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The CHarged ANTIcounter for the NA62 experiment at CERN

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The NA62 experiment at CERN aims at the very challenging task of measuring with 10% relative error the Branching Ratio of the ultrarare decay of the K+ into pi+ neutrino and antineutrino, which is expected to occur only in about 8 out of 10^11 kaon decays. This will be achieved by means of an intense hadron beam, an accurate kinematical reconstruction and a redundant veto system for identifying and suppressing all spurious events. In particular, beam induced background, caused by inelastic interactions of the hadron beam with the Si based detector which measures kaon momentum (the so called Gigatracker, GTK) can mimic the signal in case only one pion is detected downstream. To suppress this background we have designed the so called CHarged ANTIcounter (CHANTI) i.e. a series of six guard rings, to be operated in vacuum, and covering a wide angular region downstream the last GTK station. CHANTI must have time resolution below 1 ns, must be highly efficient in detecting charged particles and must cope with rates which in the inner part can be some kHz/cm^2. We have adopted a solution based on triangularly shaped scintillator bars coupled with fast wavelength shifting fibers and individually read by means of Silicon Photomultipliers (SiPM). The full scale prototype of one ring has been built and tested using a prototype front end board which allows fast amplification and individual channel fine bias setting with O(mV) resolution and 0.1% stability. We show first results on the response of the detector to minimum ionizing particles as well as on its time resolution, which are well in line with the specifications.

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