

# Study of the crystal transparency changes of ECAL CMS

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July 28, 2011



# Outline

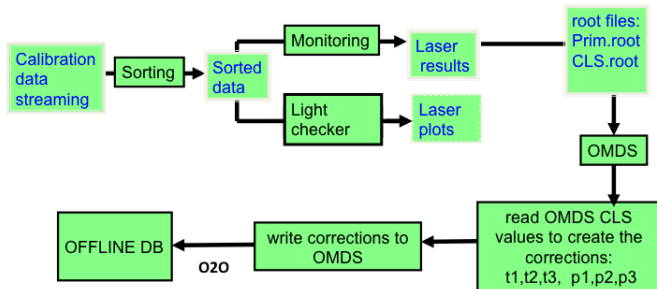
- The BIG picture
- Current work
- Future developments

# The BIG picture

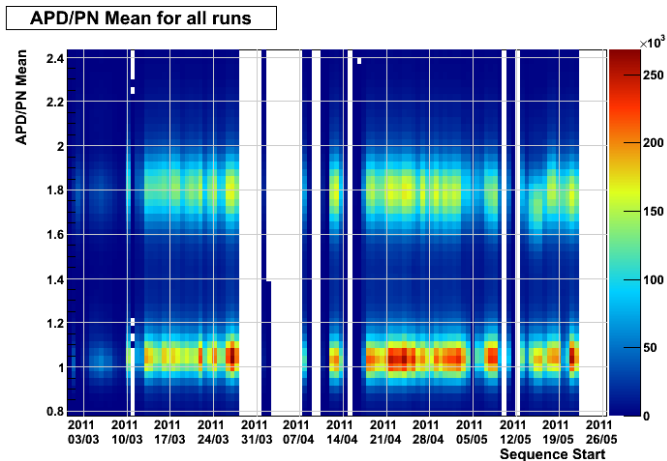
- ECAL goal: Detect  $H \rightarrow \gamma\gamma$  decay
- \$ Fr. 40,000,000 investment on a state of the art calorimeter
- Urging pressure to reduce the uncertainties in the data collected
- ECAL Calibration goal: achieve 0.5% uncertainty
- Current state:
  - EB Inner region: 0.5%
  - EB Outer region: 1%
  - EE: 2%



