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Symmetries and Ultra Dense Matter of Compact Stars II: Emergence of Symmetries in Strong Nuclear Correlations

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Message from the Guest Editor

Dear Colleagues,

In going from dilute baryonic systems to super dense astrophysical systems on the verge of gravitational collapse, ranging from few-nucleon nuclei to infinite nuclear matter to superdense compact star matter, one moves, in pursuing the strong interaction QCD with its UV completion, from pionless effective theory with nucleons only to chiral effective field theory with nucleons and pions, until the latter breaks down at densities near (2–3) times the normal nuclear matter density n_0. The mass scale for the breakdown is of the lowest vector mesons \rho, \omega, and the dilaton with emergent local and global symmetries, respectively. At this scale, it is futile to bring in the microscopic degrees of freedom of QCD. This cross-over regime is, at present, more or less totally unknown. And this is the regime that this Special Issue will address. It will involve various hidden symmetries, some explicitly associated with the gauge theory QCD, but more likely emergent in the strong nuclear correlations involving the relevant degrees of freedom in the background of a sliding vacuum...

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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