The complex structure of strong interactions in Euclidean and Minkowski space

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Breaking through the complexity of QCD in the Minkowski space-time

Friday 30 May 2025 10:00 (45 minutes)

This contribution concerns the complexity of the Hamiltonian formulation of QCD in the Minkowski spacetime. The talk will include suggestions for overcoming the issues using the front form of dynamics and eigenvalue equations for describing bound states of the quanta of quark and gluon fields, and a method for computing effective Hamiltonians in quantum field theory, called the renormalization group procedure for effective particles. The latter is meant to provide a mathematical relationship between the complex parton-model picture of hadrons, viewed as relativistic many-body systems, with their simple classification as mostly made of just two or three constituent quarks. An outline of the steps of the computational scheme for deriving the quark and gluon structure of hadrons is provided as a summary. For references, see K. Serafin, M. Gomez-Rocha, J. More, S.D. Glazek, Dynamics of heavy quarks in the Fock space, Phys. Rev. D, 109, 016017 (2024).

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