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Performance and upgrade studies of the KAPAE detector for positronium physics

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A variety of detectors have been developed in both accelerator-based and non-accelerator-based experiments for the study of positronium physics beyond the standard model reported in early 2000 after solving the lifetime-puzzle of positronium. The KNU Advanced Positronium Annihilation Experiment (KAPAE) was constructed to study rare decay of positronium, search for QED violation of C, CP and CPT as well as new particle searches. The KAPAE detector consists of 200 BGO scintillators that are finely fragmented in a compact size that is different from the previously reported detectors. Signal acquisition is triggered by a positron signal in the newly proposed trigger part and then read out with 392 channels of SiPM. We show the performance of the assembled detector and the potential for positronium physics studies. Furthermore, we report the results of sub experiments on performance improvements and upgrades that may have advantages in positronium physics studies.

In-person participation

Yes

Primary author: Dr PARK, Hyeoungwoo (Kyungpook National University)**Co-authors:** JEONG, Dongwoo (Kyungpook National University); Ms JEGAL, Jin (Kyungpook National University); Prof. KIM, Hongjoo (Kyungpook National University.)**Presenter:** Dr PARK, Hyeoungwoo (Kyungpook National University)**Session Classification:** Operation, Performance and Upgrade (Incl. HL-LHC) of Present Detectors**Track Classification:** Operation, Performance and Upgrade (Incl. HL-LHC) of Present Detectors