



Contribution ID: 52

Type: poster

Shaped Cherenkov radiators for increasing of light collection

Tuesday, 10 September 2024 18:35 (1 hour)

Here we report on the results of computer simulations of a calorimeter system for charged particle detection based on Cherenkov radiators with a profiled end-face. We performed simulations in the Geant4 package [1], which is the leading simulation toolkit in high-energy physics, accelerator physics, medical physics, and space studies. We demonstrate that profiled end-faces of Cherenkov radiators provide increase in the light output from a radiator depending on the radiation frequency and the shape of the end-face. In addition, by giving a special shape to end-faces, one can focus Cherenkov light at a certain distance from the calorimeter station. This makes it possible to move the readout electronics from the radiation hazard area and to decrease noise caused by unwanted interaction of particles with it. Such calorimeter type can be used for increasing the quality of the upcoming muon experiment - Mu2e [2, 3].

References

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Session Classification: Poster session 2