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The COMET experiment: A search for muon-to-electron conversion at J-PARC

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The COMET Experiment at J-PARC aims to search for the lepton-flavour violating process of muon to electron conversion in a muonic atom, $\mu^- N \rightarrow e^- N$, with a 90% confidence level branching-ratio limit of 6×10^{-17} , in order to explore the parameter region predicted by most well-motivated theoretical models beyond the Standard Model. The need for this sensitivity places several stringent requirements on both the muon beam and the detector system. In order to realize the experiment effectively and timely, a staged approach to deployment is employed, and the COMET Phase-I experiment will commence engineering runs in 2025. At the Phase-I experiment, a precise muon-beam measurement will be conducted, and a search for $\mu^- N \rightarrow e^- N$ will also be carried out with an intermediate sensitivity of 7×10^{-15} (90% CL upper limit). In this paper, the current status of R&D and construction of the experiment is presented in addition to the experimental overview.

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