Abstract Submitted
for the DNP19 Meeting of
The American Physical Society

Parametric correlations in energy density functionals[1] A. TANINAH, S. E. AGBEMAVA, A. V. AFANASJEV, Mississippi State University, USA, P. RING, Technical University of Munich, Germany — Density functional theories (DFT) are defined by underlying functionals. Some of those functionals depend on substantial number of parameters. However, the parametric correlations between them have not been studied before. Using covariant DFT as an example and statistical tools, we study such correlations for major classes of covariant energy density functionals. These include the non-linear meson-nucleon coupling (NL) model, the density dependent meson-exchange (DD-ME) model and point coupling (PC) model. Their functionals are defined by properties of spherical nuclei and nuclear matter properties. It turn out that parametric correlations exist between a number of parameters in all of those functionals. For example, linear parametric correlations exist between the g_2 and g_3 parameters which are responsible for the density dependence in the NL model [1]. Observed correlations effectively reduce the number of independent parameters to five or six dependent on the structure and the underlying physics of the functional. Thus, this is how many independent parameters could be defined in the CDFT using fitting protocols based on ground state and nuclear matter properties.

[1] S. E. Agbemava, A.V. Afanasjev, A. Taninah, Phys. Rev. C 99, 014318 (2019).

[1]This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics under Award No. DE-SC0013037.

Ahmad Taninah
Mississippi State University

Date submitted: 21 Jun 2019 Electronic form version 1.4