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

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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 20μ-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.* 12μm-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 20μm-thick straw, R&D on 12μm-thick straw and a brand-new graphite straw will be provided.

Primary experiment

COMET

Author: NISHIGUCHI, Hajime (KEK)

Co-authors: VOLKOV, Alexander (Russian Academy of Sciences (RU)); HAMADA, Eitaro; DANIELSSON, Hans (CERN); Mr SUZUKI, Junichi (KEK); UENO, Kazuki (KEK); Dr WATANABE, Kei (Shinshu university); Mr KAMEI, Naoya (KEK); TSVERAVA, Nikolozi (Georgian Technical University (GE)); Mr OHSAWA, Osamu (Shishu university); MIHARA, Satoshi (KEK); Dr HASHIMOTO, Yoshinori (KEK); TSAMALAIDZE, Zviadi (Georgian Technical University (GE))

Presenter: NISHIGUCHI, Hajime (KEK)

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