Detection of Cherenkov Photons at the Gießen Cosmic Ray Test Stand

Erik Etzelmüller, Michael Düren, Klaus Föhl, Avetik Hayrapetian, Benno Kröck, Oliver Merle, Daniel Mühlheim, Julian Rieke

II. Physikalisches Institut, Justus-Liebig-Universität Gießen

Internal PANDA PID meeting, DIRC 2013, 06.09.2013

Cosmic Ray Test Stand

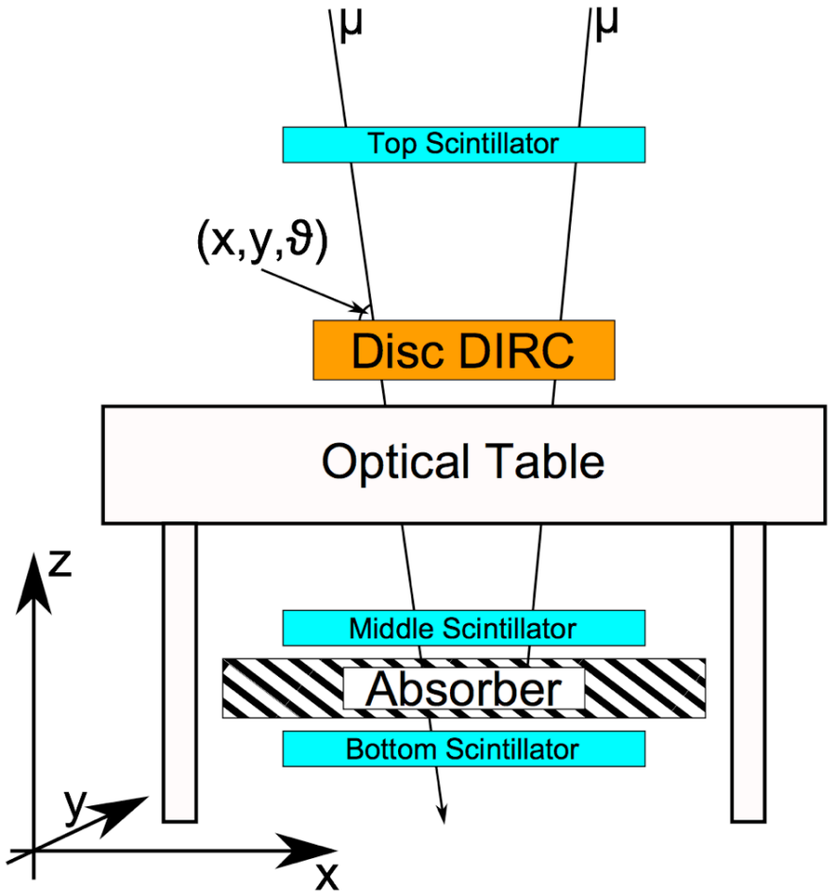
- Allows testing of DIRC components independent of rare and time-consuming test beams

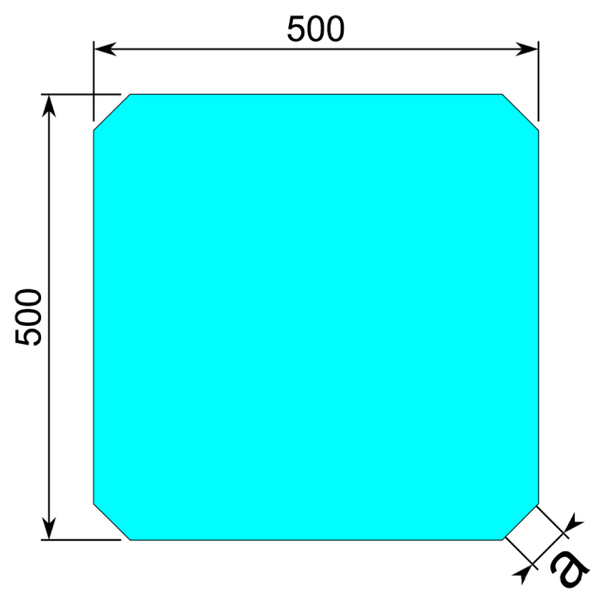
- Designed and set into operation by Daniel Mühlheim

