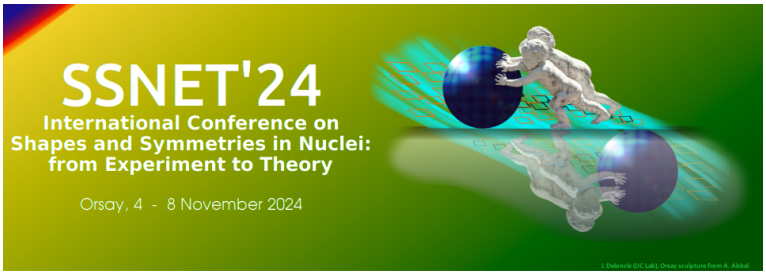

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Unraveling the Role of Pairing Interactions in Actinide Nuclear Fission

vendredi 8 novembre 2024 11:30 (20 minutes)

Abstract:
Nuclear fission is a crucial process at the heart of contemporary nuclear technology. Pairing interactions are the most important residual interactions beyond the mean-field framework, profoundly influencing the characteristics of the fissioning nucleus and the resulting fission products. For instance, the amount of pairing interactions strongly influences quantities such as spontaneous fission lifetimes, the shape of the barriers separating the ground state from scission, and fission fragment distributions.

In this presentation, we will present a comprehensive study on the fission process in Th, U, Pu, and Cm isotopes using a Yukawa-Folded mean-field plus standard pairing model. Our study provides an accurate description of pairing interactions in nuclear fission, avoiding the artificial effects produced by the BCS calculation. The analysis focuses on the effects of pairing interactions on fission barriers, static fission paths, total kinetic energy, mass distributions, and fission half-lives. The potential energy surface calculations are based on the macroscopic-microscopic model framework, with shape descriptions during fission using the Fourier series expansion method. Utilizing the three-dimensional collective model within the Born-Oppenheimer approximation (BOA), we analyze the impact of pairing interactions on fission fragment mass distributions.

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