

Nuclear energy functional

KEY FEATURE OF MODELS OF MANY-BODY SYSTEMS

1. SCOTT BOGNER: MICROSCOPICALLY BASED NUCLEAR ENERGY DENSITY FUNCTIONALS:

Density Functional Theory – the only way for treating medium and heavy nuclei

Effort to build a universal energy density functional in the form of a generalized Skyrme functional

Role of chiral effective field theory (EFT) and renormalisation group methods (RG and SRG) in this project

2. JORGE PIEKAREWICZ: NUCLEAR PHYSICS OF NEUTRON STARS:

Constraints on nuclear energy functionals from properties of neutron stars (high and low density) through the Equation of State

Suggestions of future experiments to provide even more powerful data for improvement of models of high density nuclear matter.

3. WILL NEWTON: SKYRME ENERGY FUNCTIONAL APPLIED TO NEUTRON STAR CRUST
SELF-CONSISTENTLY IN 3D AND FINITE TEMPERATURE:

Report of on the first Hartree-Fock treatment of the neutron star crust in three dimensions and finite temperature with a quadrupole constraint.

Variety of exotic shapes in the pasta phase and the transition to homogeneous nuclear matter, emerging naturally in this model, in dependence on density, temperature and the choice of the Skyrme
Discussion of the numerical method – shell effects

4. JUNCHEN PEI: COORDINATE SPACE HFB CALCULATION OF WEAKLY BOUND AND VERY DEFORMED SYSTEMS:

Treatment of mean field and pairing in systems which properties are affected by coupling to the continuum

Novel high accuracy computational method:

2D lattice Skyrme-HFB based on B-splines

Application to exotic systems: halos and extremely elongated fissioning nuclei