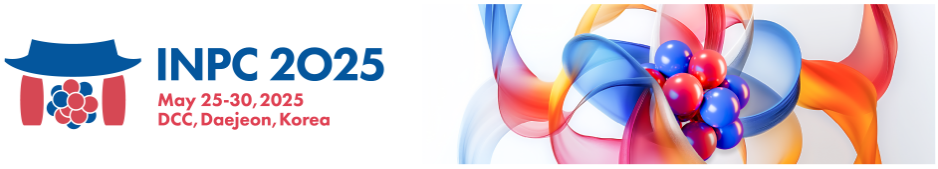

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Ternary fission analysis using Skyrme Energy density formalism

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The spontaneous disintegration of unstable nuclei encompasses various decay modes such as α-decay, spontaneous fission and ternary fission etc. Ternary fission, involving the simultaneous emission of three fragments, is a relatively rare phenomenon. An appropriate understanding of this process is essential for the incorporation of the dynamics of complex nuclear fragments emitted via heavy nuclei. These fragments play a pivotal role in the overall understanding of the decay dynamics and related properties of radioactive nuclei and may also contribute to the production of new isotopes near and beyond the drip line region. Experimental and theoretical studies show that ternary fission can occur as equatorial cluster tripartition (ECT) or collinear cluster tripartition (CCT) depending on the direction of the emitted third fragment with respect to the fission axis \cite{shell} . The spontaneous ternary emission was observed experimentally for ^{252}Cf nucleus \cite{exp}, where the isotopes of H, He, Li, Be, B, C, N, O, F, Ne, Na, Al, Mg are detected. Studies \cite{balu,exp} emphasize the observation of alpha particles as the predominant third fragment in ternary fission. The main reason for this radioactive splitting is the shell closure effect associated with the daughter nucleus. Hence, it will be of interest to explore the fragmentation behavior of the ternary decay mode of heavy nuclei by employing variety of nuclear potentials.\\
In order to understand the nuclear dynamics, selecting an appropriate nuclear interaction potential is crucial. Numerous theoretical models are introduced to explore fission dynamics based on different nuclear properties. The two most commonly used approaches for calculating nucleus-nucleus potentials are the phenomenological and microscopic methods. The phenomenological model approximates the nuclear interaction potential based on the closeness of the surfaces of interacting nuclei. Whereas, the microscopic approach treats the nuclei using a mean-field approximation where the total energy of a nuclear system is expressed as a function of the nucleon densities.
In the present study, an effort is focused on understanding the relevance of such approaches in the ternary decay mechanisms of the ^{252}Cf.

Primary authors: JINDAL, Chahat (Thapar Institute of Engineering and Technology, Patiala); Mr SHARMA, Manoj K (Thapar Institute of Engineering and Technology,Patiala)

Presenter: Mr SHARMA, Manoj K (Thapar Institute of Engineering and Technology,Patiala)

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