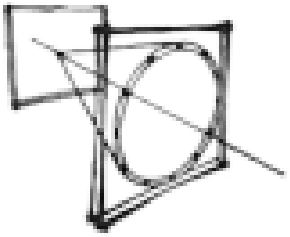

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Cherenkov light imaging with state-of-the-art solid state detectors

Monday 5 September 2016 17:25 (15 minutes)

A large area ring-imaging Cherenkov detector will be operated at the CLAS12 experiment at the upgraded continuous electron beam accelerator facility of Jefferson Lab for hadron identification.
With the new beam energy, the momentum range under study will range between 3 GeV/c and 8 GeV/c. The detector consist of areogel radiator, composite mirrors and photon detector and will be built with a hybrid optics design. Cherenkov light will be imaged in two different ways: forward tracks will be detected directly while large angles tracks will be detected after two mirror reflections.
The active area has to be densely packed and highly segmented covering about 1 mˆ2 with pixels of 6 mmˆ2. A new technology that can offer a cost-effective solution and low material budget could be Silicon Photon-multipliers (SiPM). Their properties are very attractive: high gain at low bias voltage, fast timing, good single-photoelectron resolution, insensitivity to magnetic fields. The avalanche process in the SiPM micro-cell is initialized by a primary electron/hole pairs that can be generated by an incident photon or by thermal generation effects, after-pulses or optical cross-talk. These latter intrinsic effects are responsible for their high dark count rate.
Prototypes of 3 × 3 mmˆ2 SiPM from different companies and of different micro-cell size are under investigation to comprehend and minimize this dark counts effects and to study their response to the moderate radiation damage expected at CLAS12.
Prototypes of SiPM matrices (4x4 or 8x8) is being tested at test-beam facilities or cosmic stands in order to analyse the response to Cherenkov light and their performance with the CLAS12 RICH readout.
In this poster, a brief review of the latest and most interesting results from these studies will be shown.

Registered

Yes

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