



Nuclear Theory

Sub-barrier capture with quantum diffusion approach: actinide-based reactions

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With the quantum diffusion approach the behavior of capture cross sections and mean-square angular momenta of captured systems are revealed in the reactions with deformed nuclei at subbarrier energies. The calculated results are in a good agreement with existing experimental data. With decreasing bombarding energy under the barrier the external turning point of the nucleus-nucleus potential leaves the region of short-range nuclear interaction and action of friction. Because of this change of the regime of interaction, an unexpected enhancement of the capture cross section is expected at bombarding energies far below the Coulomb barrier. This effect is shown its worth in the dependence of mean-square angular momentum of captured system on the bombarding energy. From the comparison of calculated and experimental capture cross sections, the importance of quasifission near the entrance channel is shown for the actinide-based reactions leading to superheavy nuclei.

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