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PIONEER: a next generation pion decay experiment

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The PIENU experiment at TRIUMF has provided, to date, the most precise experimental determination of $R^{\pi}_{e/\mu} = \frac{\pi^+ \to e^+(\gamma)}{\pi^+ \to \mu^+(\gamma)}$, the ratio of pions decaying to positrons relative to muons. While $R^{\pi}_{e/\mu}$ is more than an order of magnitude less precise that the Standard Model (SM) calculation, the PIENU result is a precise test of the universality of charged leptons interaction, a key principle of the Standard Model (SM), constrains a large range of new physics scenario, and allows dedicated searches for exotics such as sterile neutrinos. I'll go over a short overview of $R^{\pi}_{e/\mu}$ measurements and introduce the
next generation precision pion decay experiment in the making: PIONEER!
This newly proposed experiment aims at pushing the boundaries of precision on $R^{\pi}_{e/\mu}$ and expanding the physics reach by improving on the measurement of the very rare pion beta decay $^+ \to \pi^0 e^+ \nu$. This will provide a new and competitive input to the determination of $|V_{ud}|$, an element of the Cabibbo- Kobayashi-Maskawa (CKM) quark-mixing matrix.

Keyword-1

pion decay

Keyword-2

lepton flavour universality

Keyword-3

CKM

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