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SU(2) hadrons on a quantum computer

Lattice gauge theories are relevant in many fields of physics, and simulations with quantum computers can become a powerful tool to study them, especially in regimes inaccessible to classical numerical methods. In particular, non-Abelian gauge theories, which among other things describe fundamental particles' interactions, are of great interest. In this talk I will discuss the first quantum simulation of a non-Abelian lattice gauge theory that includes dynamical matter. I will show how the theory is formulated in order to include colour degrees of freedom, and how this allows for the existence of baryons in the model, which do not exist in Abelian theories. A quantum computation of the low-lying spectrum of the model is performed on an IBM superconducting platform using a variational quantum eigensolver. This proof-of-concept demonstration was made possible by a resource-efficient approach in the design of the quantum algorithm, and lays out the foundation for further development of the field. This talk is based on arXiv:2102.08920.