



Contribution ID: 74

Type: **not specified**

Effect of nucleon exchange on fission fragment angular momenta

Tuesday, 10 March 2026 16:00 (25 minutes)

This work was carried out in collaboration with Pavel Nadtochy, Christelle Schmitt, and Katarzyna Mazurek. It explores the role of nucleon exchange for the generation of the fission fragment angular momenta.

For a number of typical fission cases, samples of 10,000 shape evolutions were generated by Langevin simulation and, subsequently, for each of these evolutions, the nucleon exchange transport theory previously developed for damped nuclear reactions was applied, yielding the time development of the fragment spin-spin distribution within the Fokker-Planck transport framework.

The characteristic evolution of both parallel and perpendicular fragment spin components is discussed. A common feature is that the rotational modes fall out of equilibrium before scission because further nucleon exchange is being increasingly suppressed due to the shrinking neck, while the rapidly rising temperature causes the equilibrium fluctuations to keep growing.

A number of fission observables are extracted from these event ensembles: the distribution of the magnitude of the fragment spin and its orientation relative to the fission axis, as well as the correlation between the two spins and the distribution of their opening angle. The dependence of these observables on the mass asymmetry is also examined.

Type of contribution

Invited Speaker

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Session Classification: session 5 (Chair: S. Leoni)