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Direct Neutron Capture Calculations with Covariant Density Functional Theory Inputs[1] SHI-SHENG ZHANG, Beihang Univ. and ORNL, JIN-PENG PENG, Beihang Univ., MICHAEL S. SMITH, GORAN ARBANAS, ORNL, RAY L. KOZUB, Tennessee Technological Univ. — Predictions of direct neutron capture are of vital importance for simulations of nucleosynthesis in supernovae, merging neutron stars, and other astrophysical environments. We calculate the direct capture cross sections for E1 transitions using nuclear structure information from a covariant density functional theory as input for the FRESCO coupled-channels reaction code. We find good agreement of our predictions with experimental cross section data on the double closed-shell targets ^{16}O, ^{48}Ca, and ^{90}Zr, and the exotic nucleus ^{36}S. Extensions of the technique for unstable nuclei and for large-scale calculations will be discussed.

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