First objectives

- Detection of Cherenkov photons

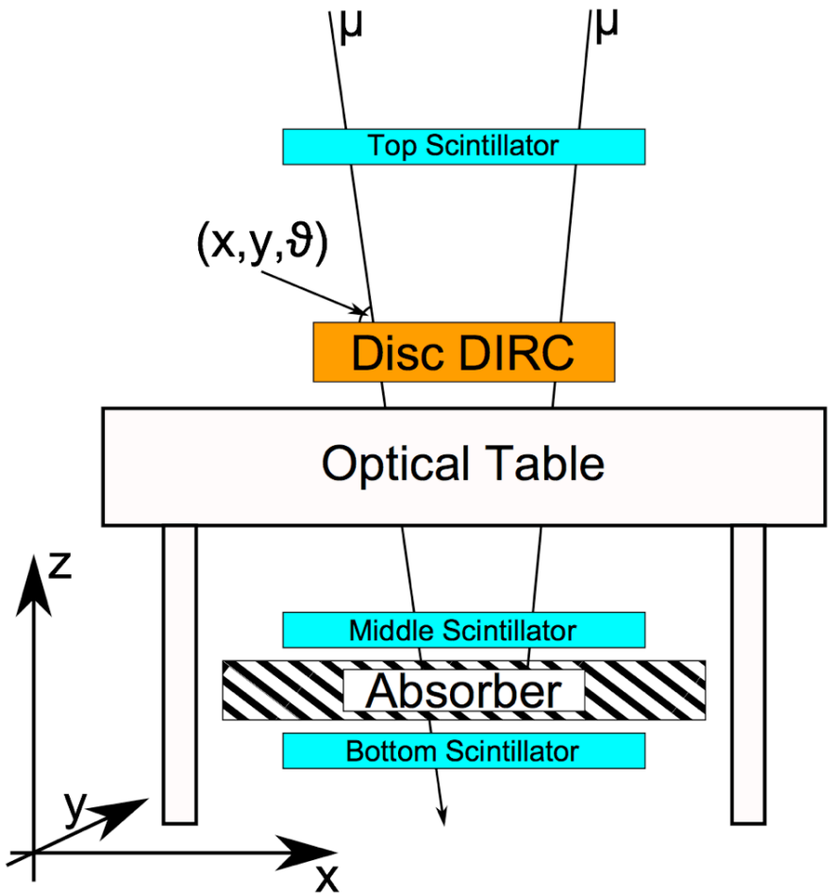
Cosmic Ray Test Stand - Setup

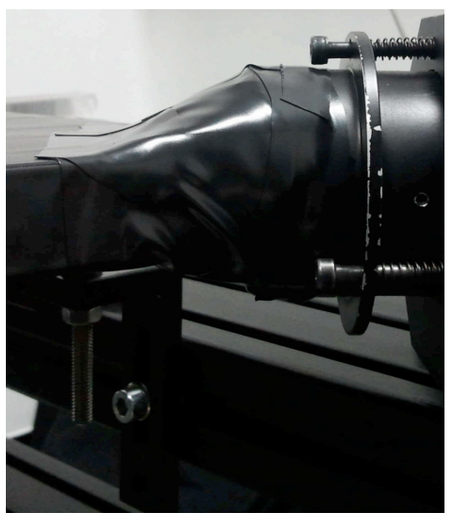


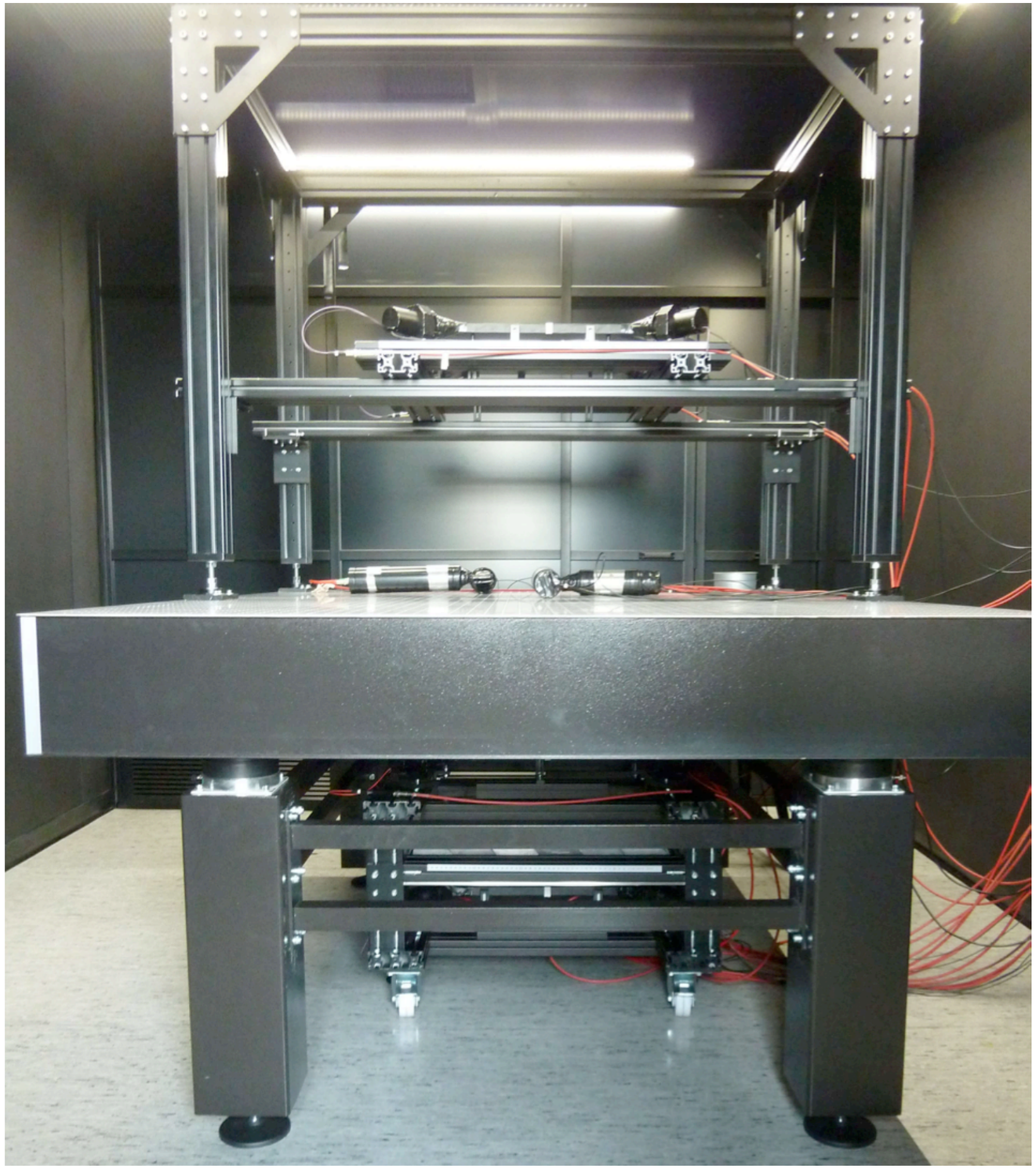


- 3 plastic-scintillators (RP-408) with an active area of roughly 2500 cm²
- Absorber to reject low-energy muons (< 212 MeV/c)
- Middle scintillator equipped with 4 Hamamatsu R11265U-100
- Top and bottom scintillators equipped with 8 Hamamatsu R9880U-110

