

## **Two-dimensional complex (dusty) plasma with active Janus particles**

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Two-dimensional complex plasma containing active Janus particles was studied experimentally. A single layer of micron-size plastic microspheres was suspended in the plasma sheath of a radio-frequency discharge in argon at low pressure. The particle sample used was a mixture of regular particles and Janus particles, which were coated on one side with a thin layer of platinum [1]. Unlike a suspension consisting of regular particles only, the suspension with inclusion of Janus particles did not form an ordered lattice in the experimental conditions used. Instead, the particles energetically moved around in a disordered suspension. Unexpectedly, the mean kinetic energy of the particles declined as the illumination laser power was increased. This is explained by the competition of two driving forces, the photophoretic force and oppositely directed ion drag force. The mean-squared displacement of the particles scaled as  $t^\alpha$  with  $\alpha=2$  at small times  $t$  indicating ballistic motion and  $\alpha \approx 1/2$  at longer times due to the combined effect of particle activity and external confinement.

1. V. Nosenko, F. Luoni, A. Kaouk, M. Rubin-Zuzic, and H. Thomas, Phys. Rev. Research **2**, 033226 (2020).