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Fusion of neutron-rich systems using time-dependent density-constrained DFT[1] VOLKER OBERACKER, A.S. UMAR, Vanderbilt University — In connection with experiments at Radioactive Ion Beam Facilities, we study fusion reactions with a new approach [1] which is based on a time-dependent density-constrained density functional theory (DFT). The only input is the Skyrme NN interaction, there are no adjustable parameters. We calculate heavy-ion interaction potentials $V(R)$, mass parameters $M(R)$, and total fusion cross sections. Some of the effects naturally included in these calculations are: neck formation, mass exchange, internal excitations, deformation effects, as well as nuclear alignment for deformed systems. Results will be presented for low-energy fusion reactions of ^{12}C+^{16,24}O and for ^{16,24}O+^{16,24,28}O which occur in the crust of neutron stars [2]. Finally, we will discuss fusion with neutron-rich halo nuclei, in particular ^{11}Li+^{208}Pb.

[1] Umar and Oberacker, PRC 74, 021601(R) (2006)
[2] Umar, Oberacker, and Horowitz, PRC 85, 055801 (2012)

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