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A first study of strong isospin breaking effects in lattice QCD using truncated polynomials

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Computing derivatives of observables with respect to parameters of the theory is a powerful tool in lattice QCD, as it allows the study of physical effects not directly accessible in the original Monte Carlo simulation. Prominent examples of this include the impact of the up-down quark mass difference and electromagnetic corrections. In this talk, I will present a new approach based on automatic differentiation to evaluate such derivatives to arbitrarily high orders. Particular emphasis will be placed on strong isospin-breaking effects and on the propagation of derivatives through the conjugate gradient algorithm in the computation of correlation functions. Finally, I will compare the computational cost of this method with that of the RM123 approach and with explicit strong isospin-breaking simulations.

Parallel Session (for talks only)

Algorithms and artificial intelligence

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