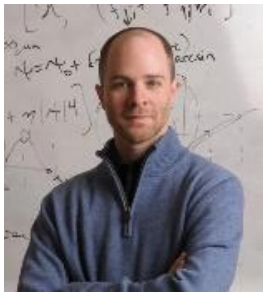
Prof. Lincoln D. Carr

Quantum Engineering Program
Department of Physics
Department of Applied Mathematics and Statistics
Colorado School of Mines, Golden, Colorado, USA

Friday, January 20, 11:00 am. Osborne A204

Quantum Solitons Surprise(s)



Solitons are particle-like robust solutions of nonlinear waves found in systems as diverse as the earth's oceans and lasers in fiber optics. Despite being thought of as a classical phenomenon, solitons are shown to be surprisingly persistent in quantum many-body systems. From multiscale media to strong interactions beyond mean field hydrodynamics to highly entangled states and the emergence of complexity and quantum advantage, solitons are ubiquitous in the quantum context. These case studies provided raise a number of intriguing mathematical and physical puzzles and bring into question our classical notions of solitons. Concrete examples will be provided as well as indicative experimental demonstrations on Google's quantum computer.

Short Bio

Lincoln D. Carr received his B.A. from the University of California, Berkeley, and his M.S. and Ph.D. in Physics from the University of Washington, Seattle. He is an IEEE Senior Member, a Fellow of the American Physical Society, a Kavli Fellow and a Jefferson Science Fellow of the National Academies of Sciences, Engineering, and Medicine, an Alexander von Humboldt Fellow, a National Science Foundation Distinguished International Fellow, and an Embassy Science Fellow of the U.S. Department of State. He is an Honors Faculty Fellow and Payne Institute for Public Policy Fellow at the Colorado School of Mines, where he is a Professor in the Quantum Engineering Program and the Physics Department, and a Graduate Faculty Advisor in the Applied Mathematics and Statistics Department. His research brings together complexity theory, quantum information science and engineering, education, condensed-matter physics, atomic, molecular, and optical physics, nonlinear dynamics, computational physics, and applied mathematics, pushing the frontiers of complexity theory in the quantum world. To date he has mentored over 100 students in research, received over 10 million in grant funding and fellowships, and published over 160 articles and books with over 16,000 citations. He has taught for over 25 years in science and engineering, social sciences, and the humanities on topics ranging from quantum physics and engineering to revolutions in science, literature, and society to science and engineering diplomacy.

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