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The COMET experiment

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The COMET experiment intends to search for the lepton flavor-violating conversion of a muon to electron while in the orbit of an atomic nucleus. The process is not forbidden by any symmetry of the Standard Model, but remains extremely suppressed even when flavor-mixing neutrino masses are introduced, due to the relative smallness of these masses. Because this suppression is accidental in the Standard Model, the rate of such conversion is expected to be greatly enhanced across a very broad range of new physics scenarios.

COMET makes use of the J-PARC Main Ring accelerator and novel curved-solenoid focussing elements to obtain a very intense pulsed muon beam, and this gives the experiment the ability to observe a signal four orders of magnitude weaker than current limits. Because the increase in sensitivity is so dramatic, the experiment will run in phases, with the first phase using fewer focussing elements in order to obtain data on the secondary beam composition. This “Phase-I” of the project is nevertheless capable of a factor 100 improvement over the current limit. Both phases will be described, including progress in construction of the Phase-I experiment.

Summary

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