

ACMS Statistics Seminar

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154 Hurley Hall

3:30 PM – 4:30 PM



Diagrammatic Monte Carlo Methods for Open Quantum Systems

In reality, all quantum systems we study are coupled to uninteresting environment which we call bath, causing the system to exhibit some classical behaviour. In this talk, we aim to study the spin dynamics coupled to a harmonic bath. Such dynamics can be represented as a sum of infinite diagrams following a derivation that is similar to Feynman's methodology where each diagram stands for an integral. This sum can then be evaluated by sampling the diagrams using Monte Carlo. Afterwards, we introduce bold diagrams which are defined as the sum of many diagrams with similar structures. We will discuss how we can take advantage of bold lines to accelerate the computations and reduce the variance of Monte Carlo. In particular, we will consider a specific diagrammatic method called the inchworm method and some of its extensions. We will also reveal the limitations of the current method and point out some future directions.

The Department of Applied and Computational
Mathematics and Statistics

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