



Contribution ID: 67

Type: **Talk**

Scintillation Tile Hodoscope for the PANDA Barrel Time-Of-Flight Detector

Tuesday, 12 June 2018 16:10 (20 minutes)

The PANDA barrel time-of-flight detector will be conducted as scintillator tile, covering $\phi=1\text{m} \times 2\text{m}$ long surface. The area is segmented in 2000 tiles, each of which has a dimension of $9 \times 3\text{cm}^2$ and 5mm thickness. Photons are detected at two ends of each tiles, at each end 4 SiPMs are combined serially to increase the effective sensitive area of SiPM. Tiles are mounted on a large PCB backplane with MMCX coaxial connectors. The PCB backplane integrates signal transmission lines with the microstriplines technique. In 16 multilayer PCB board 5-6 signal lines are stacked vertically within the width of about 1mm. The signal processing and digitisation circuit is concentrated on one end of the backplane, realising a nearly cable-less design. The current prototype shows reasonably homogeneous performances over the surface. The average time resolution is about 50ps in standard deviation.

In this paper, we present the ground design of the detector based on the Technical Design Report, accepted recently by FAIR, and recent topics toward mass production.

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Session Classification: Large Scale Characterization and Reliability

Track Classification: Large Scale Characterization and Reliability