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# **WITHDRAWN** Theory of Ejected Electron Recoil Momentum in the Beta Decay of the Halo Nucleus He-6

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The beta-decay of the halo nucleus helium-6 is investigated, with analysis of the relative abundances of the daughter states and the angular correlations between the products of the beta-decay. The corrected, higher precision, ion recoil spectrum is calculated, taking into account the momentum of ejected electrons. This spectrum contains the antineutrino signature, which is one of the products of the beta-decay. The standard model predicts that this should be a pure Gamow-Teller process of the axial vector type. A recent paper computed and investigated the probabilities for the various daughter states of the aforementioned beta-decay. Study of the recoil corrections to shake-up ((ˆ6)Liˆ+ bound states) and shake-off <sup>6</sup>Li<sup>++</sup> continuum states) was achieved by plotting the fractional abundance of ( ˆ6)Liˆ(++) versus the recoil energy. This work has revealed a 7σ disagreement with previously well-accepted experiment results. Our theoretical work is in collaboration with experimental groups performing spectroscopic analysis at Argonne National Laboratory and the University of Washington. The conceptual formulation of plausible mechanisms, and their subsequent testing, will aim to explain why such discrepancies exist. One such idea is that the continuum threshold could have been suppressed in an unaccounted fashion, due to the relatively high pressure of the background gas, compared to what can be achieved today. Another potential mechanism is the possible production of higher than expected quantities of neutral Lithium ((ˆ6)Li), which is analyzed theoretically by solving the Dirac equation for an electron moving in a Coulomb field, overlapped with the orbitals of ( ˆ6)Li. These, and other possibilities identified, are thoroughly scrutinized as potential sources of error.

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