

Abstract Submitted
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Density-constrained TDHF calculation of fusion cross sections for neutron-rich nuclei¹ VOLKER OBERACKER, SAIT UMAR, Vanderbilt University — The density-constrained TDHF method [Ref. 1] is a fully microscopic theory for calculating heavy-ion interaction potentials and fusion cross sections below and above the fusion barrier. The only input into the theory is the effective NN interaction (Skyrme force). There are no adjustable parameters. The method is based on the TDHF evolution of the nuclear system slightly above the fusion barrier, coupled with density-constrained Hartree-Fock calculations. This approach incorporates all of the dynamical entrance channel effects such as neck formation, particle transfer, internal excitations and dynamical deformation effects. We will discuss applications to neutron-rich systems ($^{64}\text{Ni}+^{132}\text{Sn}$, $^{64}\text{Ni}+^{64}\text{Ni}$, $^{40}\text{Ca}+^{96}\text{Zr}$). Several prescriptions for calculating the coordinate-dependent mass parameters (effective mass, dynamical reduced mass) within the DC-TDHF method will be presented, and we examine their influence on the total fusion cross section. Ref. 1: A.S. Umar and V.E. Oberacker, PRC 77, 064605 (2008)

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