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## Fission decay modes of $^{254}\text{Fm}^*$ compound nucleus formed in $^{16}\text{O}+^{238}\text{U}$ reaction

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A thorough understanding of nuclear fission is still an arduous task due to its sudden transition from asymmetric to symmetric division, especially in the actinide mass region (near  $A=254$  to  $258$ ). Recently, an attempt has been made to see the effect of compact and elongated configurations of quadrupole ( $\beta_2$ ) deformed decay fragments on the spontaneous fission of  $^{242}$ - $^{260}\text{Fm}$  isotopes using preformed cluster model [1]. It has been observed that tip-to-tip (elongated) configuration results in the production of double-peaked (asymmetric) to triple-humped (multimodal) fission fragment mass distribution with an increase in neutron number of Fm isotopes. In the present work, Quantum mechanical fragmentation theory (QMFT) [2] based dynamical cluster-decay model (DCM) [3] is applied to analyze the possibility of multimodal fission modes of excited  $^{254}\text{Fm}$  compound nucleus produced in  $^{16}\text{O}+^{238}\text{U}$  nuclear reaction. The calculations are made at center-of-mass energy  $E_{c.m.} \approx 84$  MeV near the Coulomb barrier by considering  $T$ -dependent  $\beta_2$ -deformed compact as well as elongated configurations with optimum orientations. The competitive emergence of different symmetric [symmetric superlong (SL), symmetric supershort (SS)] and asymmetric [standard 1 (S1), standard 2 (S2), standard 3 (S3), superasymmetric (SA)] fission modes has been explored by studying the fragmentation potential and multi-humped peak of preformation yield  $P_0$  of  $^{254}\text{Fm}$ . The division of mass and charge in nuclear fission of  $^{254}\text{Fm}^*$  depicts the importance of spherical and deformed magic shell closures. The most energetic light (AL) and heavy (AH) decay fragments of aforementioned fission modes are identified. Moreover, the DCM-calculated fission cross-section and other depicted results show reasonable agreement with the experimental measurements of Ref. [4].

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