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The KLOE-2 High Energy Taggers

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Content

The precision measurement of the $\pi^0 \rightarrow \gamma\gamma$ width allows to gain insights into the strong QCD dynamics. A way to achieve the precision needed (1%) in order to test Theory predictions is to study the π^0 production through $\gamma\gamma$ fusion in the $e^+e^- \rightarrow e^+e^-\gamma^*\gamma^* \rightarrow e^+e^-\pi^0$ reaction. The KLOE-2 experiment, currently running at the DAΦNE facility in Frascati, aims to perform this measurement. For this reason, new detectors, which allow to tag final state leptons, have been installed along the DAΦNE beam line in order to reduce the huge background coming from ϕ -meson decays. The High Energy Tagger (HET) detector measures the deviation of leptons from their main orbit by determining their position and timing. The HET detectors are placed in roman pots just at the exit of the DAΦNE dipole magnets, 11 m away from the IP, both on positron and electron sides. The HET sensitive area is made up of a set of 28 plastic scintillators. A dedicated DAQ electronic board, based on a Xilinx Virtex-5 FPGA, has been developed for this detector. It provides a MultiHit TDC with a time resolution of 550(1) ps and the possibility to clearly identify the correct bunch crossing ($\Delta T_{bunch} \sim 2.7$ ns). The most relevant features of the KLOE-2 tagging system operation as time performance, stability, efficiency, and the techniques used to determine the time overlap between the KLOE and HET asynchronous DAQs will be presented.

Summary

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