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Abstract

As a possible upgrade of the ALICE experiment the construction of the Focusing Aerogel Ring Imaging Cherenkov (FARICH) detector is proposed.

The goal of the FARICH is to extend the working momentum range of the charged particle identification at ALICE for a high transverse momentum PT region up to 10 GeV/c for the pion-kaon separation and up to 15 GeV/c for kaon-proton separation. It will enable to provide better conditions for the investigation of the parton-medium effects at LHC energies.

In this report the FARICH detector concept and possible detector construction on the basis of a multi-layer aerogel radiator and photosensitive MRS APD focal plane are presented.

The main idea of the FARICH detector development is to employ a Cherenkov radiator composed of several aerogel layers with different index of refraction. Index of refraction of each layer is gradually increased along the particle direction, so that Cherenkov ring images produced by different layers coincide in the focal plane and form more narrow ring image.

Simulation was made for a multi-layer radiator based on the Geant4 software toolkit. Results of the FARICH prototype test on the 6 GeV/c negative pion beam of the CERN PS T10 test channel are presented and discussed. Taking into account the FARICH prototype geometrical efficiency the FARICH Cherenkov angle resolution of about 2,1 mrad was obtained.

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