KAON 2019,

Results on the search for the $K_L^0 \to \pi^0\nu\bar{\nu}$ decay with the KOTO detector at J-PARC

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The KOTO experiment was designed to observe and study the $K_L^0 \to \pi^0\nu\bar{\nu}$ decay at J-PARC. The Standard Model (SM) prediction for the process is (3.0± 0.3) x 10^{-11} with small uncertainties. This unique *golden* decay is an ideal candidate to probe for new physics and can place strict constraints on beyond the standard model (BSM) theories. The previous experimental upper limit of the branching ratio (BR) was set by the KEK E391a collaboration as BR $<$ 2.6 x 10^{-8}.

The signature of the decay is a pair of photons from the π^0 decay and no other detected particles, and a large discernible transverse momentum. For the measurement of the energies and positions of the photons, KOTO uses a Cesium Iodide (CSI) electromagnetic calorimeter as the main detector, and hermetic veto counters to guarantee that there are no other detected particles. KOTO's initial data was collected in 2013 and achieved a similar sensitivity to the E391a result. We completed hardware upgrades and had the first major physics runs in 2015. I will present KOTO's results from the physics runs in 2015 were we set a new upper limit of BR $<$ 3.0 x 10^{-9} 90%(C.L.).