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Lattice Field Theory and the Sign Problem

* No prior knowledge of physics required.

The solution of many problems of theoretical physics is given by some integrals in a limit of infinitely many integration variables. Analytical expressions for such limits are scarce. Hence, numerical and computational methods are important. A leading computational approach is "computational lattice field theory", which uses the Monte Carlo method for the evaluation of integrals. In some cases, e.g., when some of the integrals are complex, the computational cost of this method becomes exponential. This situation is known as "the sign problem".

In the talk we will introduce lattice field theory from a mathematical and computational point of view, as well as the sign problem and possible resolutions thereof.