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Stereoscopic observation of the Brownian motion of a single dust particle[1] CHRISTIAN SCHMIDT, ALEXANDER PIEL, IEAP Christian-Albrechts-University, D-24098 Kiel, Germany, MICHAEL HIMPEL, ANDRÉ MELZER, Institute of Physics, EMAU University, D-17489 Greifswald, Germany — The Brownian motion of a single melamine-formaldehyde particle of 6.8 micron diameter is observed with 3 fast video cameras that are aligned in the xyz directions. The particle is trapped in the "anodic plasma" that forms in front of a small, positively DC-biased (0-300 V) additional electrode of 3 mm diameter embedded in the lower electrode of a parallel plate rf-discharge operated at 13.56 MHz, p_{argon} = 10-20 Pa, U_{pp} = 50-150 V. The random motion of the particle in 3D is analyzed in terms of the velocity distribution f(vx,vy,vz) and spatial distribution w(x,y,z). Systematic errors in deriving correct temperatures are discussed and compared with Langevin MD simulations. The eigenfrequencies of the potential trap are derived from FFT-spectra of the individual velocity components and are found consistent with the spatial distribution w(x,y,z).

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