



Contribution ID: 89

Type: Poster

The RICH detector of the NA62 experiment at CERN

NA62 is the last generation kaon experiment at CERN. Its main goal is to measure the branching ratio of the ultra-rare decay $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ with 10% accuracy and background contamination at the 10% level. Given the tiny branching ratio of this decay, $O(10E-10)$, to fulfil such request the main background process $K^+ \rightarrow \mu^+ \nu$ (BR $\sim 63\%$) must be suppressed by a rejection factor of $4 \times 10E-13$. This is accomplished by using a combination of kinematical cuts ($8 \times 10E-6$), the different power of penetration through matter of pion and muon ($10E-5$) and a further $5 \times 10E-3$ suppression factor provided by a RICH detector in the momentum range 15-35 GeV/c.

The RICH consists of a vacuum-proof cylindrical vessel with 4 m diameter, about 18 m long, filled with Ne gas at atmospheric pressure. The Cherenkov light is reflected by a mosaic of 20 hexagonal mirrors with 17 m focal length and collected by about 2000 photomultipliers. The RICH will provide the pion crossing time with a resolution of ~ 100 ps, to minimize wrong matching with parent kaons measured by an upstream detector and also used as a fast information to the NA62 trigger system.

The construction of the detector is almost completed in view of the first NA62 run, foreseen in fall 2014. New and final results of the prototype tests at CERN, an updated description of the detector and the status of the construction, installation and commissioning will be presented, as well as the status of the RICH based customized readout electronics and trigger system.

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Track Classification: Experiments: 2a) Experiments & Upgrades