Contribution ID: **129** Type: **Oral Presentation**

Measurement of Analog-Antianalog Isospin Mixing in ^{47}K Beta Decay

Monday 10 June 2024 14:50 (20 minutes)

While both Charge-Parity (CP) symmetry, and more recently Time (T) symmetry have been directly shown to be violated in the weak interaction, it remains an open question whether new sources of CP violation could explain the matter-antimatter asymmetry in the universe. TRIUMF's Neutral Atom Trap (TRINAT) is equipped to study the angular distribution of all decay products from spin-polarized beta emitting isotopes produced by the Isotope Separator and Accelerator (ISAC) facility. Decay from ^{47}K (I=1/2) into the isobaric analog state is energetically forbidden, but instead 80% of the decays proceed via an isospin changing branch to a single I=1/2 state. The recoil asymmetry is made nonzero by the product of the Gamow-Teller and isospin-suppressed Fermi matrix elements, an effect we measured at TRINAT in order to test analog-antianalog isospin mixing.

We discuss the experiment and resulting magnitude of the Coulomb mixing of the candidate antilog $1/2^+$ final state with the unbound isobaric analog resonance of ^{47g}K. Our measurement was carried out by trapping approximately 10^3 laser-polarized ^{47}K ($t_{1/2}$ = 17.5 $\pm$ 0.24 s) atoms at a time over the course of approximately one day.

A future measurement of $DI \cdot v_\beta \times v_\nu$ would have enhanced sensitivity to isospin-breaking, parity even, T-odd interactions, since they would be referenced to the Coulomb interaction. Furthermore, constraints from the neutron EDM on D [Ng, Tulin PRD 2012] are relaxed for such isospin-breaking interactions.

Authors: GORELOV, Alexandre (TRIUMF); VARGAS-CALDERON, Brayden (Texas A&M); Dr KOOTTE, Brian (TRIUMF); LUKTUKE, Chaitanya (University of Waterloo and TRIUMF); MELCONIAN, Dan (Cyclotron Institute and Texas A&M University); GALLOP, Hannah (University of Waterloo and TRIUMF); MCNEIL, James (University of British Columbia and TRIUMF); BEHR, John; Dr KLIMO, Jozef (Texas A&M)

Presenter: Dr KOOTTE, Brian (TRIUMF)

Session Classification: Plenary