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Energy Density Functionals from First Principles

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Nuclear structure physics endeavors a robust and accurate description of the way an arbitrary number of nucleons self-organizes and gets disorganized in nuclei. To achieve this goal, nuclear physics has entered an era of reformulation of its standard phenomenological models into bona fide effective field theories (EFTs). However, the empirical microscopic model offering the best compromise between predictive power and numerical complexity - the so-called energy density functional (EDF) - has so far resisted all attempts of reformulation into an EFT. This presentation examines various attempts to derive the EDF approach from first principles.

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