

UCLA Department of Physics & Astronomy

COLLOQUIUM

**Thursday, May 22nd at 4 p.m.
1-434 PAB**

Charting Quantum Frontiers: Unveiling Nature's Essence through First-Principles Simulation of Fundamental Forces

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The Standard Model of particle physics grapples with notable gaps, failing to elucidate critical aspects of our universe, such as the existence of dark matter and the intriguing baryon-antibaryon asymmetry. Unraveling the mysteries requires scrutinizing experimental data against Standard Model predictions, a task hindered by the intricate nonperturbative nature of the strong interaction. Classical simulation methods, like Euclidean lattice QCD, prove inadequate for many pertinent processes.

In this context, quantum computing emerges as a transformative force, holding the promise to revolutionize the simulation of Standard Model processes. This presentation provides a concise introduction to quantum computing before delving into recent advancements that pave the way for first-principles simulations of the non-perturbative dynamics within the strong interaction. Highlighting a few compelling outcomes, the discussion concludes with a forward-looking perspective on potential breakthroughs in the coming decade.

Refreshments at 3:30 p.m. on the PAB Patio. Undergraduates Welcome!