A measurement of 74,76Ge(3He,n)

An observation of neutrinoless double beta decay (0v2b) would give incredible information about the neutrino. The observation alone would indicate that neutrinos are Majorana, but other important information - such as the absolute mass scale of the neutrinos, depends on the nuclear matrix elements (NME) of the decaying nucleus. Significant effort has been expended toward calculating the NME's needed by the 0v2b community, but different methods disagree with each other by as much as 60%. Data is badly needed to help check the many theoretical models currently employed to understand the nuclei used in 0v2b searches. Particularly useful are the angular distributions of single nucleon transfer reactions, which are sensitive to level occupancies, and two-nucleon transfers, which are sensitive to nucleon correlations. Several candidate nuclei have been studied, and work on Ge has been extensive: relevant single particle transfers have been measured, as well as two-neutron transfers. The two-proton transfer reaction 74,76Ge(3He,n) has not been measured yet, partly because facilities able to provide both a time-bunched 3He beam at favorable energies and appropriate neutron detectors are rare. Our group has been able to measure the angular distribution of the 74,76Ge(3He,n) reaction at Notre Dame's Nuclear Structure Laboratory by adding a cosmic ray veto to existing neutron detectors. I will discuss some useful lessons learned from the detector development and also present some preliminary results of the experiment.