Title: The Quest for Solving Quantum Chromodynamics: the tensor network approach

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Abstract: <p>The strong interaction of quarks and gluons is described theoretically within the framework of Quantum Chromodynamics (QCD). The most promising way to evaluate QCD for all energy ranges is to formulate the theory on a 4 dimensional Euclidean space-time grid, which allows for numerical simulations on state of the art supercomputers. We will review the status of lattice QCD calculations providing examples such as the hadron spectrum and the inner structure of nucleons. We will then point to problems that cannot be solved by conventional Monte Carlo simulation techniques, i.e. chemical potentials and understanding the large amount of charge and parity symmetry violation. It will be demonstrated at the example of the 1+1 dimensional Schwinger model that tensor network techniques are able to overcome these problems opening thus a possible path for a solution also in QCD.</p>