Cosmic Ray Test Stand - Setup

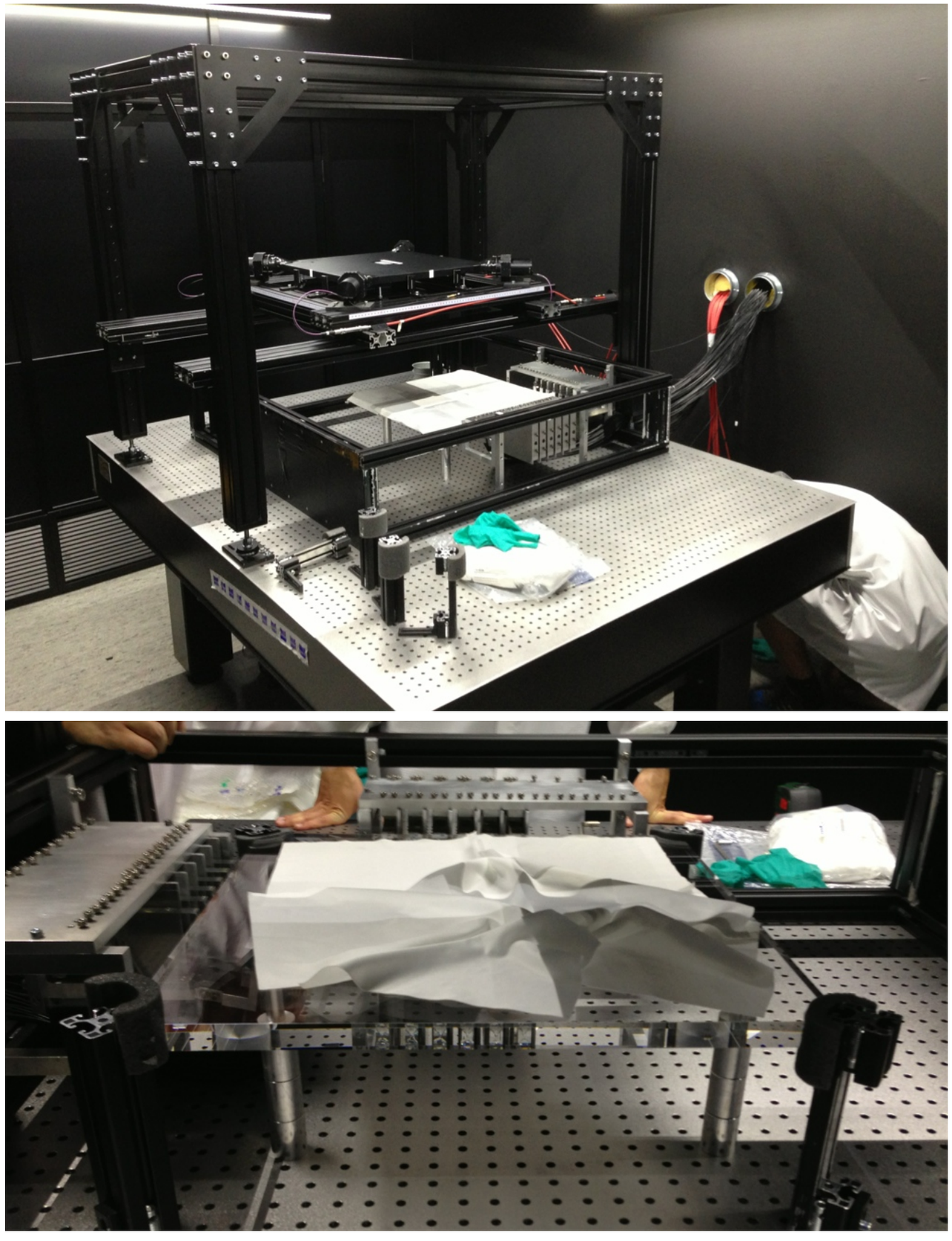




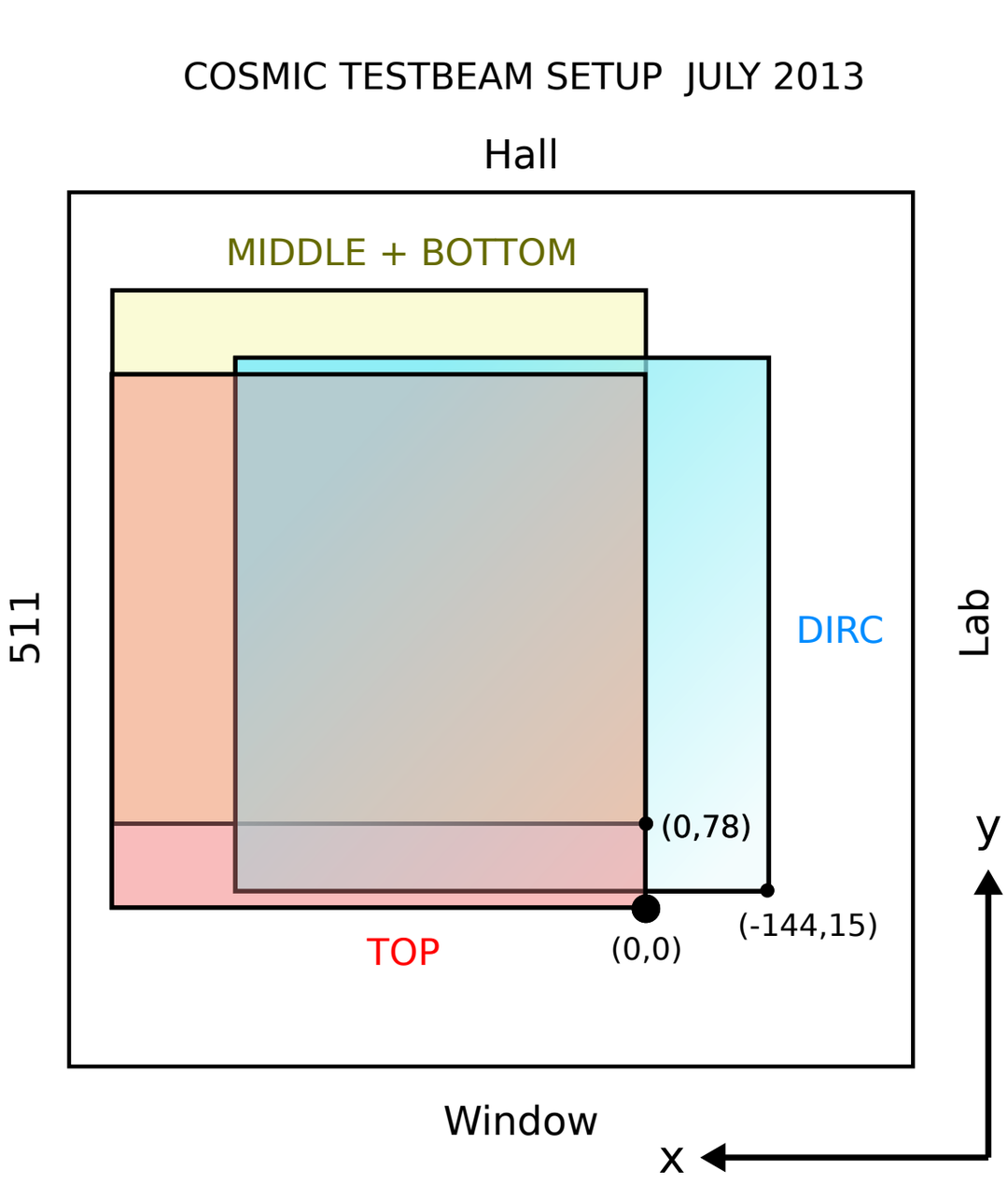


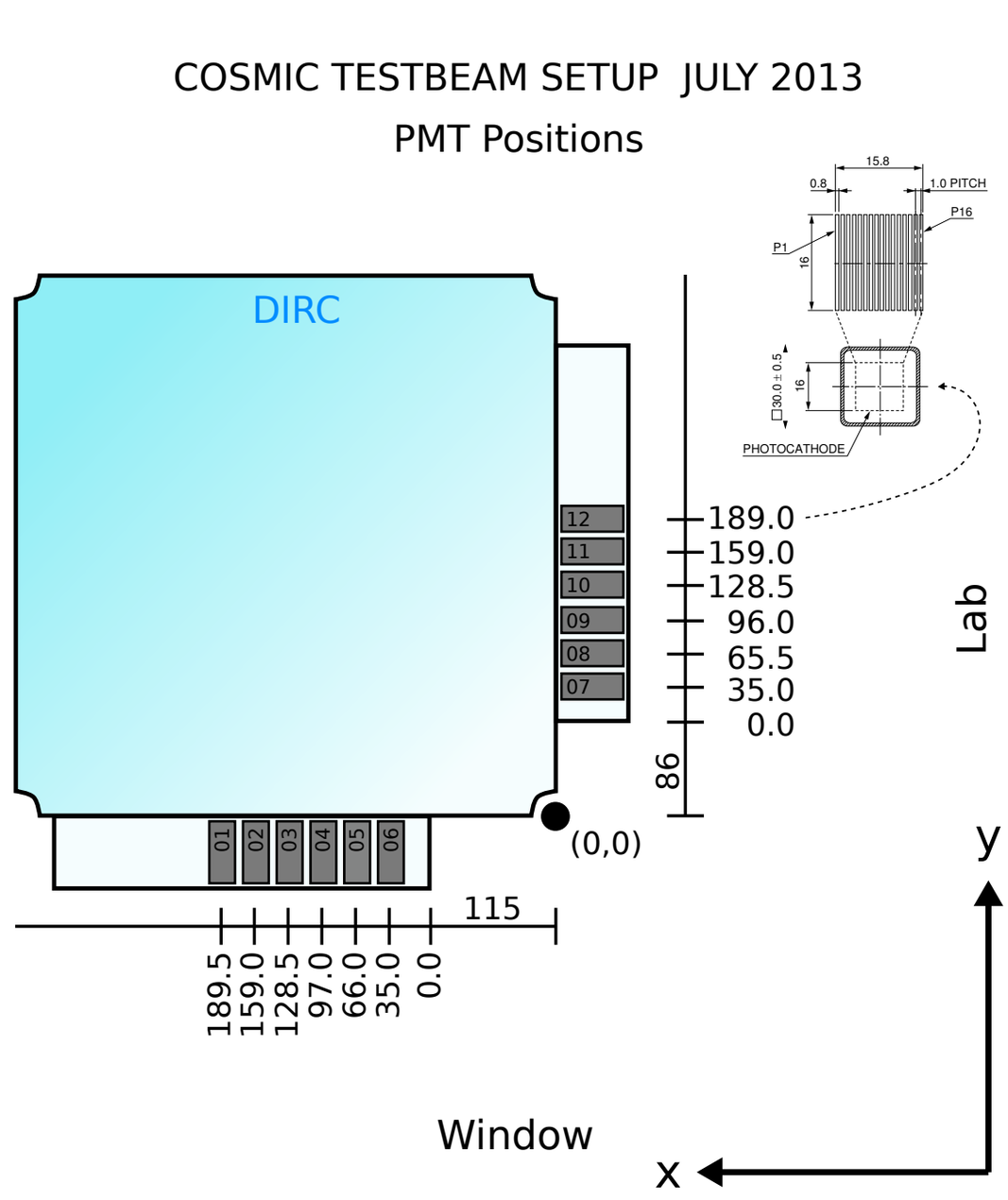
Cosmic Ray Test Stand - Installation

- First measurement with small DIRC prototype
- Silica glass plate with roughly 2500 cm² area
- 12 PMTs were mounted
- Readout using TRBv2



