Abstract Submitted
for the DNP10 Meeting of
The American Physical Society

Microscopic study of heavy-ion reactions with n-rich nuclei: dynamic excitation energy and capture[1] VOLKER OBERACKER, A.S. UMAR, Vanderbilt University — Heavy-ion reactions at RIB facilities allow us to form new exotic neutron-rich nuclei. These experiments present numerous challenges for a microscopic theoretical description. We study reactions between neutron-rich ^{132}Sn nuclei and ^{96}Zr within a dynamic microscopic theory, and we compare the properties to those of the stable system ^{124}Sn+^{96}Zr. The calculations are carried out on a 3-D lattice using the density-constrained Time-Dependent Hartree-Fock (DC-TDHF) method [1- 3]. In particular, we calculate the dynamic excitation energy $E^*(t)$ and the quadrupole moment of the dinuclear system $Q_{20}(t)$ during the initial stages of the collision. Regarding the heavy-ion interaction potential $V(R)$, we find that the fusion barrier height and width increase dramatically with increasing beam energy. The fusion barriers of the neutron-rich system ^{132}Sn+^{96}Zr are systematically 1-2 MeV higher than those of the stable system. Large differences (9 MeV) are found in the interaction barriers of the two systems. Capture cross sections are analyzed in terms of dynamic effects and a comparison with recently measured capture-fission data is given. [1] Umar and Oberacker, PRC 76, 014614 (2007). [2] Umar, Oberacker, Maruhn, and Reinhard, PRC 80, 041601(R) (2009). [3] Umar, Maruhn, Itagaki, and Oberacker, PRL 104, 212503 (2010).

[1]Supported by DOE grant DE-FG02-96ER40963

Volker Oberacker
Vanderbilt University

Date submitted: 09 Jun 2010 Electronic form version 1.4