Octupole shape phase transitions in neutron rich actinides within the covariant density functional theory

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Abstract

Octupole shape phase transitions and critical points of four isotopic chains of: Cm, Cf, Fm and No with neutron numbers $186 \leq N \leq 200$ are studied within the covariant density functional framework. The relativistic density dependent point coupling (DD-PC1) functional is used to calculate axially reflection - asymmetric quadrupole-octupole constrained energy surfaces. Spectroscopic observables related to order parameters are computed using a collective quadrupole - octupole Hamiltonian (QOCH). The results suggest quantum phase transitions from non-octupole to octupole deformed shapes and to octupole vibrations with increasing neutron number. ^{288}Cm is possibly close to the critical point of a simultaneous phase transition from spherical to prolate deformed and from non-octupole to stable octupole deformed configurations.

References

[1] Vaia Prassa, *European Physical Journal A* **58** (2022) 183.