
ENERGY DENSITY FUNCTIONAL

INSPIRED BY AN EFFECTIVE FIELD THEORY

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Inspired by an effective field theory for Fermi systems, we write the nuclear energy density functional (EDF) as a power expansion in the Fermi momentum k_F , or the cubic root of the density. With the help of pseudodata from microscopic calculations we fit the coefficients of the functional and demonstrate the low-order hierarchy of the expansion within a wide range of densities relevant for nuclei and neutron stars. The functional at low order can reproduce known or adopted values of nuclear matter near saturation, a range of existing microscopic results on asymmetric matter, and a neutron-star mass-radius relation consistent with observations [1].

Our approach leads to a transparent expansion of Skyrme-type EDFs and opens up many possibilities for future explorations in nuclei and homogeneous matter.

REFERENCES

- [1] Panagiota Papakonstantinou, Tae-Sun Park, Yeunhwan Lim, Chang Ho Hyun, to be submitted.