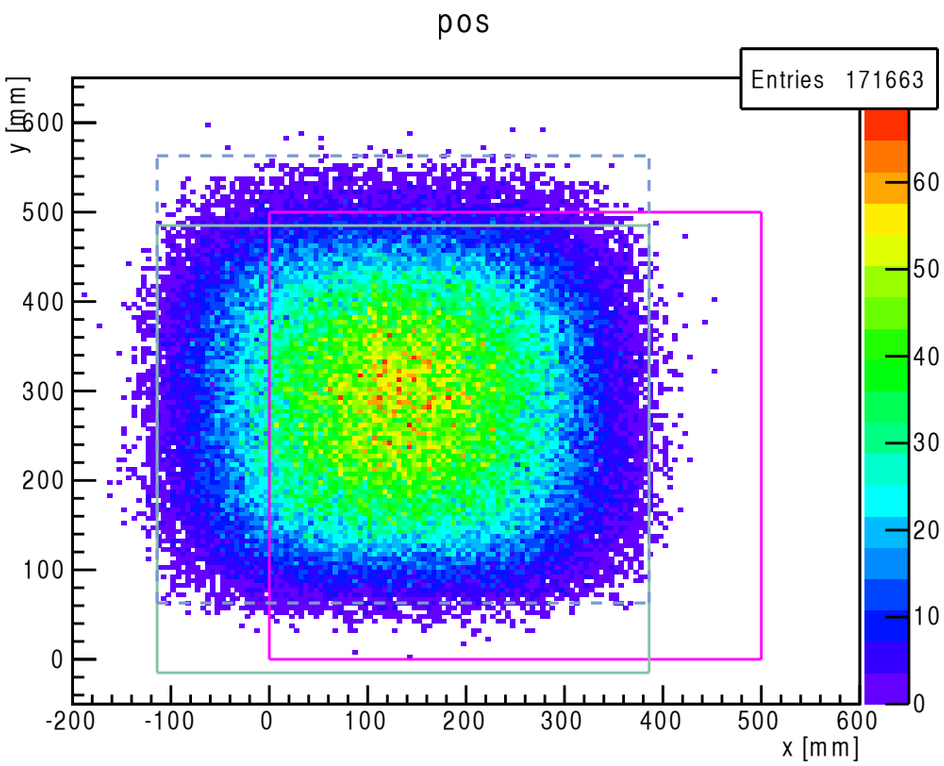
Cosmic Ray Test Stand - Installation

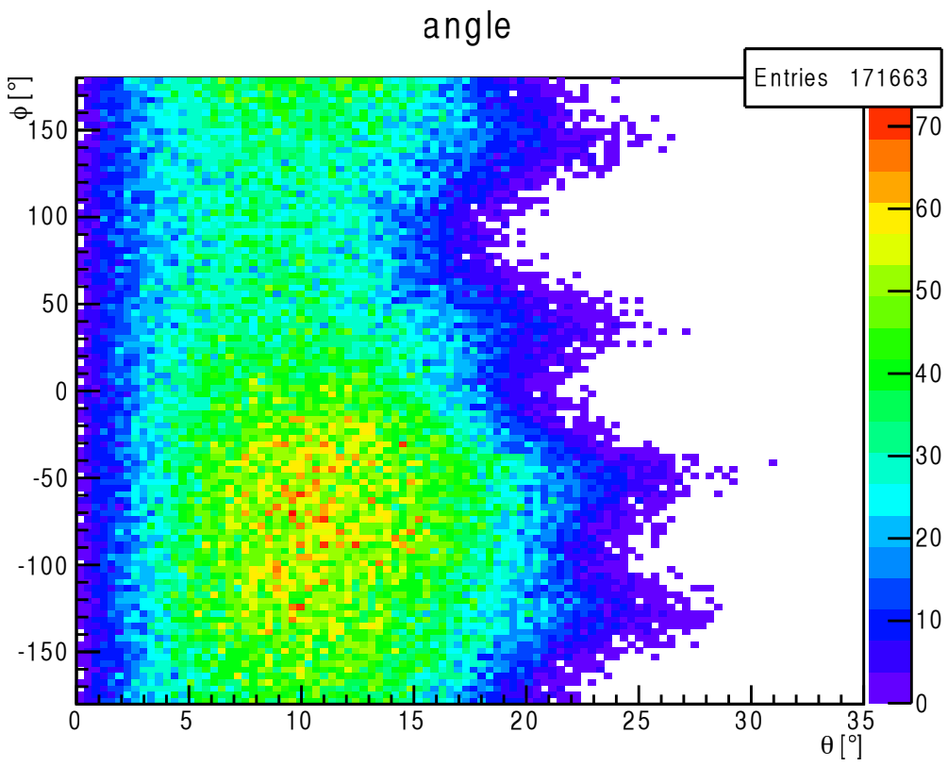


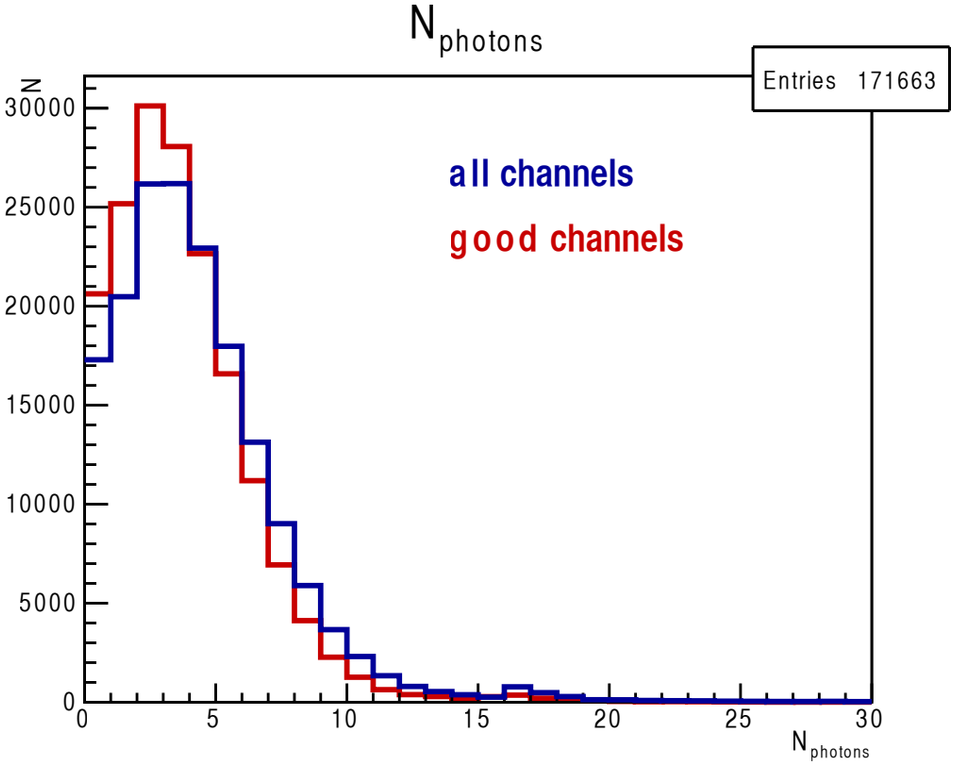


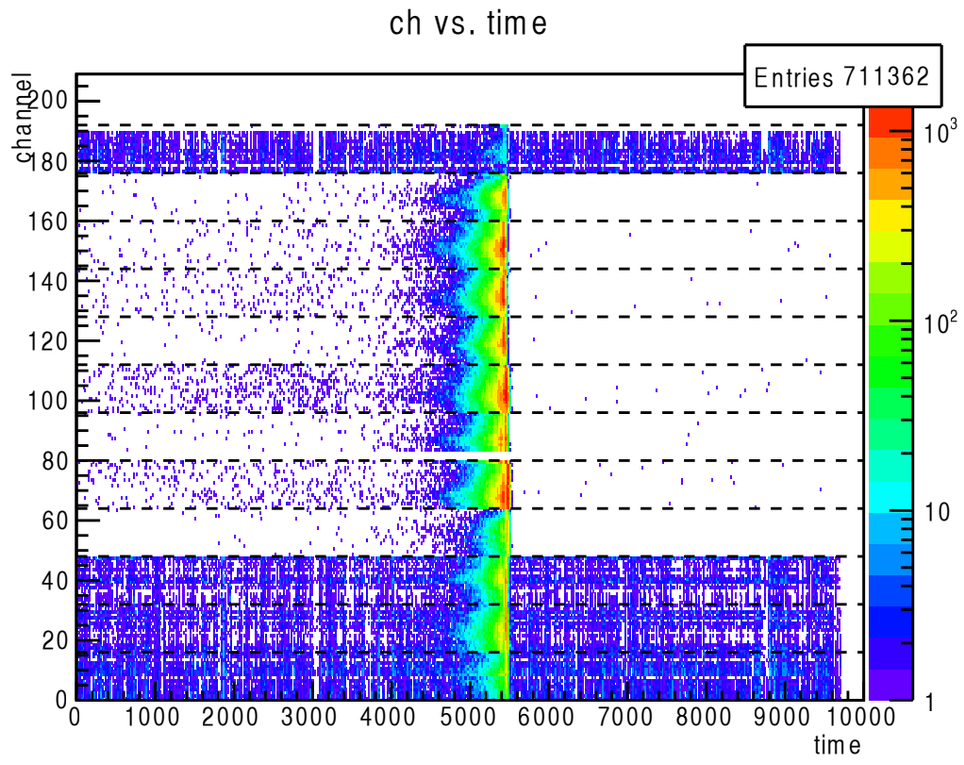
- Due to mechanical issues positions had to be shifted

