

Mesososcopic signatures of colloidal heating, motility, and retarded and non-reciprocal interactions

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On a mesoscale, suspensions of colloidal particles that are locally out of equilibrium can to some extent be described like isothermal suspensions with effective parameters. Such parameters can often be calculated for sufficiently symmetric setups, but the convenient mappings may ultimately break down. I will discuss informative mesoscale signatures of local nonequilibria for a range of minimal models, involving local heating, self-propulsion, and time-delayed and non-reciprocal interactions of colloidal particles. The emergent phenomenologies comprise hot Brownian motion, active heat engines, static and dynamic polarization-density patterns, ensuing autonomous ratcheting, and time-reversal symmetry breaking fluctuations at phase transitions.

