



## DoNuTS Technical Meeting

**Time:** 1600 Wednesday, 30 September 2009

**Place:** NE Conference Room, 1106 Etcheverry

**Speaker:** Chris Angell, UC Berkeley Nuclear Engineering

**Subject:** Basic Measurements with Applications in Nuclear Security

As part of the Domestic Nuclear Threat Security (DoNuTS) project, basic measurements are made to obtain data needed for applications in homeland security and reactor design. Activities are split into two main components: Surrogate reactions and nuclear resonance fluorescence (NRF).

Surrogate reactions are used to obtain neutron fission cross sections on unstable nuclei needed for reactor design. The same compound nucleus as in the reaction of interest is formed in the surrogate by using a direct reaction. In a recent experiment, the surrogate of  $^{232}\text{Th}(^3\text{He}, ^3\text{He}' f)$  was used in place of  $^{231}\text{Th}(n, f)$ . A ratio is used to a known nucleus, in this case  $^{236}\text{U}(^3\text{He}, ^3\text{He}' f)$  to normalize to the known  $^{235}\text{U}(n, f)$  cross section. The results of this experiment will be presented.

In NRF, specific states in a nucleus are fluorescently excited with  $\gamma$  rays, and provide a unique signature of the nucleus. NRF can be used for both assaying and detection of actinides. The basics of NRF will be presented, as well as results from a recent NRF measurement on  $^{237}\text{Np}$ . Plans for upcoming experiments will be discussed, highlighting areas for student involvement.