

Effect of effective interaction potentials used in quantum molecular dynamics on nucleon-induced reactions

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A quantum molecular dynamics (QMD) model is applied to investigate the light-ion production in nucleon-induced reactions. The JQMD [1] code is employed and the generalized evaporation model (GEM) [2] is used to account for statistical decay processes after the QMD stage. In order to improve the ground state properties of the created nucleus new effective interactions [3, 4] are added to the original JQMD ones. A phenomenological Pauli potential is introduced to reproduce the fermionic nature of the nucleons, a momentum-dependent interaction is included in order to simulate the energy dependence of the optical potential, and finally the Yukawa potential is incorporated into the Hamiltonian for more realistic description of the nuclear properties. The results show an improvement of the ground state properties of the nuclei in comparison with the original JQMD ones. The effect of the newly added effective interactions on the total reaction cross sections and differential cross sections of light-ion production in nucleon-induced reactions are also investigated.

- [1] K. Niita, S. Chiba, T. Maruyama, T. Maruyama, H. Takada, T. Fukahori, Y. Nakahara and A. Iwamoto, Phys. Rev. C **52**, 2620 (1995).
- [2] S. Furihata, Nucl. Instrum. Methods Phys. Res. B **171**, 251 (2000).
- [3] G. Peilert, J. Konopka, H. Stöcker, W. Greiner, M. Blann and M. G. Mustafa, Phys. Rev. C **46**, 1457 (1992).
- [4] T. Maruyama, K. Niita, K. Oyamatsu, T. Maruyama, S. Chiba, and A. Iwamoto, Phys. Rev. C **57**, 655 (1998).