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A diagrammatic Monte Carlo root finding approach: The Homotopy Analysis Method applied to Dyson-Schwinger Equations TOBIAS PFEFFER, LODE POLLET, LMU Muenchen — Diagrammatic Monte Carlo is a promising tool to study quantum many-body models. This is because it does not suffer from the exponential scaling of the sign problem with the system's volume as it is the case in path integral Quantum Monte Carlo approaches. It is nevertheless not without its own challenges, notably the series convergence or the inherent difficulties in sampling and storing multi-dimensional objects like 4-point vertices in the skeleton approach. In this talk, we present the construction of a different series of diagrams for the diagrammatic Monte Carlo sampling in non-perturbative parameter regimes. The construction is based on the expansion of a root finding algorithm applied to the Dyson-Schwinger equations in terms of rooted tree diagrams. This method can tackle generic high-dimensional integral equations, avoids the curse of dealing with high-dimensional objects, and can be applied in the regime where a straightforward calculation of Feynman diagrams fails to give an answer. We show results for the simple though representative example of ϕ^4 theory in non-perturbative parameter regimes.

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