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Advances in quantum simulation for nuclear physics[1]

ZOHREH DAVOUDI, University of Maryland, College Park

A vigorous program has formedin recent years in various scientific disciplinesto take advantage of near-term and future quantum-simulation and quantum-computing hardware to study complex quantum many-body systems, buildingupon the vision of Richard Feynman for quantum simulation. Such activities have started in nuclear physics recently, hoping to bring new and powerful experimental and computational tools to address a range of challenging problems in strongly interacting nuclear many-body systems. In this talk, I reviewa number of important developments, including proposals for simulating strongly interacting field theories with the goal of studying strong dynamics of quarks and gluons in the heart of matter, and for quantum computations of hadron and nuclear structure. The hardware technologies that are expected to enable both the analog simulations and the digital quantum computations of these problems will be enumerated, and their unique feature for applications in nuclear physicswill be outlined.

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