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Quincke random walkers[1] GERARDO PRADILLO, Northwestern University, ANEESH HEINTZ, Brown University, PETIA VLAHOVSKA, Northwestern University — The spontaneous rotation of a sphere in an applied uniform DC electric field (Quincke effect) has been utilized to engineer self-propelled particles (Bricard et al, Nature (2013)): if the sphere is initially resting on a surface, it rolls. The Quincke rollers have been widely used as a model system to study collective behavior in active suspensions. If the applied field is DC, an isolated Quincke roller follows a straight line trajectory. In this talk, we discuss the design of a Quincke roller that executes a random-walk-like behavior. We utilize AC field upon reversal of the field direction a fluctuation in the axis of rotation (which is degenerate in the plane perpendicular to the field and parallel to the surface) introduces randomness in the direction of motion. The MSD of an isolated Quincke walker depends on frequency, amplitude, and waveform of the electric field. Experiment and theory are compared. We also investigate the collective behavior of Quincke walkers,the transport of inert particles in a bath of Quincke walkers, and the spontaneous motion of a drop containing Quincke active particle.

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