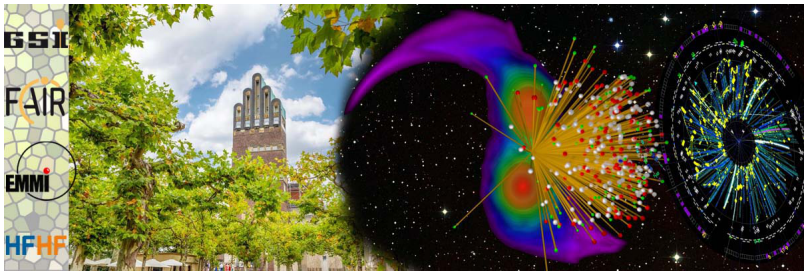

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Implications of CREX and PREX for energy density functionals

Wednesday, 20 September 2023 11:00 (30 minutes)

New insights into the nuclear symmetry energy and related formation of neutron skin in nuclei have been gained through recent precise parity-violating electron scattering experiments on ^{48}Ca (CREX) and ^{208}Pb (PREX-II). To understand the implications of these experiments for the nuclear energy density functionals (EDF), consistent investigation is required to address the nuclear matter symmetry energy and isovector properties of finite nuclei, including neutron skin thickness and dipole polarizability. Recently, the weak-charge form factors obtained from the CREX and PREX-II experiments have been employed directly to constrain the relativistic density-dependent point coupling EDFs [1]. Interestingly, the EDF established with the CREX data yields significantly smaller values for the symmetry energy parameters, neutron skin thickness, and dipole polarizability both for ^{48}Ca and ^{208}Pb, in comparison to the EDF obtained using the PREX-II data, as well as previously established EDFs [1]. Despite the valuable insights provided by CREX and PREX-II experiments, it is essential to assess why they do not offer consistent constraints for the isovector sector of the EDFs. Further theoretical and experimental investigations are necessary to improve our understanding of this aspect.

[1] E. Yuksel, N. Paar, "Implications of parity-violating electron scattering experiments on Ca-48 (CREX) and Pb-208 (PREX-II) for nuclear energy density functionals", Phys. Lett. B 836, 137622 (2023).

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