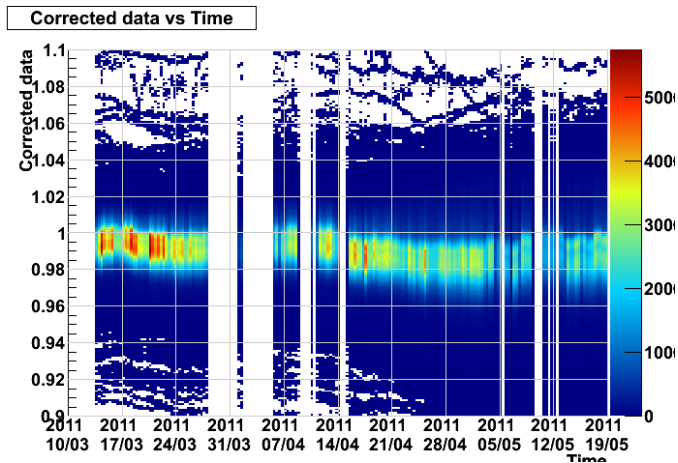
# ECAL Laser Correction Chain



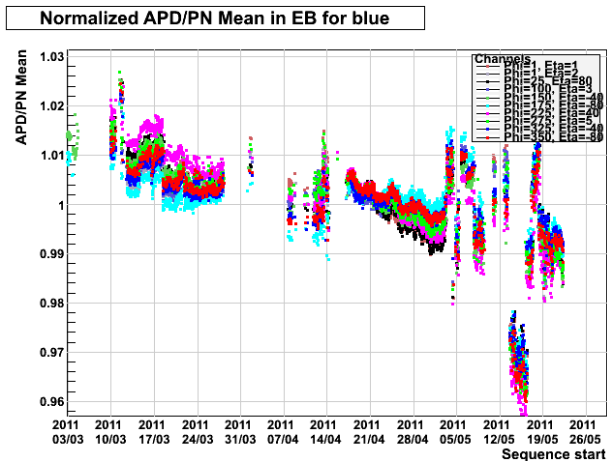
# Uncorrected data from March to May



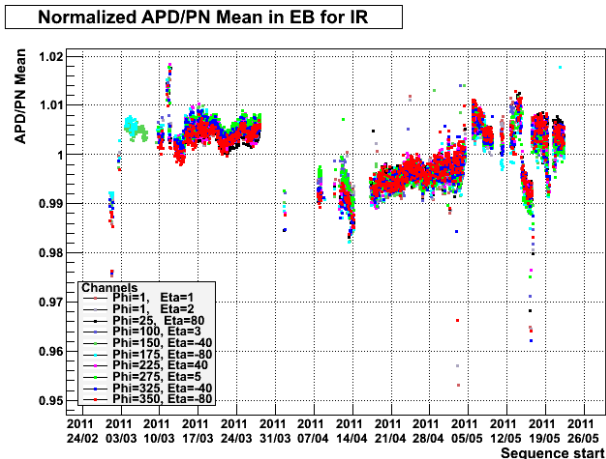
# Corrected data from March to May



# Uncorrected data for 10 channels - Blue Laser



# Uncorrected data for 10 channels - Red Laser



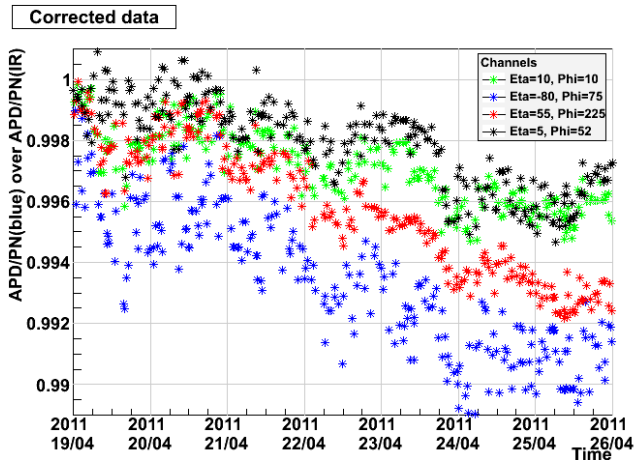


## Synchronizing with ETH group

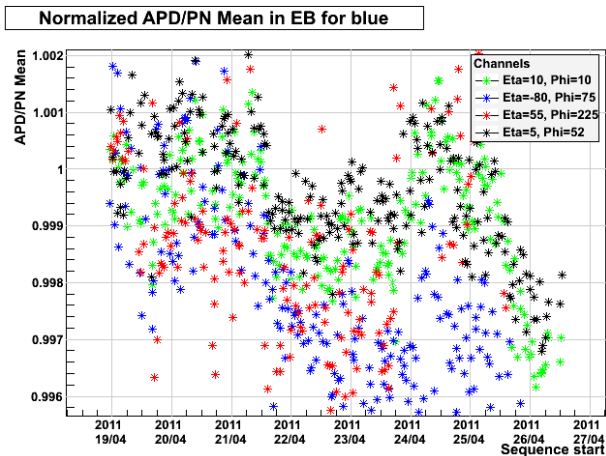
In order to test plots, we picked a range between April 19<sup>th</sup> and April 26<sup>th</sup>. The following channels were selected:

- $\eta = 10$        $\phi = 10$
- $\eta = -80$       $\phi = 75$
- $\eta = 55$        $\phi = 255$
- $\eta = 5$          $\phi = 52$

