Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **2413** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

Anti-neutrino Energy Spectrum and Ground State Branching Ratio of Laser Trapped $^{92}Rb \rightarrow {}^{92}Sr\beta^{-}\bar{\nu}_e$

Monday 3 June 2019 14:00 (15 minutes)

Reactor neutrino oscillation experiments observe two anomalies in anti-neutrino energy spectra: a total deficit of events, and an event excess in the 5-7 MeV range compared to theory. A total deficit in anti-neutrino flux may support a non-SM sterile neutrino, but both discrepancies may result from inadequate understanding of the reactor fuel cycle. In the 5-7 MeV range first-forbidden $0^- \rightarrow 0^+$ decays account for 30% of the total anti-neutrino ($\bar{\nu}_e$) flux, with ^{92}Rb ground-state to ground-state branch (GSB) alone accounting for 30-50% of $0^- \rightarrow 0^+$ $\bar{\nu}_e$ flux. Model predictions will be improved by measuring the $\bar{\nu}_e$ energy spectra from ^{92}Rb decay, and measuring the strong GSB ratio with projected 2% accuracy and independent systematics to traditional total absorption spectrometers. Using the TRINAT neutral atom trap, and measured momenta of beta and recoiling ^{92}Sr daughter, kinematic reconstruction of $\bar{\nu}_e$ energy spectra, decay Q-value, GSB ratio, and beta-neutrino angular correlation coefficient $a_{\beta\nu}$ are examined experimentally.

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Session Classification: M2-2 Fundamental Symmetries (DNP) | Symétries fondamentales (DPN)

Track Classification: Nuclear Physics / Physique nucléaire (DNP-DPN)