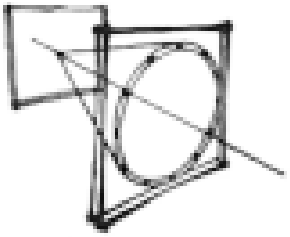

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# Aerogel mass production for the CLAS12 RICH: Novel characterization methods and Optical Performance

*Friday 9 September 2016 10:55 (25 minutes)*

A large area ring-imaging Cherenkov detector has been designed for the CLAS12 experiment, to achieve a pion vs kaon rejection power of 500:1 in the momentum range 3 - 8 GeV/c. The adopted solution foresees a novel hybrid optics design based on aerogel radiator, composite mirrors and multi-anode photon detectors. To minimize the instrumented area, a proximity imaging method will be used for forward scattered particles, whereas at larger angles the Cherenkov light will be focused by a mirror system and undergo two further passes through the radiator material before detection.

Good optical properties of the aerogel radiator are crucial for the performance of such a challenging RICH. In order to achieve the required separation power, the detector design foresees the use of large-area 20×20 $\mathrm{cm}^2$ aerogel tiles, conjugating high refractive index n=1.05 and high-transmission in the 300-600 nm wavelength range. Each RICH module requires 120 tiles: the geometrical precision and the optical quality matching the stringent specifications are critical tasks of such an aerogel mass production.

Safety procedures to preserve the aerogel performance during characterization, storage and assembling of a large number of tiles and long term stability in different environmental conditions were studied. Light forward scattering in the aerogel volume or refraction at the aerogel surface represent potential significant contributions to the Cherenkov angle resolution, which may be enhanced due to the peculiar reflected light path in the CLAS12 RICH. Not invasive methods were developed to study in details these effects with a dedicated laser test-bench. The chromatic dispersion was measured by two independent methods: in laboratory by the prism method and in a test-beam by selecting different wavelength ranges of the detected Cherenkov light with optical filters.

The procedures and the results of the detailed aerogel characterization will be discussed in the presentation.

## Registered

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