

Probing dynamics in quantum magnetism with ultracold atoms

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We consider time-dependent dynamics in magnetic models corresponding to two-component bosons in an optical lattice. Beginning from a state with all effective magnetic spins in the same direction, we investigate dynamics of spin-spin correlations, and how they behave in situations with different interaction ranges and for different total spin. We show in some cases that this leads to synchronisation between the spins. One of the challenges in working with these systems in the laboratory remains reaching the low temperatures/entropies necessary to produce some particularly sensitive interacting states, and rotating the spins adiabatically from a low-entropy initial state provides a promising route to lower temperature many-body states.

[1] A.B. Kuklov *et al.*, *Phys. Rev. Letters* **90**, 100401 (2003).

[2] E. Altman *et al.*, *New Journal of Physics* **5**, 113.1-113.19 (2003).

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