SLAC COLLOQUIUM SERIES

Atoms and Photons: Quantum Technology meets Fundamental Physics

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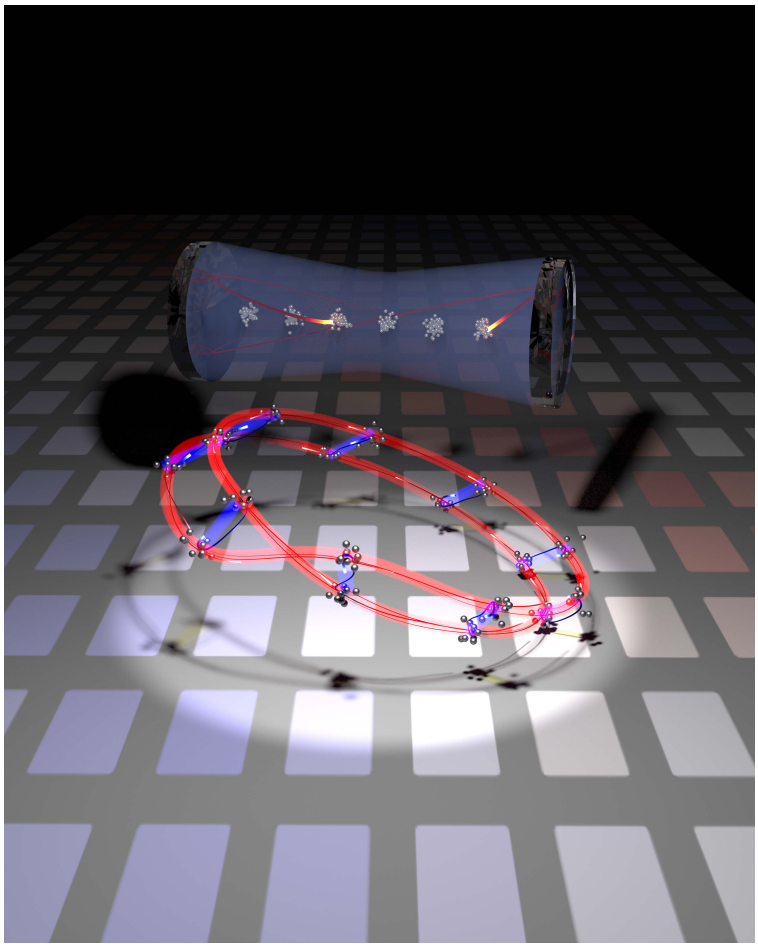
Abstract:

The power of quantum information lies in its capacity to be non-local, encoded in correlations among entangled particles. Yet our ability to produce, understand, and exploit such correlations is hampered by the fact that the interactions between particles are ordinarily local. To circumvent this limitation in the laboratory, we let distant atoms "talk" to each other with the aid of photons that act as messengers. By tailoring the frequency spectrum of an optical control field, we program the spin-spin couplings in an array of atomic ensembles, thereby accessing frustrated interaction graphs and exotic geometries and topologies. Such advances in optical control of interactions open new opportunities in areas ranging from quantum technologies to fundamental physics. I will touch on implications for quantum optimization algorithms, quantum-enhanced sensing, and simulating quantum gravity.



January 31, 2022 | Zoom | 3:30 pm - 4:30 pm