Canadian Association of Physicists
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(I) PIONEER: a next generation pion decay experiment

Tuesday 20 June 2023 16:15 (30 minutes)

Measurement of the charged-pion branching ratio to electrons versus muons, Re/μ, is extremely sensitive to a wide variety of new physics effects. The precision of the SM prediction for Re/μ is ˜1 part in 10ˆ4, 15 times more precise than the current experimental result. A next-generation experiment, PIONEER, is aiming at reducing the precision gap between theory and experiment, testing lepton flavor universality at an unprecedented level and probing new physics mass scales up to the PeV range. Additionally PIONEER is aiming at a 3 to 10-fold improvement in the pion beta decay, $\pi+ \longrightarrow \pi 0 e+\nu(\gamma)$ measurement which determines |V_ud| in a theoretically pristine manner. This measurement would shed new lights on existing tensions in the CKM matrix unitarity. PIONEER will use a combination of new detector technologies based on LGAD silicon tracking target, a deep, and high solid angle coverage LXe calorimeter featuring excellent energy and time resolution. I'll discuss PIONEER's detector concept and goals in light of previous experimental designs and achievements.

Keyword-1

pion decay

Keyword-2

Lepton Flavour Universality

Keyword-3

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