Cluster radioactivity of ^{294}Og

Objectives

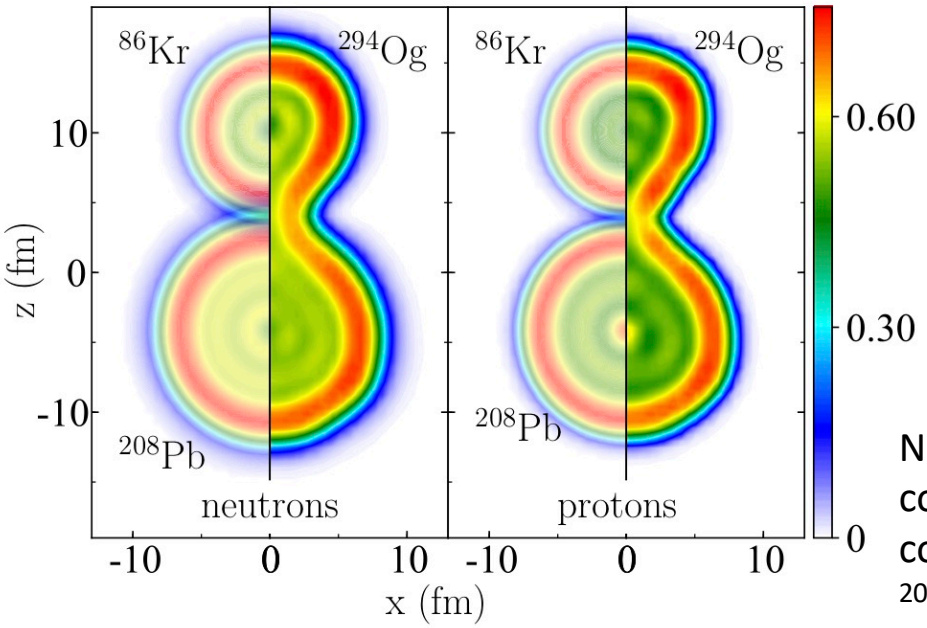
- According to theory, cluster radioactivity becomes an important decay mode in superheavy nuclei.
- We study the strongly asymmetric fission for ^{294}Og, which is currently the heaviest synthetic isotope known.
- Our theoretical approach incorporates important features of fission dynamics, including quantum tunneling and stochastic dynamics up to scission.

Impact

- We predict that the dominant spontaneous fission mode of ^{294}Og will be a highly asymmetric cluster emission sharply centered around doubly magic ^{208}Pb and magic ^{86}Kr.
- We show that despite appreciable differences in static fission properties such as fission barriers and spontaneous fission lifetimes, the prediction of cluster radioactivity in ^{294}Og is robust with respect to the details of calculations.
- The predicted enhanced asymmetric fission of ^{294}Og provides a trigger for future experimental searches of cluster decay in superheavy nuclei.

Accomplishments

- Publication: Z. Matheson, S. Giuliani, W. Nazarewicz, J. Sadhukhan, and N. Schunck, Phys. Rev. C 99, 041304(R) (2019)



Nucleon localization function for a highly deformed configuration of ^{294}Og for neutrons and protons. For comparison, localizations are shown for the prefragments ^{208}Pb and ^{86}Kr on the left side of each subplot.