



## PERFORMANCES OF THE NA62 RICH DETECTOR (12' + 3')

Saturday, 6 August 2016 15:00 (15 minutes)

NA62 is the latest generation kaon experiment at CERN. Its main goal is the measurement of the  $K^+ \rightarrow \pi^+ \nu \bar{\nu}$  branching ratio with 10% accuracy. The key element of the PID in NA62 is the Ring Imaging Cherenkov detector (RICH). It is used to identify  $\pi$  and  $\mu$  in the momentum range between 15 and 35 GeV/c with a  $\mu$  rejection factor better than 1%; it is also required to measure the  $\pi$  arrival time with precision better than 100 ps and the Cherenkov angle with resolution better than 80  $\mu$ rad.

The detector consists of a 17.5 m long cylindrical vessel with a diameter varying from 3.4 to 4 m filled with neon at atmospheric pressure and room temperature. The RICH vessel was installed at CERN in February 2014 and a full vacuum test was done in March 2014. Two semispherical mirrors with 17 m focal length placed at the downstream end of the vessel reflect the Cherenkov photons. Since the area covered by the mirrors is large (around 3 m diameter) a mosaic of 20 hexagonal segments is used. The reflected light is collected by around 2000 photomultiplier tubes (PMTs) with 18 mm pixel size and suitable quantum efficiency and timing performances. The PMTs are assembled in a compact hexagonal packing into two aluminium disks placed at the entrance window. Winston cones carved into the disks and covered with aluminized mylar are used to convey the light onto the active PMT area, thus increasing light collection by up to 20%. Quartz windows are used to separate the PMTs from the neon. The mirror segments are individually hanged on a light aluminium honeycomb structure and moved by means of two piezo-motors each, in order to align the light toward the two PMTs disks. The mirrors installation and alignment was completed in August 2014.

From the data collected during a pilot run in 2014 and during the first physics run in 2015 the performances of the RICH have been studied in detail. From the 2014 data a time resolution better than 100 ps has been measured for particles with momentum between 15 and 35 GeV/c, fully matching the experiment request. In the same momentum range the  $\pi$ - $\mu$  separation has been studied, measuring a  $\mu$  rejection of a factor 50 at  $\pi$  identification efficiency of 80%. During the 2015 run we used the collected data to align the RICH mirrors. At the ICHEP conference we will present new results obtained with the aligned mirrors and improved analysis tools.

**Primary author:** BUCCI, Francesca (Universita e INFN, Firenze (IT))

**Presenter:** BUCCI, Francesca (Universita e INFN, Firenze (IT))

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