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Spontaneous fission half-life with improved collective inertia

Spontaneous fission is one of the primary decay modes in heavy and superheavy nuclei. A large uncertainty in theoretical estimates of the fission half-life is a well-known, long-standing problem. In the description of the energy density functionals [1,2], the collective inertia along the fission path has been evaluated using the so-called cranking approximation that ignores dynamical residual effects.

Recently, we have developed a framework of the local quasiparticle random-phase approximation (QRPA) to evaluate the collective inertia in fission that includes the dynamical residual effects and applied it to the description of spontaneous fission [3,4]. We will report our result of spontaneous fission study with the improved collective inertia and recent progress of the description of spontaneous fission in multi-dimensional collective space.

[1] A. Baran et al., Phys. Rev. C 84, 054321 (2011).

[2] J. Sadhukhan et al, Phys. Rev. C 88, 064314 (2013).

[3] K. Washiyama, N. Hinohara, T. Nakatsukasa, Phys. Rev. C 103, 014306 (2021).

[4] K. Washiyama, EPJ Web of Conf. 306, 01026 (2024).

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