Contribution ID: **43** Type: **Poster**

Feasibility of recoil distance lifetime measurements using transfer reactions at T-REX/ISS

Thursday 5 December 2019 12:36 (1 minute)

The Recoil Distance Doppler-Shift (RDDS) technique [1] has become a well established method of measuring the lifetimes of excited nuclear states. A two-foil plunger allows excited nuclei to radiate either one of two velocities. This results in two γ-ray energies associated with each transition due to the Doppler shift in energy. The relative intensity of each of these components can then be used to calculate the lifetime of the state. Such devices typically use fusion evaporation reactions to produce the nuclei of interest.

The feasibility of a plunger device that would allow for RDDS lifetime measurements to be made in conjunction with transfer reactions within T-REX or ISS is investigated. This would allow for selection on beam-like and recoil-like events. A similar plunger device is already used with the CLARA and PRISMA spectrometers [2] that allows for lifetimes to be probed using transfer reactions. Performing transfer reactions with a plunger would allow for model independent measurement of transition rates between excited nuclear states in neutron rich nuclei. Transition rates currently obtained from such reactions at ISOLDE are dependent on the choice of optical model used, as they are calculated from the deduced wavefunctions of the nuclear states.

The ability to perform transfer reactions in conjunction with a plunger device would allow for lifetimes of excited nuclear states within neutron rich nuclei to be probed. Examples of lifetime measurements that would be a motivation for developing such a device are also presented.

[1] Dewald, A., O. Möller, and P. Petkov. Progress in Particle and Nuclear Physics 67, no. 3 (2012): 786-839.
[2] J.J. Valiente-Dobón et al. Physical Review Letters, 102 (2009), p. 242502

Authors: BARBER, Liam (University of Manchester); CULLEN, David Matthew (University of Manchester (GB))

Presenter: BARBER, Liam (University of Manchester)

Session Classification: Poster Session