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Study of radiative pion and muon decays in the PEN experiment[1]

DINKO POCANIC, University of Virginia, PEN COLLABORATION — Radiative decays of the muon: $\mu^+ \to e^+ + \nu_e + \bar{\nu}_\mu + \gamma$, and pion: $\pi^+ \to e^+ + \nu_e + \gamma$, or $\pi_{e2\gamma}$, where the photon carries away an appreciable portion of the available energy, are sensitive in different ways to departures from the basic $V-A$ dynamics of the weak interaction. Like other pion and muon decay channels, they are described with extreme precision in the standard model (SM) of elementary particles and fields. Hence, both processes are effective in studies of the limits on certain non-SM interactions. Additionally, the radiative pion electronic decay offers direct information on the weak form factors of the pion. The ratio of the axial-vector and vector pion form factors, F_A/F_V provides critical basic input for low energy chiral lagrangians, such as chiral perturbation theory. We discuss the physics reach, and present an analysis update, of the pion and muon radiative decay measurements in the PEN experiment.

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