Statistical measure of complexity in Compact Stars with global charge neutrality

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December 12, 2012

The problem

- Recently, it has been suggested that a critical electrical field arises during the gravitational collapse of massive stars leading to a vacuum polarization. This, in turn, leads to the necessity of a reexamination of the gravito-electrodynamical properties of compact stars of the class of neutron stars.

- Due to recent proof of the impossibility of local charge neutrality by solving the coupled system of the general relativistic Thomas-Fermi-Einstein-Maxwell equations for the structure of neutron stars, we have calculated how the global neutrality hypothesis affects the order/disorder of these systems for a simple equation of state, using Information Theory. We show the relative preference of global neutrality over local in terms of the obtained information content of the systems under consideration.

Results

- It seems that the global charge neutrality and the presence of strong interactions actually lower the disequilibrium of the star sequence in a way that the star tend to the ideal gas case in our intuition plot.
- If our full calculations validate this results to the entire sequence of stars, we could have a direct measure of the effects of the global charge neutrality via the methods of Information theory on the structure of neutron stars making these interactions and conditions more probable to be realized in nature.
- This work is in progress.

Thanks!