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High purity and high brightness muon beam for next generation muon-electron conversion experiments

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The search for muon-electron conversion processes that violate the conservation of charged lepton flavors has attracted much attention for its superior sensitivity to the discovery and verification of new physical phenomena beyond the Standard Model. Two experiments, COMET and Mu2e, are currently underway in Japan and the United States to search for muon electron conversion processes with O(10ˆ-17) single-event experimental sensitivity. The Mu2e-II experiment, which improves the experimental sensitivity by a factor of 10, is also under investigation.
What should be done next as a muon-electron conversion process depends on the results of these experiments. In the case that the muon electron conversion process is not found, further exploratory experiments with increased experimental sensitivity are needed. If the muon-electron conversion process is discovered, the dependence of the decay ratio on the muon stopping target material should be investigated to clarify the physical mechanism causing this process. In either case, the next generation experiments should not only increase the muon beam intensity, but also improve its purity and energy spread.
Therefore, we have proposed the PRISM project, in which phase-space rotation is performed in a muon storage ring. In this talk, I will explain the key points and outline of the PRISM project and discuss the possibility of future muon-electron conversion experiments.

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