LABORATORY FOR ELEMENTARY-PARTICLE PHYSICS

LEPP Joint Seminar

John Preskill

Caltech

Simulating Quantum Field Theory with a Quantum Computer

Forthcoming exascale digital computers will further advance our knowledge of quantum chromodynamics, but formidable challenges will remain. In particular, Euclidean Monte Carlo methods are not well suited for studying real-time evolution in hadronic collisions, or the properties of hadronic matter at nonzero temperature and chemical potential. Digital computers may never be able to achieve accurate simulations of such phenomena in QCD and other strongly-coupled field theories; quantum computers will do so eventually, though I'm not sure when. Progress toward quantum simulation of quantum field theory will require the collaborative efforts of quantumists and field theorists, and though the physics payoff may still be far away, it's worthwhile to get started now. Today's research can hasten the arrival of a new era in which quantum simulation fuels rapid progress in fundamental physics.

Friday, April 12, 2019

1pm

401 Physical Sciences Bldg.