From the crust to the core of Neutron stars with Quark-meson coupling model

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The Neutron star physics has been going through some remarkable progress in the recent years, with much more yet to come through the novel observations and data on these natural 'laboratories' of cold dense matter. To describe them, we are introducing the quark-meson coupling (QMC) model [1] where nuclear medium effects are treated through modification of the internal structure of the nucleon. Within this novel approach the QMC EDF depends on a single set of only four adjustable parameters, which have clear physical basis, and give results of similar quality as the (non)relativistic MF models or EDF approaches. The model was already successfully applied to the ground state calculations of finite nuclei [2] and to predict the cold non-rotating neutron stars properties [3].

The latest advances of QMC model will be presented when applied to the NS physics, starting from the nuclei sequence calculation for NS outer crust, elaborating on the challenges to describe the inner crust and going up to the high densities in the cores of todays heaviest known neutron stars, exploring the insights for the QMC model coming from GW measurements [4].

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