First Measurements

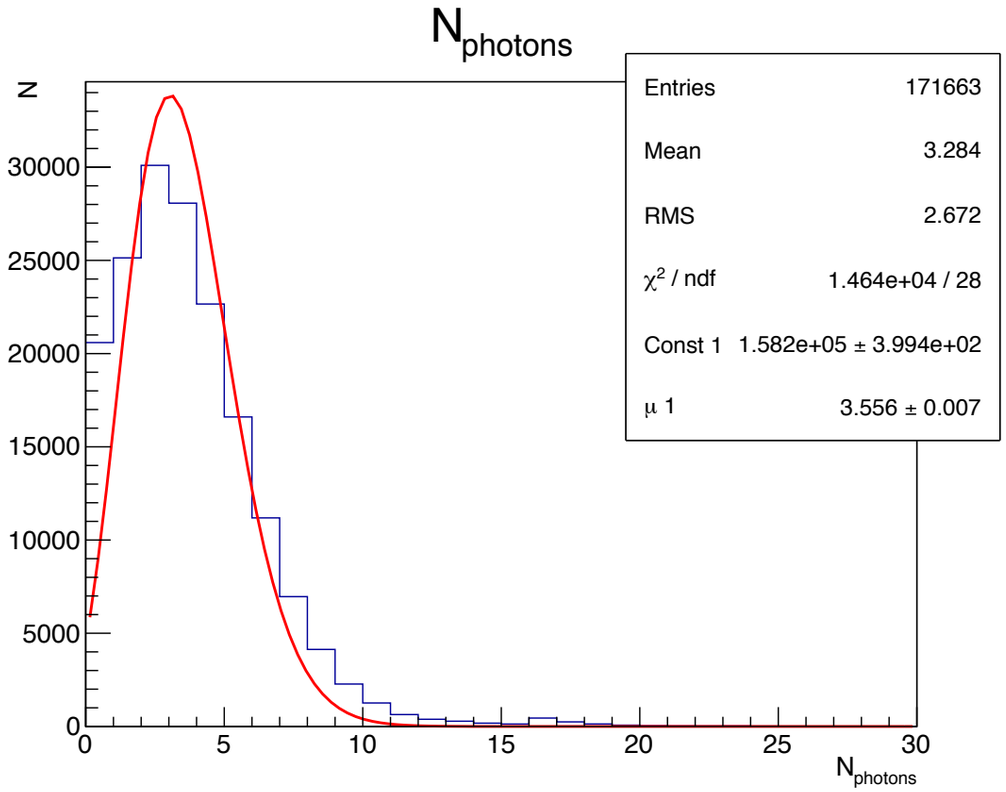


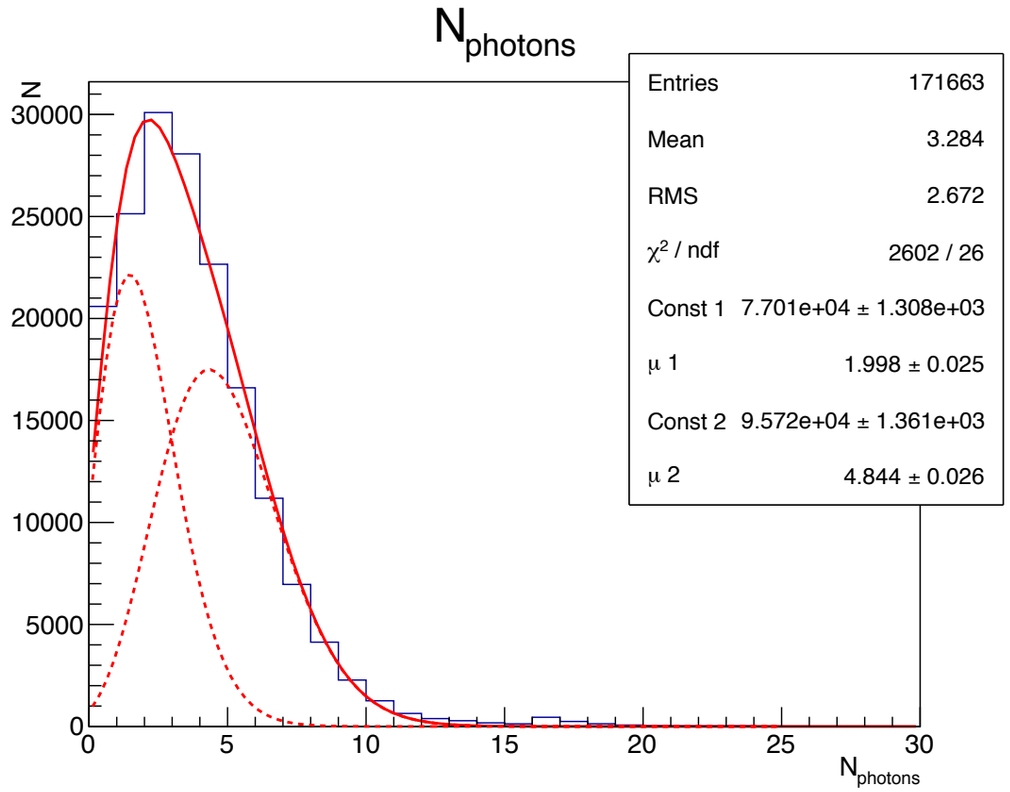


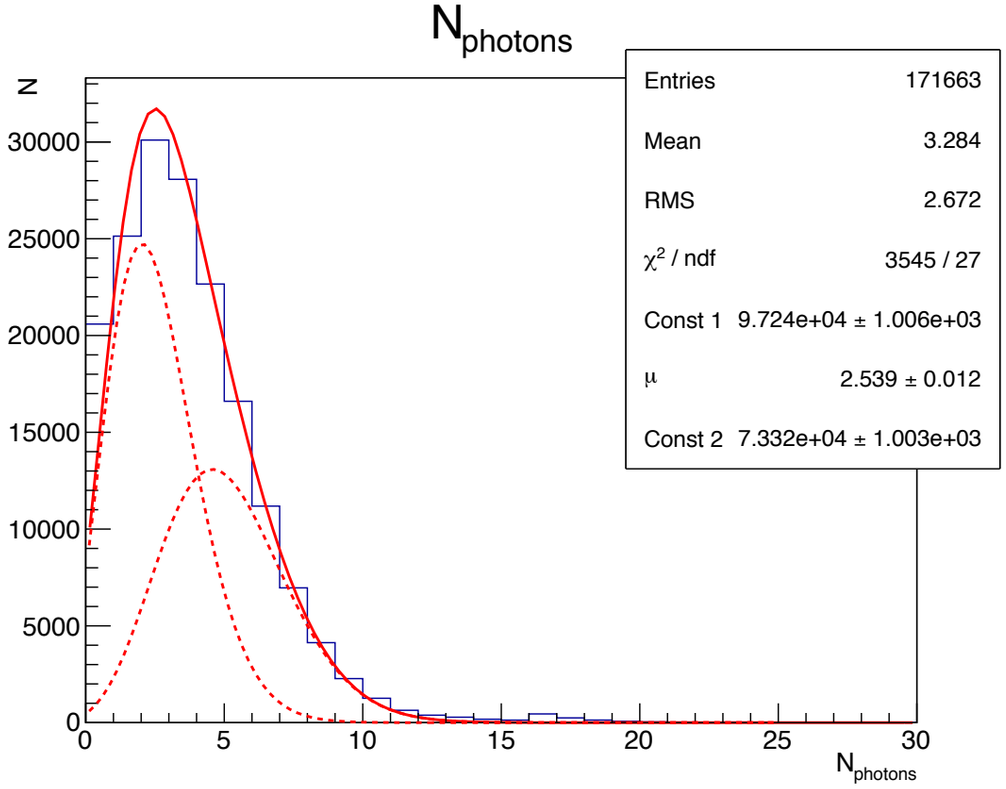




Number of Detected Photons

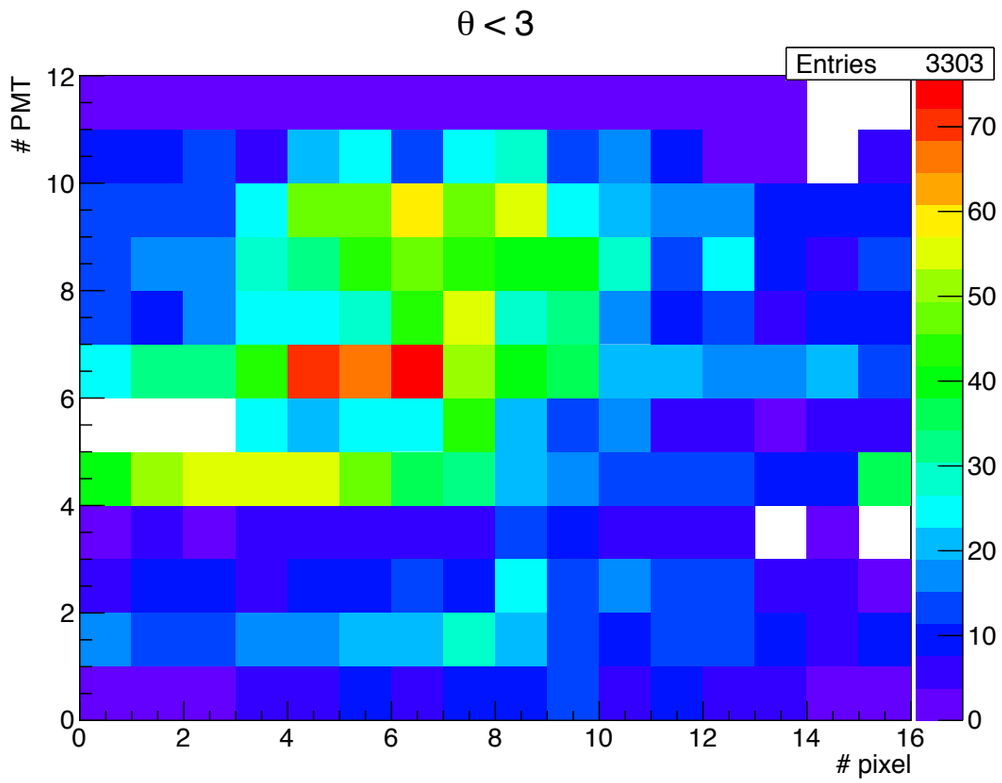


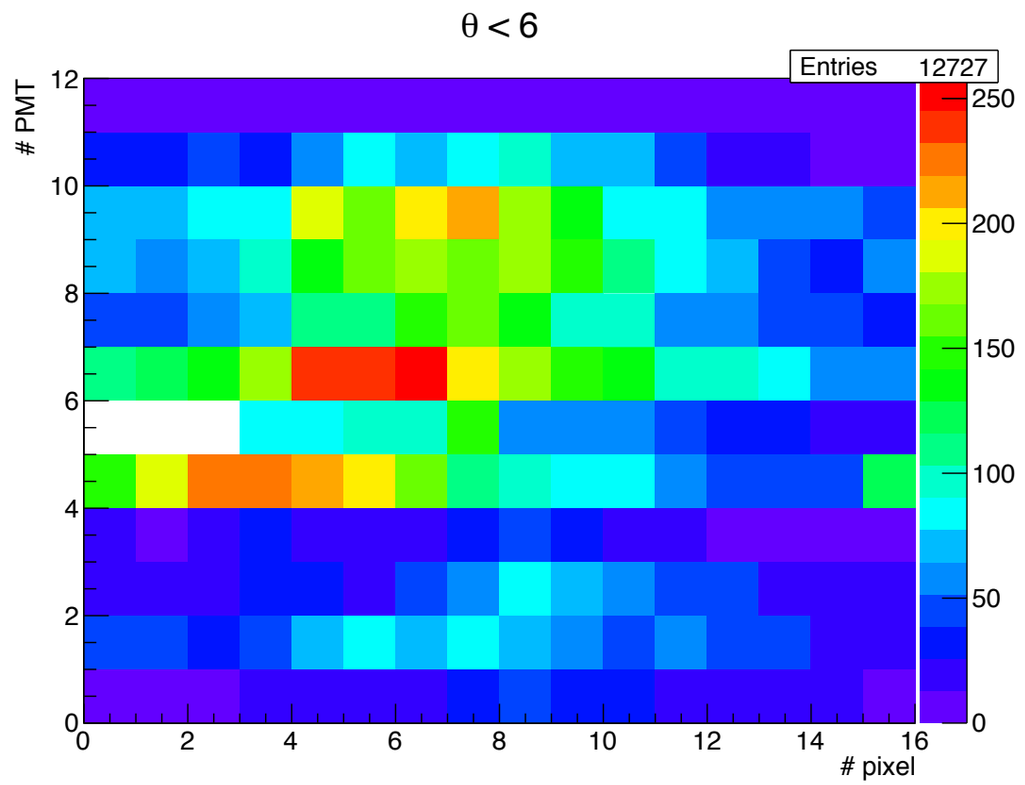


