

## Photon counting with a FDIRC Cherenkov prototype readout by SiPM arrays

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A prototype of a Focused Internal Reflection Cherenkov, equipped with 16 arrays of NUV-SiPM, was tested at CERN SPS in March 2015 with beams of relativistic ions at 13 and 30 GeV/n obtained from fragmentation of an Ar primary beam. The detector, designed to identify cosmic nuclei, features a Fused Silica radiator bar optically connected to a cylindrical mirror, of the same material, and an imaging focal plane of dimensions  $\sim 4\text{ cm} \times 3\text{ cm}$ , covered with a total of 1024 SiPM photosensors. Thanks to the outstanding performance of the SiPM arrays, the detector could be operated in photon counting mode as a fully digital device. The Cherenkov pattern was recorded together with the total number of detected photoelectrons increasing as  $Z^2$  as a function of the atomic number  $Z$  of the beam particle. In this paper, we report on the characterization and test of the SiPM arrays and the performance of the Cherenkov prototype in the charge identification of the beam particles.

**Author:** Prof. MARROCCHESI, Pier Simone (University of Siena (IT) and INFN Pisa)

**Co-authors:** Dr BASTI, Andrea (Univ. of Pisa and INFN); Dr SULAJ, Arta (Univ. of Siena and INFN Pisa); Dr CHECCHIA, Caterina (Univ. of Padova and INFN); Dr PIEMONTE, Claudio (Fondazione Bruno Kessler (FBK), Trento, IT); Dr STOLZI, Francesco (Univ. of Siena and INFN Pisa); Dr BIGONGIARI, Gabriele (Univ. of Siena and INFN Pisa); Dr COLLAZUOL, Gianmaria (Univ. of Padova and INFN); Dr SUH, JungEun (Univ. of Siena and INFN Pisa); Dr BAGLIESI, Maria Grazia (Univ. of Siena, IT); Dr BROGI, Paolo (Univ. of Siena and INFN Pisa, IT); Dr MAESTRO, Paolo (Univ. of Siena and INFN Pisa); Dr BONECHI, Simone (Univ. of Siena and INFN Pisa)

**Presenter:** Prof. MARROCCHESI, Pier Simone (University of Siena (IT) and INFN Pisa)

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