



Contribution ID: 162

Type: Live Presentation

Vacuum-Compatible Ultra-Thin-Wall Straw Tracker; Detector construction, Thinner straw R&D, and the brand-new graphite-straw development

Wednesday, 23 February 2022 15:15 (20 minutes)

The COMET experiment at J-PARC aims to search for a lepton-flavour violating process of muon to electron conversion, with a branching-ratio sensitivity of 10^{-17} , to explore the region predicted by most of theoretical models beyond the Standard Model. The expected signal of this process is mono-energetic 105 MeV single electron. To distinguish such a low energy signal, a material budget of detector is essential since the detection accuracy is primarily limited by multiple scattering.

To realize the required low material detector, a vacuum-compatible ultra-thin-wall straw tracker has been designed, then $20\mu\text{-thick}$ Mylar straw with 70nm Al cathode has been developed employing ultrasonic-welding technique. This was reported in VCI2016, and the detector performances such as detection efficiency and intrinsic spacial resolutions were reported in VCI2019. After the previous VCI, a detector construction using this straw was performed. In parallel to this, thinner straw, *i.e.* $12\mu\text{-thick}$ straw, has been developed with joint collaboration among KEK, JINR and CERN. During this R&D, it was noticed that the current technology cannot achieve much thinner/smaller tubes than the present one. Then, we launched a brand-new project to realize the **graphite-textile straw** which realizes an extremely low material tracker.

In VCI2022, a brief report on detector construction with $20\mu\text{-thick}$ straw, R&D on $12\mu\text{-thick}$ straw and a brand-new graphite straw will be provided.

Primary experiment

COMET

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Session Classification: Gaseous Detectors

Track Classification: Gaseous Detectors