

Abstract Submitted
for the DNP08 Meeting of
The American Physical Society

Sorting Category: 11. (T)

Neutron Transfer Dynamics and Doorway to Fusion in TDHF Theory¹ SAIT UMAR, VOLKER OBERACKER, Vanderbilt University — Within the time-dependent Hartree-Fock (TDHF) theory, we analyze in detail the mass exchange in the vicinity of the Coulomb barrier for heavy-ion collisions involving neutron-rich nuclei. Two examples are considered: $^{16}\text{O} + ^{24}\text{O}$ and $^{40}\text{Ca} + ^{96}\text{Zr}$. Specifically, we study the neutron densities of the neutron-rich nucleus as a function of time, and we examine the neutron single-particle probabilities long after the recoil. In the $^{16}\text{O} + ^{24}\text{O}$ reaction, most of the mass transfer originates from the $2s_{1/2}$ neutron state of ^{24}O . In the $^{40}\text{Ca} + ^{96}\text{Zr}$ reaction, the $2d_{5/2}$ state in ^{96}Zr dominates the mass transfer, in particular the magnetic substates with the most positive quadrupole moments. We find that the potential barriers seen by individual single-particle states can be considerably different than the effective barrier of the ion-ion potential. Hence, we observe a substantial transfer probability even at energies below the effective fusion barrier. Ref. 1: A.S. Umar, V.E. Oberacker, and J.A. Maruhn, *Eur. Phys. J A* (2008), in print

¹Supported by DOE grant DE-FG02-96ER40963.

Prefer Oral Session
 Prefer Poster Session

Sait Umar
umar@compsci.cas.vanderbilt.edu
Vanderbilt University

Date submitted: 25 Jun 2008

Electronic form version 1.4