The status and prospects of Cylindrical Drift Chamber for COMET Phase-I

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The COMET experiment is seeking to measure the neutrinoless, coherent transition of a muon to an electron ($\mu -$ e conversion) in the field of an aluminum nucleus. The facility for the experiment is J-PARC Hadron Hall at Tokai village in Japan. The J-PARC main ring can provide high intensity 8-GeV proton beam to the Hadron Hall, and the generated pions are captured by the surrounding capture solenoid and will decay to muons in the curved transport solenoid which is connecting to the detector part. With these system, the muon intensity will be the world highest, thus the sensitivity of the experiment could reach to the branching ratio to test the several beyond the standard models which predict the neutrinoless muon to electron conversion process.

In the COMET Phase-I, we will search for the μ-e conversion process with a single event sensitivity of $\sim 10^{-15}$, corresponding to the factor 100 improvement from the past search done by the SINDRUM-II experiment at PSI. The main detector is Cylindrical Drift Chamber (CDC) to measure the electron momentum with high momentum resolution (better than 200 keV/c). To suppress the effect of multipel scattering, the chamber gas is He based with 10% of iso-butane. The detector construction was completed in 2016, and the commissioning with cosmic-ray muon has been ongoing at KEK. In my poster, the current status and prospects of the CDC detector will be presented.