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Upgrade of the Cesium Iodide calorimeter for the KOTO experiment

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The KOTO experiment, conducted at J-PARC (Ibaraki Japan), is set to observe the rare decay $K_L \to \pi^0\nu\bar{\nu}$. The branching ratio is heavily suppressed in the Standard model (SM) and the experimental observation may reveal hints from physics beyond the SM.
The observed signature of $K_L \to \pi^0\nu\bar{\nu}$ is two γ's produced from a π^0 and no other signal. Thus the KOTO detector consists of an electromagnetic calorimeter and hermetic veto counters.

The calorimeter, made of 50-cm-long Cesium Iodide (CsI) crystals, plays a crucial role in both the detection of photons, and the rejection of neutron-induced background.
%It is a key to reject accidental hits of neutron produced by beam to maintain the sensitivity.
In addition to already established techniques, we need to reject neutrons by a factor of ten to achieve the standard model sensitivity.
We are instrumenting the front surface of CsI calorimeter with Multi Pixel Photon Counters (MPPC) to measure the timing difference between the arrival of signals at MPPCs and at photo multiplier tubes connected to the rear surface of the calorimeter.
The depth of energy deposition is measured through the timing difference, which in turn aids to discriminate neutron and photon.
In this presentation, we present the status of the upgrade.

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