

# Development of a Cerenkov Trigger Detector for the COMET Experiment

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The COMET experiment at the J-PARC Hadron Experimental Facility [1] searches for the muon-to-electron conversion in a muonic atom,  $\mu^- + N(A,Z) \rightarrow e^- + N(A,Z)$ , at a branching ratio of  $\sim 10^{-15}$  in the first phase of the experiment. Signal electrons are identified and triggered with a Cerenkov-type trigger detector. The trigger detector is placed upstream and downstream of the inner wall of the cylindrical drift chamber as shown in Fig.1 and consists of 64 segments in each end. A prototype of the one segment has two layers;  $300 \times 45 \times 5 \text{ mm}^3$  ultra-fast plastic scintillator and  $300 \times 45 \times 30 \text{ mm}^3$  UV transparent acrylic radiator. Multi-Pixel Photon Counters (MPPCs) as the photo sensors are attached on the edge. A coincidence of signals from the two layers is used for the trigger.

We constructed and tested a prototype detector. Studies for the radiator and reflector optimization, and a test of UV sensitive MPPC were carried out with cosmic rays. A beam test using an electron beam is planned in this fall. Details of the trigger detector development will be described in the symposium.

## References

[1] Y. Kuno, "A search for muon-to-electron conversion at J-PARC: the COMET experiment." Progress of Theoretical and Experimental Physics 2013.2 (2013): 022C01.

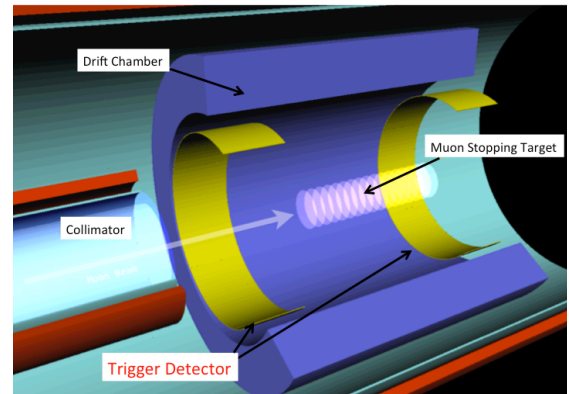


Fig. 1.  
The detector geometry. Yellow parts are the trigger detector.