



Nuclear Theory

Study of the neutron skin thickness of ${}^{208}\text{Pb}$ in mean field models

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We study whether the neutron skin thickness Δr_{np} of ${}^{208}\text{Pb}$ originates from the bulk or from the surface of the neutron and proton density distributions in mean field models. We find that the size of the bulk contribution to Δr_{np} of ${}^{208}\text{Pb}$ strongly depends on the slope of the nuclear symmetry energy, while the surface contribution does not. We note that most mean field models predict a neutron density for ${}^{208}\text{Pb}$ between the halo and skin type limits. We investigate the dependence of parity-violating electron scattering at the kinematics of the PREX experiment on the shape of the nucleon densities predicted by the mean field models for ${}^{208}\text{Pb}$. We find an approximate formula for the parity-violating asymmetry in terms of the central radius and the surface diffuseness of the nucleon densities of ${}^{208}\text{Pb}$ in these models.

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