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(I) Towards measuring the Fierz interference parameter in 6He β decay from a Penning trap using the CRES technique

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Measurements of correlation parameters in nuclear β decay have a long history of helping shape our current understanding of the fundamental symmetries governing our universe: the standard model. A variety of observations indicate this model is incomplete, so scientists continue to search for what may lie beyond the standard model. Nuclear β decay continues to play an important role in this search for new physics, one that is complementary to other searches. To achieve the precision required to be competitive with the LHC, for example, elegant and sensitive techniques are required. The 6He Cyclotron Radiation Emission Spectroscopy (CRES) experiment under development at CENPA, the University of Washington, aims to make the world's most sensitive search for tensor components to the weak interaction by an energy-spectrum shape measurement of this pure Gamow-Teller decay. As demonstrated by Project 8, the energy of β-decay electrons emitted in a magnetic field can be measured to 15 eV. If the 6He ions are confined in a Penning trap to avoid wall effects, the ultimate precision on the Fierz interference parameter is estimated to be ΔbFierz=10−4. This talk will outline the 6He CRES experiment and our plans to observe the cyclotron radiation of electrons emitted from 6He confined in a Penning trap.

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