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**Chaotic routes to colloidal molecules** HAMED ABDI, RASAM SOHEILIAN , RANDALL ERB , CRAIG MALONEY, Northeastern Univ — We present computer simulation and experiments on dilute suspensions of superparamagnetic particles subject to rotating magnetic fields. We focus on short chains of particles and their decay routes to stable structures. At sufficiently high rates, the typical behavior of a small set of particles, initially aligned in a chain along the axis of the field is to go through a period of chaotic motion and, after some time to decay into one of a number of possible periodic orbits with a compact spatial structure. Transition between these periodic orbits is also possible and will depend on both rotation rate and finite temperature. We show the entry into and transitions between periodic orbits is an activated process with no memory and report on associated rate constants for the transitions.

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