

Contribution ID: 154 Type: Oral

Measuring the 40 K Feeding to the Ground State of 40 Ar

Experimental nuclear physicists are well acquainted with the ubiquitous 1461 keV background γ ray from the first-forbidden unique electron-capture decay of 40 K to 40 Ar. The third-forbidden unique beta decay to the 40 Ca ground state is also well known. Not so well known is the third-forbidden unique electron-capture decay channel directly to the 40 Ar ground state. This small decay branch has never been directly measured. Predicted intensities and experimental upper limits are highly variable (0-0.8%). This decay channel can be an important background for many rare-event searches, (such as DAMA, ANAIS-112, COSINE-100, SABRE, COSINUS, etc...). This exotic decay branch is also a limiting factor in 40 K based geochronological dating. The KDK (Potassium (K) Decay (DK)) experimental group is an international collaboration dedicated to perform the first measurement of this undetected 40 K decay branch. The KDK group has created an enriched 40 K source that the low-energy x rays can escape, built a silicon drift detector to measure the x rays, and integrated both into a highly efficient γ -ray detector, Oak Ridge National Laboratory's Modular Total Absorption Spectrometer (MTAS).

The KDK setup has been calibrated, tested, and the enriched 40 K source was measured for 45 days. We report on the experimental details and the current state of analyzing the unblinded KDK data.

Primary author: RASCO, Bertis (Oak Ridge National Laboratory)

Presenter: RASCO, Bertis (Oak Ridge National Laboratory)

Session Classification: Poster Session

Track Classification: Poster Presentations