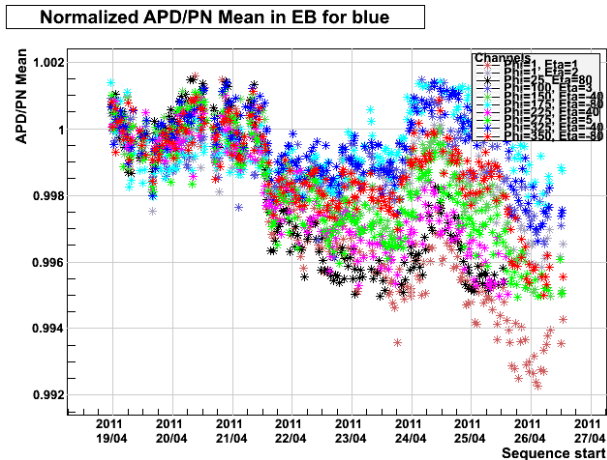
# Corrected data



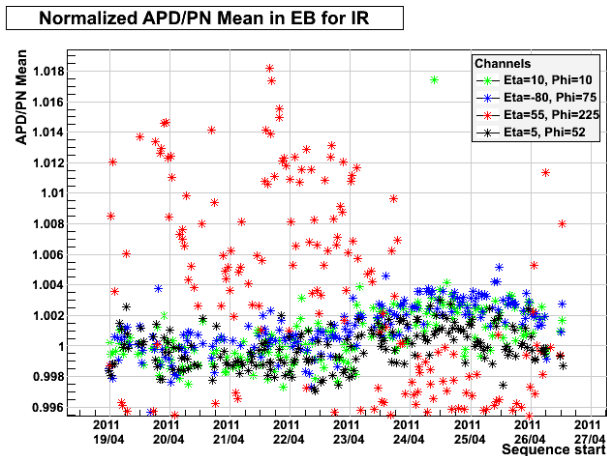
# APD/PN(blue) for uncorrected



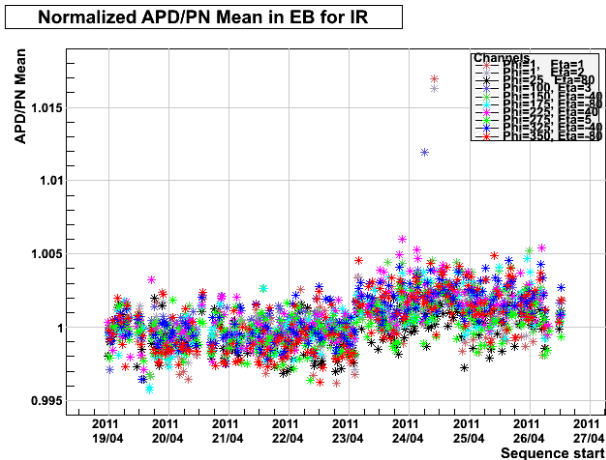
# Uncorrected data for 10 channels - APD/PN(blue)



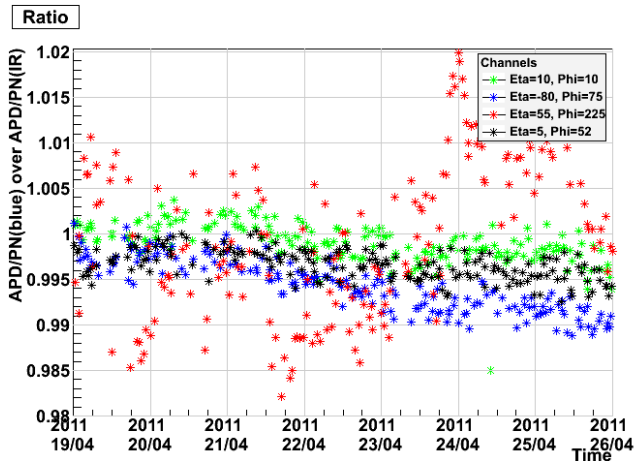
# APD/PN(IR) for uncorrected



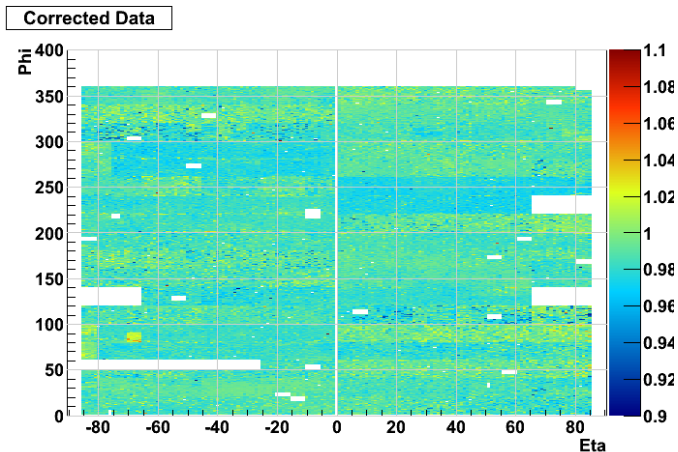
# Uncorrected data for 10 channels - APD/PN(IR)



