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High precision measurement of the $\pi \to e\nu$ branching ratio: a sensitive probe in the search for new physics KAORU YAMADA, University of British Columbia, PIENU COLLABORATION — Study of rare decays is an important approach for exploring physics beyond the Standard Model (SM). New physics could be seen if deviations from well-calculated SM predictions occur. In particular, the branching ratio of the helicity suppressed pion decays, $\frac{\Gamma(\pi\to e\nu_e+\pi\to e\nu_e\gamma)}{\Gamma(\pi\to\mu\nu_\mu+\pi\to\mu\nu_\mu\gamma)}$ is the most accurately calculated decay process involving hadrons and has so far provided the most stringent test of the hypothesis of electron-muon universality in weak interactions. It has been calculated in the SM to better than 0.01% to be $\mathrm{R}_{SM} = 1.2353(1) \times 10^4$. The PIENU experiment at TRIUMF, which will be online in a few weeks, aims to reach an accuracy five times better than the current world average value so as to confront the theoretical calculation at the level of $\pm 0.1\%$. At this level,"new physics" beyond the Standard Model, at potentially very high mass scales, could be revealed or sensitive constraints on hypotheses can be obtained for interactions involving pseudoscalar, axial vector, or scalars The presentation will outline the physics motivations behind the measurement and describe the PIENU experiment's concept, apparatus and techniques designed to achieve the high precision measurement of the branching ratio.

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