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Quincke rotation of an ellipsoid[1] PETIA VLAHOVSKA, QUENTIN BROSSEAU, Brown University — The Quincke effect - spontaneous spinning of a sphere in a uniform DC electric field - has attracted considerable interest in recent year because of the intriguing dynamics exhibited by a Quincke-rotating drop and the emergent collective behavior of confined suspensions of Quincke-rotating spheres. Shape anisotropy, e.g., due to drop deformation or particle asphericity, is predicted to give rise to complex particle dynamics. Analysis of the dynamics of rigid prolate ellipsoid in a uniform DC electric field shows two possible stable states characterized by the orientation of the ellipsoid long axis relative to the applied electric field : spinless (parallel) and spinning (perpendicular). Here we report an experimental study testing the theoretical predictions. The phase diagram of ellipsoid behavior as a function of field strength and aspect ratio is in close agreement with theory. We also investigated the dynamics of the ellipsoidal Quincke roller: an ellipsoid near a planar surface with normal perpendicular to the field direction. We find novel behaviors such as swinging (long axis oscillating around the applied field direction) and tumbling due to the confinement.

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