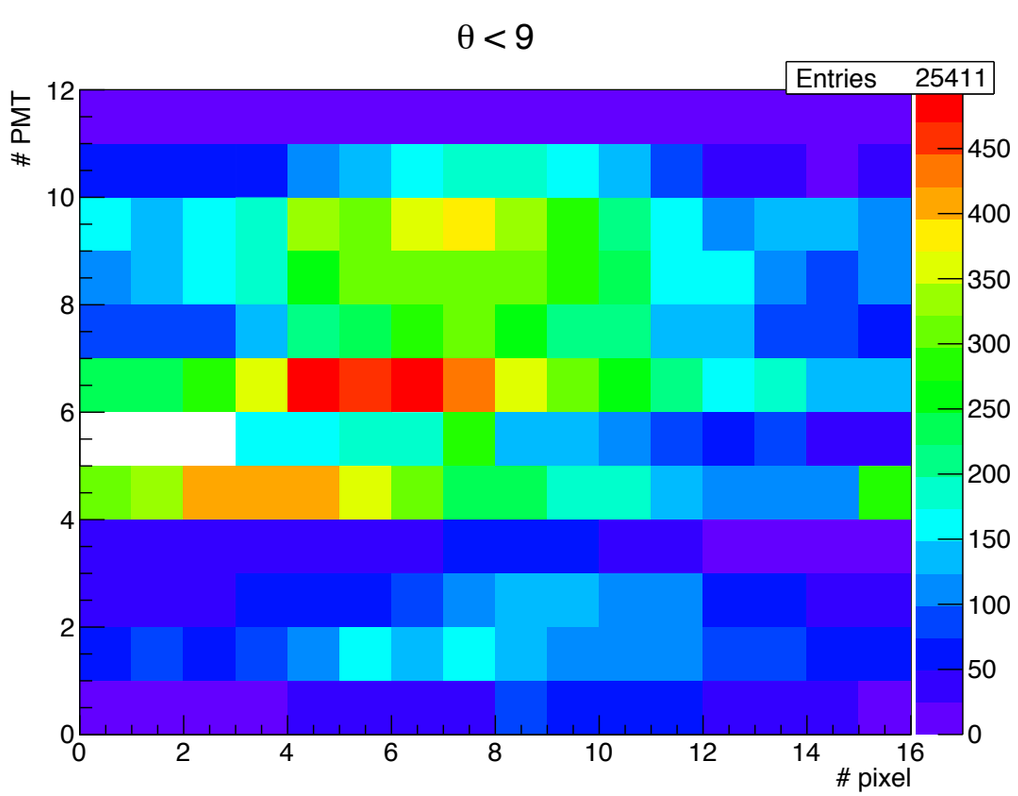


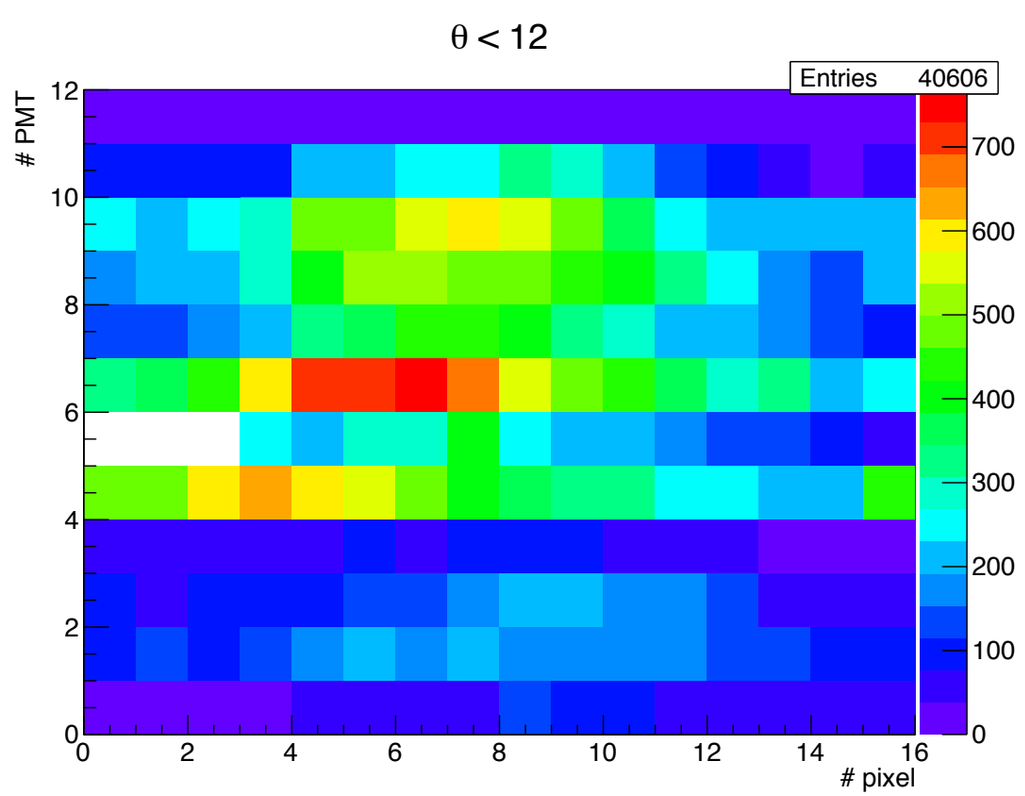
- Attempts to understand the distribution of numbers of photons
- Optical and electronic reasons have yet to be evaluated

PMT Patterns









Summary and outlook

- Successful detection of Cherenkov photons at the Gießen cosmic ray test stand

To-Do:

- Read-out electronics and spacial resolution of the test stand have to be improved
- Better understanding of number of detected photons per event
- Measure, measure and measure...