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Unbound States of Neutron-Rich Oxygen Isotopes: Investigation into the N=16 Shell Gap[1] C. HOFFMAN, S.L. TABOR, FSU, T. BAUMANN, W.A. PETERS, H. SCHEIT, A. SCHILLER, M. THOENNESSEN, NSCL/MSU, N. FRANK, Concordia College, P.A. DEYOUNG, Hope College, J. HINNEFELD, IUSB, MONA COLLABORATION — The energy of the first excited state in ^{24}O and the ground state decay energy of ^{25}O have been measured for the first time. Due to the lack of observation of an excited state in ^{24}O using γ-ray spectroscopy, as well as the known unbound nature of ^{25}O, techniques involving neutron spectroscopy had to be used. ^{25}O (^{24}O*) was populated via proton (proton-neutron) removal from a ^{26}F beam. Break-up neutrons were detected by the Modular Neutron Array (MoNA) located at 0° relative to the beam direction. Charged fragments of desired rigidity were selected by a large-gap dipole (Sweeper) magnet and their properties were measured in the focal plane. Complete 4-vector reconstruction for neutrons and fragments at their break-up point revealed resonant energies of 750(50) keV and 840(30) keV for n-^{23}O and n-^{24}O coincidences respectively. Using the known neutron separation energy (S_n) of ^{24}O, its first excited state is calculated to be 4.45(40) MeV. These results are to be compared with current shell model predictions to aid in understanding of the N=16 shell gap.

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Calem Hoffman
FSU

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