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Towards quantum simulation of spin dynamics in frustrated systems IPPEI NAKAMURA, RYUTA YAMAMOTO, TAKESHI FUKUHARA, RIKEN Center for Emergent Matter Science (CEMS) — Ultra-cold atoms trapped in an optical lattice are an ideal platform to simulate quantum spin systems governed by the Heisenberg model. As the periodic potential formed by interference of laser beams is free from the defects inescapably existing in solid-state materials, and further, offers a well-defined two-dimensional system, the optical lattice system is highly suited to study the nature of many-body physics under the geometrical frustration. The quantum gas microscope technique enables us to observe and manipulate individual spins in optical lattices[1]. By applying this technique to a triangular[2] or kagome lattice[3], both of which exhibit geometrical frustration, we aim to trace the dynamics of an (emergent) excitation, like a spinon, in the frustrated spin system. To this end, we have been developing an experimental setup of triangular optical lattice employing Rb atoms and to date, have generated a ^{87}Rb BEC by evaporative cooling in a crossed optical dipole trap and succeeded in transferring the BEC into a triangular optical lattice.

[1]T. Fukuhara *et al.*, Nat. Phys. **9**, 235 (2013).
[2]C. Becker *et al.*, New J. Phys. **12**, 065025 (2010).
[3]G.-B. Jo *et al.*, Phys. Rev. Lett. **108**, 045305 (2012).

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