Abstract Submitted
for the DNP15 Meeting of
The American Physical Society

Population of ^{13}Be with a Nucleon-Exchange Reaction[1] BRADON MARKS, PAUL DEYOUNG, Hope College, JENNA SMITH, MICHAEL THOENNESSEN, NSCL/MSU, MONA COLLABORATION — Neutron-unbound nuclei are traditionally formed by the removal of one or more nucleons from a fast beam of ions. This method often results in a background, which is difficult to separate from the particle of interest. Nucleon-removal entrance-channels also require the ion beam to be more massive than the particle of interest, which presents the additional challenges of the beam being difficult to make. The present work was done with a nucleon-exchange entrance channel. At the National Superconducting Cyclotron Laboratory, a 71 MeV/u ^{13}B beam impinged on a 47 mg/cm^2 thick target of ^{9}Be. As a result numerous reactions occurred, including the population of ^{13}Be through the nucleon-exchange entrance-channel. The ^{13}Be nuclei decayed to ^{12}Be and one neutron in approximately 10^{-21} seconds. The resulting neutrons were detected by either the Modular Neutron Array (MoNA) or the Large multi-Institution Scintillator Array (LISA), while the ^{12}Be nuclei were directed through an array of charged particle detectors by a 4T superconducting sweeper magnet. The four-momentum vectors of the fragment nucleus and the neutron were calculated to determine the decay energy of ^{13}Be. Monte-Carlo simulations consistent with results from previous analyses of ^{13}Be were satisfactorily fit to the decay-energy spectrum. Additionally, the cross-section for the nucleon-exchange entrance-channel is consistent with a theoretical prediction.

[1]This material is based upon work supported by the National Science Foundation under grant No. PHY-1306074.

Bradon Marks
Hope College

Date submitted: 31 Jul 2015 Electronic form version 1.4