Spin lattices of walking droplets

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Millimetric liquid droplets can walk while bouncing on the surface of a vibrating liquid bath \cite{Couder2005, Bush2015}. We present experiments that demonstrate the spontaneous emergence of collective behavior in spin lattices of these walking droplets \cite{Saez2018}. Circular wells at the bottom of the fluid bath encourage individual droplets to walk in clockwise or counterclockwise direction along circular trajectories centered at the lattice sites. A thin fluid layer between the wells enables wave-mediated interactions between neighboring walkers resulting in coherent rotation dynamics across the lattice. When the pair-coupling is sufficiently strong, interactions between neighboring droplets may induce local spin flips leading to anti-ferromagnetic order.

Figure 1: A 2D spin lattice of walking droplets.

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