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Applying recursive numerical integration techniques for solving high dimensional integrals

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The error scaling for Markov Chain - Monte Carlo techniques (MC-MC) with N samples behaves like $\frac{1}{\sqrt{N}}$. This scaling makes it often very time intensive to reduce the error of calculated observables, in particular for applications in lattice QCD.
It is therefore highly desirable to have alternative methods at hand which show an improved error scaling. One candidate for such an alternative integration technique is the method of recursive numerical integration (RNI). The basic idea of this method is to use Gauss quadrature with Legendre polynomials and apply it iteratively to integrate over observable and Boltzmann weight.
In this talk we will present the application of such an algorithm to the topological rotor and the anharmonic oscillator and compare the error scaling to MC-MC results. In particular, we demonstrate that the RNI technique shows an error scaling in N that is at least exponential.

Author: Ms VOLMER, Julia (DESY Zeuthen)

Co-authors: Prof. GENZ, Alan (Washington State University); Dr AMMON, Andreas (OAKLABS GmbH); Dr LEÖVEY, Hernan (Humboldt-Universität zu Berlin); Dr JANSEN, Karl (DESY Zeuthen); Dr HARTUNG, Tobias (King's College London)

Presenter: Ms VOLMER, Julia (DESY Zeuthen)

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