Contribution ID: **30** Type: **talk**

Homotopic Action: A Pathway to Convergent Diagrammatic Theories

Wednesday 22 January 2025 11:30 (45 minutes)

The major obstacle preventing Feynman diagrammatic expansions from accurately solving many-fermion systems in strongly correlated regimes is the series slow convergence or divergence problem. Several techniques have been proposed to address this issue: series resummation by conformal mapping, changing the nature of the starting point of the expansion by shifted action tools, and applying the homotopy analysis method to the Dyson-Schwinger equation. They emerge as dissimilar mathematical procedures aimed at different aspects of the problem. The proposed homotopic action offers a universal and systematic framework for unifying the existing—and generating new—methods and ideas to formulate a physical system in terms of a convergent diagrammatic series. It eliminates the need for resummation, allows one to introduce effective interactions, enables a controlled ultraviolet regularization of continuous-space theories, and reduces the intrinsic polynomial complexity of the diagrammatic Monte Carlo method. We illustrate this approach by an application to the Hubbard model.

Author: SVISTUNOV, Boris (University of Massachusetts Amherst)

Presenter: SVISTUNOV, Boris (University of Massachusetts Amherst)

Session Classification: Wednesday morning (Uwe-Jens Wiese mini-symposium part 1)