# Ratio between APD/PN(blue) and APD/PN(IR) for the uncorrected data

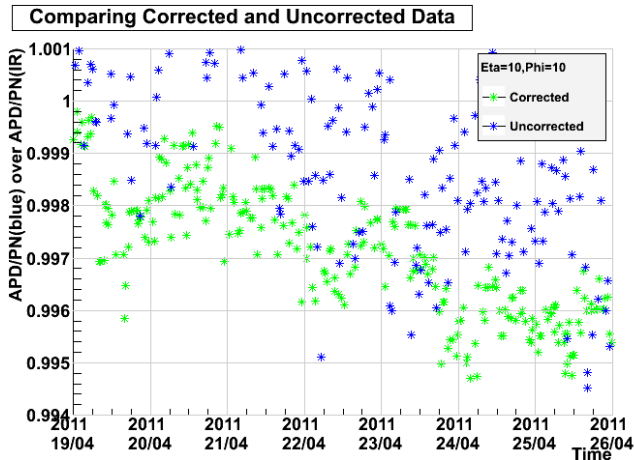


# Average of 'cor' distributed over $\eta$ and $\phi$ for corrected data

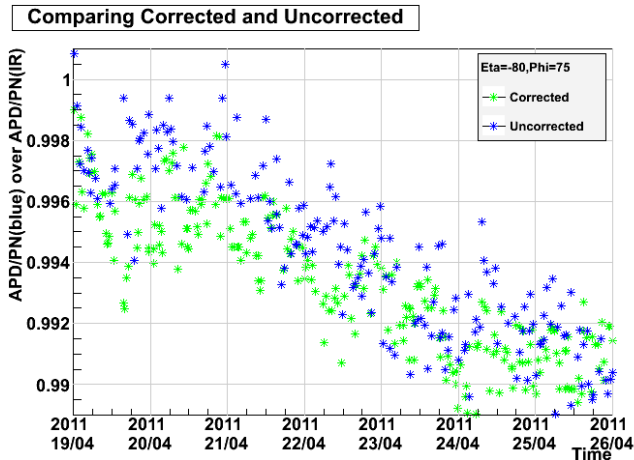




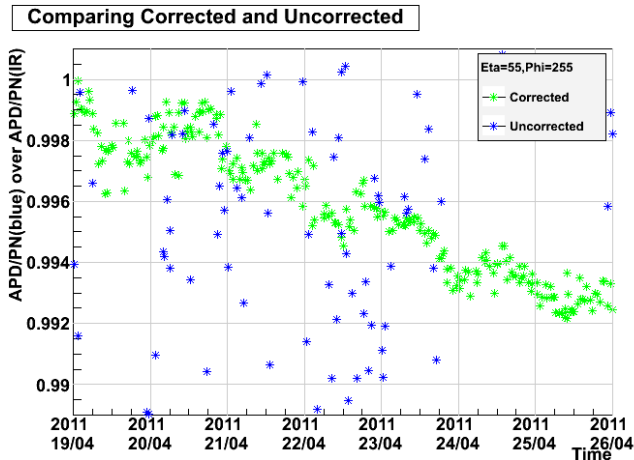
# Comparing data sets: $\eta=10, \phi=10$



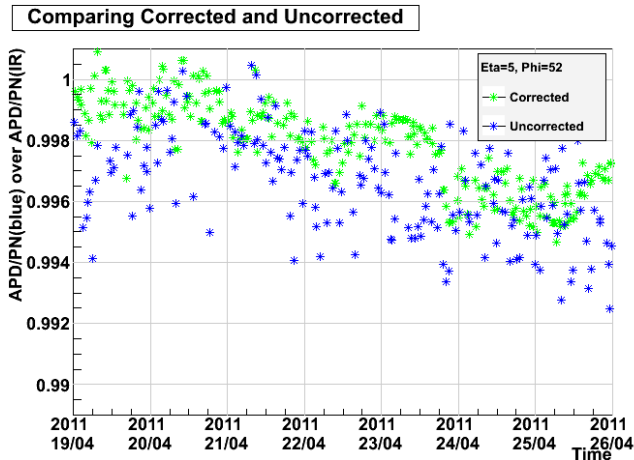
# Comparing data sets: $\eta=-80$ , $\phi=75$



# Comparing data sets: $\eta=55$ , $\phi=255$



# Comparing data sets: $\eta=5$ , $\phi=52$



# Quantifying the behavior of all 61,200 crystals

- Method
  - Take the difference between ratio and corrected data
  - Normalize
  - Store the RMS
- Mapping of the discrepancy between corrected and uncorrected data has been achieved!
- Issue: processing about 70 GB of data

## Future work (about 2 weeks left!!!)

- More plots
- Make fittings to the APD/PN vs time plots
- Extend the analysis to EE.
- Implement an upgraded correction algorithm to the Laser Monitoring System.

# The best of Lyon!

