# A new and consistent approach to deal with Pauli-blocking mechanism in nuclear reactions via intranuclear cascade processes

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The dynamical Pauli-blocking mechanism at multiple nucleon-nucleon scattering in nuclear reactions is investigated via the multicollisional Monte Carlo (MCMC) intranuclear cascade model. Differently from other transport models so far used, which are based on a randomly generated nuclear ground state with a stochastic treatment of the Pauli-blocking, our model incorporates a shell-structured nuclear ground state where each nucleon is assigned to a single quantum state. The transition between the pre-equilibrium and evaporation phases is energetically determined, allowing the description of the cascade process without any free-parameter, such as some ambiguous stopping time parameters adopted in similar time-structured cascade models. The occupation number distribution after the cascade is calculated and propitiates a stringent test of confidence for our Pauli-blocking mechanism since the long-standing spurious depletion of the Fermi-sphere, usually present in other cascade models, no longer shows up. The quasideuteron channel is investigated, and we have found a blocking factor for the photoabsorption mechanism which is in overall agreement with previous results based on Fermi gas level-densities calculations. Experimental data of neutron multiplicities for Sn, Ce, Ta and Pb in the 20-140 MeV range are described fairly well by our model.

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