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Quantum simulation/computation of non-Abelian gauge theories beyond 1D with finite resources

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Performing gauge theories'calculations by realizing their Hamiltonians in controllable quantum systems to complement existing methods like perturbation theory and quantum Montecarlo is promising and challenging endeavor. After a brief and partial review of current successes and challenges, I will focus on the task of achieving continuum limit calculation with finite resources. I will present an efficient scheme to allow to determine the running of the coupling in SU(N) gauge theories by computing the expectation value of plaquette operator for any regime of the coupling with finite resources. I will illustrate the results obtaining for pure SU(2) gauge theory on a minimal torus and discuss the application of the scheme in current quantum computers and tensor-network computations

Author: CELI, Alessio (Universitat Autònoma de Barcelona)

Presenter: CELI, Alessio (Universitat Autònoma de Barcelona)