

Dynamical fusion threshold in time-dependent Hartree-Fock theory

Lu Guo^{1,2}, Takashi Nakatsukasa², Cédric Simenel³

¹ University of Chinese Academy of Sciences, Beijing 100190, China

² RIKEN Nishina Center, Hirosawa, Wako-shi, Saitama 351-0198, Japan

³ Department of Nuclear Physics, RSPE, Australian National University, Canberra, ACT 0200, Australia

Abstract. We investigate dynamical fusion threshold systematically in the framework of the fully three-dimensional time-dependent Hartree-Fock theory [1-3] with a Skyrme energy density functional. The dynamical fusion threshold in our calculations agrees quite well with the experimental fusion barrier. We find that an extra push energy over Coulomb barrier is necessary in order to make the heavy systems fuse. Our predictions of extra push energy compared with other theoretical models is in a better agreement with the experiments. The mechanism of extra push in fusion reactions are revealed microscopically for the first time to be the competition between fusion and fission barriers [4].

References

- [1] Umar A S and Oberacker V E 2006 *Phys. Rev. C* **74** 021601(R)
- [2] Guo Lu, Maruhn J A, Reinhard P G, and Hashimoto 2008 *Phys. Rev. C* **77**, 041301(R)
- [3] Simenel C and Chomaz Ph 2009 *Phys. Rev. C* **80** 064309
- [4] Guo Lu, Nakatsukasa Takashi, Simenel Cédric, *in preparation*