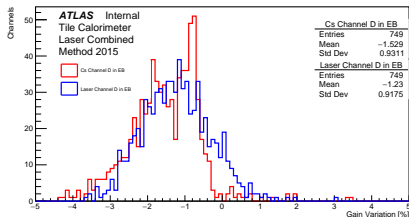
(b) Extended Barrel

Figure: Laser and Cesium gain variation for BC channels IOV 2

Cesium vs Laser Scans in 2015



(a) Long Barrel

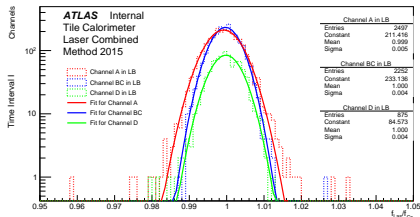


(b) Extended Barrel

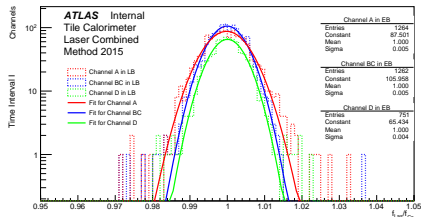
Figure: Laser and Cesium gain variation for D channels IOV 2

Cesium vs Laser Scans in 2015

- The goal is to do a similar study as done for run 1 laser data by Djamel, Dominique and Emmanuelle.
- For reference, see the following [document](#).
- $$f = \frac{1}{1 + \Delta_{drift}}$$



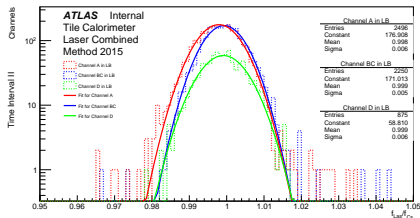
(a) Long Barrel



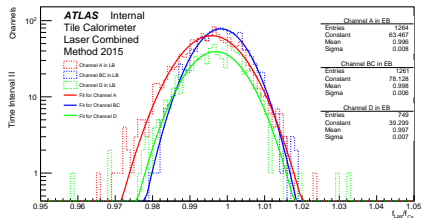
(b) Extended Barrel

Figure: Fraction of Laser and Cesium gain variation IOV 1

Cesium vs Laser Scans in 2015



(a) Long Barrel



(b) Extended Barrel

Figure: Fraction of Laser and Cesium gain variation IOV 2

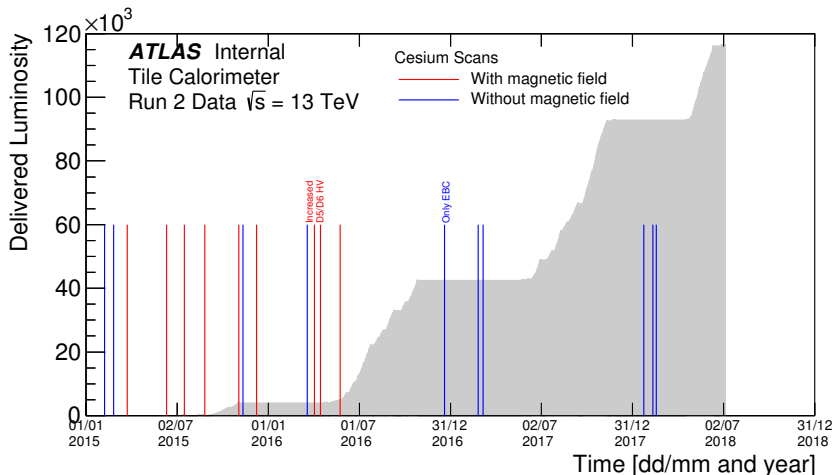
We will continue this study.

- Update the laser calibration files with the latest and greatest version of the code (including latest developments by Henric)
- Include a comparison Cesium-Laser for 2016 and 2017 (covering the full year)
- Doing similar checks for the direct method (CF). Djamel/Nazlim will kindly provide the data for this (so it includes the latest developments).
- The ultimate goal of this is to extract conclusions from the comparison with Cesium measurements and approve plots for public use.

Thank you for your attention!

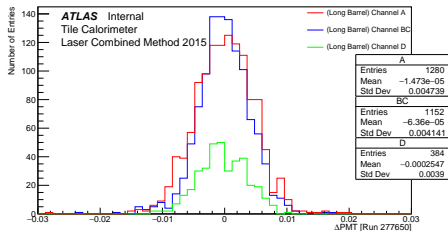
Backup Slides

Cesium Scans in Run 2

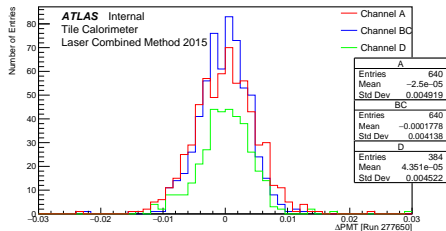


Plan: Compare the drifts measured by Cesium and laser system during several time periods (IOV), according to Cesium scan availability.

1-D Distributions for Laser runs in 2015



(a) Long Barrel



(b) Extended Barrel

Figure: Distribution of ΔPMT (Aug 30, 2015) (New)

Reference plots

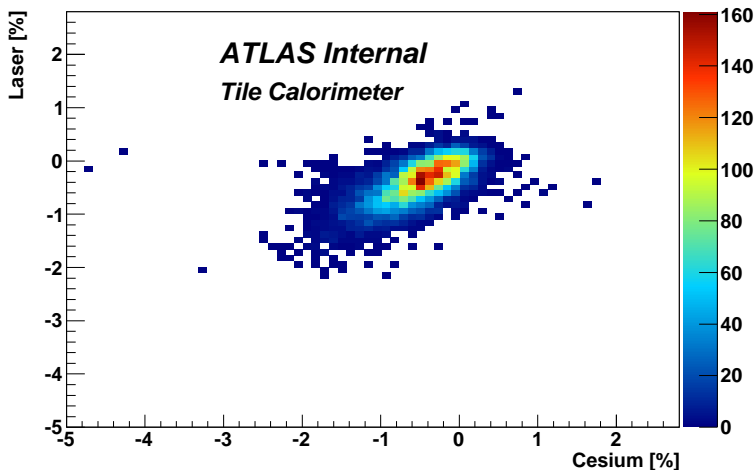
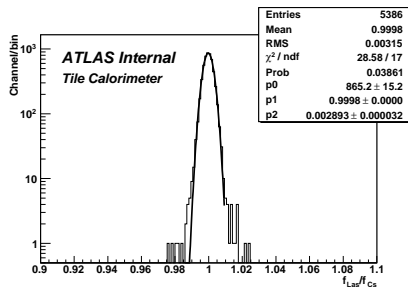


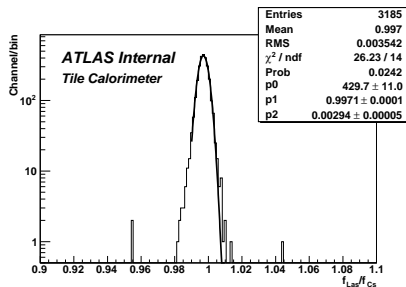
Figure: Gain variation in Cesium vs Gain variation in Laser

This plot is taken from the document referred in slide 35.

Reference plots



(a) for long barrels



(b) for extended barrels

Figure: Distribution of the ratio f_{Las}/f_{Cs}

This plot is taken from the document referred in slide 25.