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[575] Towards quantum simulations with two-dimensional ion crystals

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Trapped ions are a well-established platform for analog or variational quantum simulation of quantum magnetism. Up to now, ions in linear Paul traps allow for simulations of the 1D Ising model with up to 50 spins. In our project, we aim for extending this approach to the second dimension which will enable studies of 2D non-equilibrium physics with a larger particle number (> 50). Here we present the first results from our new ion trap apparatus whose centerpiece is a novel monolithic micro-fabricated linear Paul trap, enabling us to create the anisotropic potentials required for trapping 2D ion crystals with simultaneous optical access for imaging and single-ion addressing.

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