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The Large Angle Photon Veto System for the NA62 Experiment at CERN

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Content :

The branching ratio (BR) for the decay K+ -> pi+ nu anti-nu is about 10-10 and can be predicted in the Standard Model with minimal theoretical uncertainties, making it a sensitive probe for new physics. Measurement of this BR is challenging because of the background from dominant channels. The goal of the NA62 experiment is to measure this BR to within about 10%.

A system of photon vetoes is needed to reject e.g. pi0's from K+ -> pi+ pi0. We describe the design and construction of one of the main components of the photon veto system: the large-angle vetoes (LAV), a series of 12 ring-shaped detectors stationed at intervals of about 10 m along the beam line. The LAVs make creative reuse of lead-glass blocks recycled from the OPAL electromagnetic calorimeter barrel. We describe the mechanical design and challenges faced during construction, the development of front-end electronics to allow simultaneous time and energy measurements over an extended dynamic range using the time-over-threshold technique, and the development of an in situ calibration and monitoring system. Our results are based on test beam data taken to assist the design of the LAV detectors.

Primary authors : PALLADINO, Vito (INFN, Sezione di Roma "La Sapienza")

Co-authors :

Presenter : PALLADINO, Vito (INFN, Sezione di Roma "La Sapienza")

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