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Ion Chains in Optical Lattices as Simple Quantum Glasses ROMAN SCHMIED, TOMMASO ROSCILDE, DIEGO PORRAS, IGNACIO CIRAC, Max Planck Institute for Quantum Optics — We propose the loading of linearly trapped ions onto an intense optical lattice. In the limit of a deep lattice, we recover a classical one-dimensional Coulomb lattice gas in a harmonic trap. This system exhibits glassiness, due to significant metastability in its translational degrees of freedom. Quantum fluctuations can be induced at will by lowering the lattice amplitude, which allows for the controlled realization of a quantum glassy system. We study the dynamics of such systems during thermal and quantum annealing, and discuss how the effects of glassiness can be observed in the currently available experimental ion-trap setups.

Roman Schmied
Max Planck Institute for Quantum Optics

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