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Search for three body pion decays $\pi^+ \rightarrow l^+ \nu X$ in the PIENU experiment

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The existence of massive or massless weakly interacting neutral particles X such as axion-like particles, sterile neutrinos, and Majorons has been suggested to augment the standard model with motivations that include providing dark matter candidates, explaining baryogenesis, and revealing the origin of neutrino masses. The three body pion decays $\pi^+ \rightarrow l^+ \nu X$ ($l = e, \mu$) involving such particles were sought in the PIENU experiment with order of magnitude improved sensitivity over the previous experiment. The result of the searches and prospects of the PIENU experiment will be presented.

Collaboration name

PIENU collaboration

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