Contribution ID : **93** Type : **Nuclear and Particle Astrophysics**

Bound-State Beta-Decay Rate of 205Tl

Wednesday, 10 February 2021 16:30 (15)

Bound-state beta-decay (β_b-decay) is an exotic β^--decay mode where the electron is emitted directly into a bound orbital (often K/L) of the daughter nuclei. Hence, the decay mode is only accessible to highly charged ions with no electrons (HCIs). Thallium-205 is an interesting stable neutral ion, whilst being unstable to β_b-decay as a bare ion. This instability at high charge states could cause a branching point just before the termination of the slow neutron capture process. In addition, the capture of solar-neutrinos onto 205Tl to produce 205Pb is the lowest energy threshold neutrino-induced reaction known. The geochemical activation experiment LOREX (LORandite EXperiment) aims to calculate the integrated solar neutrino flux from this reaction in thallium bearing Lorandite. The nuclear matrix element of this reaction is currently unknown but identical to the β_b-decay matrix element.

The experiment was conducted at the GSI Helmholtz Centre, Darmstadt, Germany during March 2020. A 400 MeV/u 205Tl beam was produced by the Fragment Separator (FRS) and stored in the Experimental Storage Ring (ESR). During storage, the beam is electron cooled and monitored by resonant Schottky detectors that identify ion species by their revolution frequency in the ring. Growth of the $^{205}Pb^{82+}$ signal in the ring over time is directly attributable to β_b-decay. The authors aim to present the motivation, storage ring methods, and some preliminary results.

email address

gleckenby@triumf.ca

Please select: Experiment or Theory

Experiment

Primary author(s) : Mr LECKENBY, Guy (TRIUMF); Dr DILLMANN, Iris (TRIUMF); Dr GRIFFIN, Chris (TRIUMF)

Presenter(s) : Mr LECKENBY, Guy (TRIUMF)