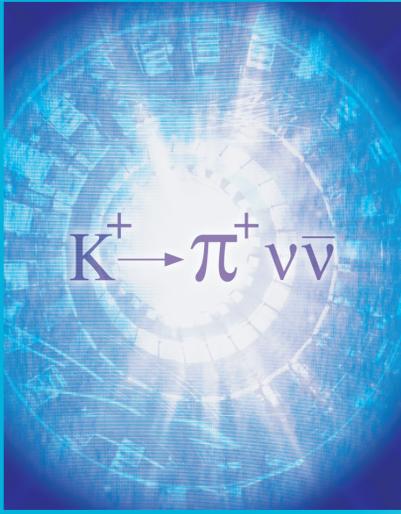


Upgrade of the Level-0 trigger system for BNL-E949



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- The E949 Experiment

The BNL-E949 experiment, which is a successor to E787, aims to measure the branching ratio of the rare kaon decay $\pi^+ \nu \bar{\nu}$ whose branching ratio is predicted to be 10^{-10} . Several improvements, one of which is the upgrade of the Level-0 trigger system, were made to E787 in order for E949 reach a sensitivity of 10^{-11} and observe 10 Standard Model events.

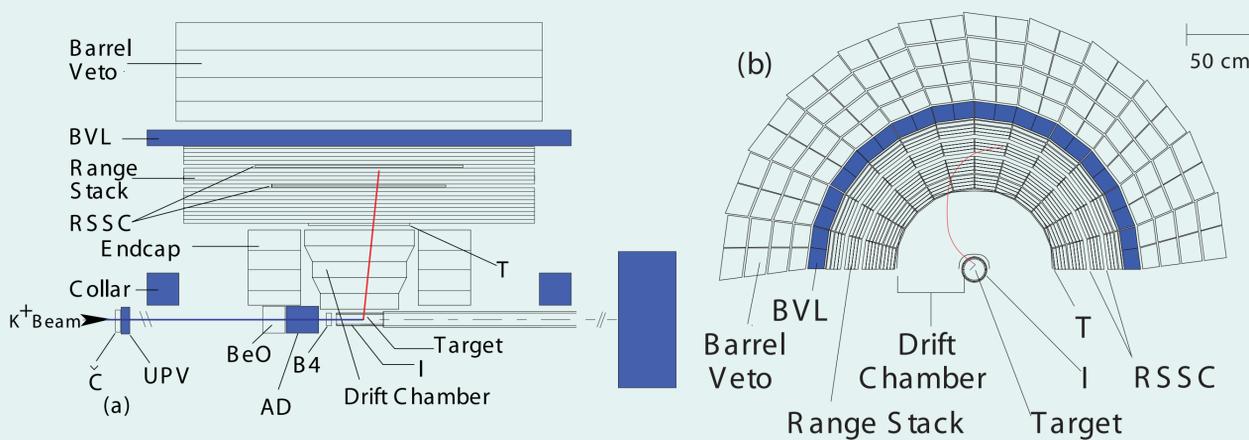


FIG. 1. Schematic sideview(left) and endview(bottom) of the upper half of E949 detector. Shaded part is the newly installed detector for E949.

- E949 Level-0 Trigger System

The trigger condition for $\pi^+ \nu \bar{\nu}$ is defined as follows:

$$\pi^+ \nu \bar{\nu} \equiv K_B \cdot DC \cdot (T \cdot 2) \cdot \frac{(6_{ct} + 7_{ct}) \cdot \overline{19_{ct}} \cdot RR \cdot L0_{zfrf}}{(BV + BVL + EC) \cdot HEX}$$

The E949 experiment aims to accumulate more statistics with higher beam intensity than E787. The trigger system must work more flexibly and with less dead time. In E949, programmable L0 trigger board installed instead of the E787 trigger board for the flexibility of the trigger. Digital Mean-timer modules were installed to reduce dead time.

Both modules have Programmable Logic Device(PLD).

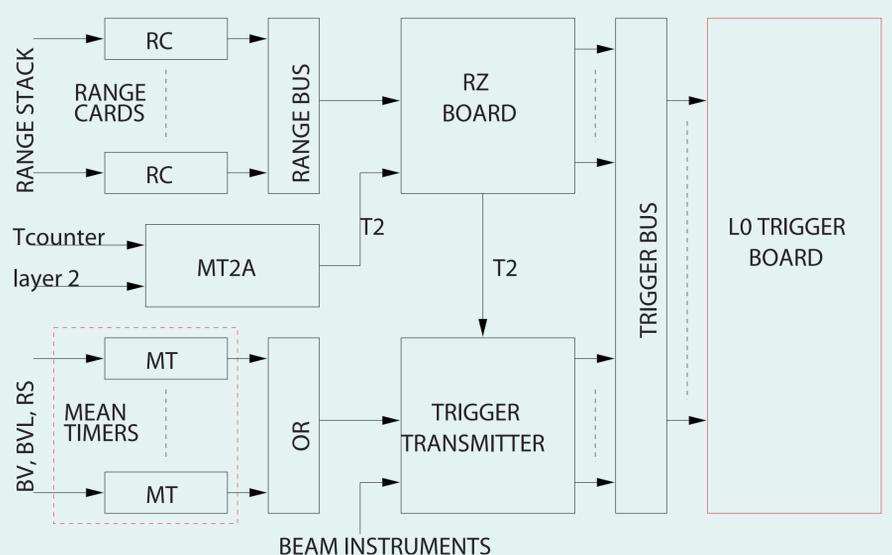


FIG. 2. A block diagram of the E949 trigger system. All trigger decisions, defined as combinational logic of L0 trigger bits on the Trigger Bus, are performed by L0 trigger board.