TRIUMF Advanced Rare Isotope Laboratory (ARIEL)

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# Physics Opportunities with TRIUMF's neutral atom trap for beta decay (TRINAT)

TRINAT has at least four existing efforts with opportunities for collaborators and their students. A correlation between spin, beta, and recoil has enhanced sensitivity to time-reversal odd, parity-even, isospin-breaking nucleon-nucleon interactions because of 47K decay's isospin-hindered Fermi component, making it potentially complementary to MORA's more general decays as well as to electric dipole moment searches and neutron resonance experiment NOPTREX. Developing metrology for the potassium atom's 4S to 5P1/2 transition will test atomic many-body theory needed to enable a better charge radius measurement of 38mK to test isospin-breaking calculations needed for Vud determination. The angular distribution of neutrinos and betas from the isobaric analog decay of 37K reflects their absolute and relative helicities, a distinct prediction of our model of electroweak interactions. We also consider an improved 38mK beta-nu correlation experiment, which requires considerable development to reach sensivity goals of WISArD. With this poster the local spokesperson would present these opportunities to this workshop.

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