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## Test beam performance of a novel compact RICH detector with timing capabilities for the future ALICE 3 PID system at LHC

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The ALICE Collaboration is proposing a completely new apparatus, ALICE 3, for the LHC Run 5 and beyond. A key subsystem for high-energy charged particle identification will be a Ring-Imaging Cherenkov (RICH) detector consisting of an aerogel radiator and a photodetector surface based on Silicon Photomultiplier (SiPM) arrays in a proximity-focusing configuration. A thin high-refractive index slab of transparent material (window), acting as a second Cherenkov radiator, is glued on the SiPM arrays to achieve precise charged particle timing.

We assembled a small-scale prototype instrumented with different Hamamatsu SiPM array sensors coupled with various window materials and pitches ranging from 1 to 3 mm. The Cherenkov radiator consisted of a 2 cm thick aerogel tile. The prototype was successfully tested in beam test campaigns at the CERN PS T10 beam line with pions and protons.

The data were collected with a complete chain of front-end and readout electronics based on the Petiroc 2A and Radioroc 2 together with a picoTDC to measure charges and times. We measured a single photon Cherenkov angular resolution better than 4 mrad in the momentum range between 8 and 10 GeV/c combined with a charged particle time resolution better than 70 ps.

In this talk we present the current status of the R&D performed for the ALICE 3 RICH detector and the beam test results obtained with the RICH prototype.

### Primary experiment

ALICE 3 RICH Working group

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