Abstract Submitted
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Neutron Transfer Dynamics and Doorway to Fusion in TDHF Theory[1] 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: 16O + 24O and 40Ca + 96Zr. 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 16O + 24O reaction, most of the mass transfer originates from the 2s1/2 neutron state of 24O. In the 40Ca + 96Zr reaction, the 2d5/2 state in 96Zr 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

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Sait Umar
Vanderbilt University

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