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Dusty Plasma Experiment for Measuring the Dynamic Structure Factor[1] VITALIY ZHURAVLYOV, JOHN GOREE, CHUN-SHANG WONG[2], JORGE BERUMEN, University of Iowa — The physics of strongly coupled plasmas can be studied experimentally using a dusty plasma. An advantage of dusty plasmas is that the particles can be tracked using video microscopy. An experiment is planned, with a 2D monolayer of polymer microspheres levitated in an RF plasma, to measure the dynamic structure factor, $S(k, \omega)$, which is a measure of the viscoelasticity of a strongly coupled plasma. The dynamic structure factor reveals the time scales and length scales for (elastic) energy storage as compared to (viscous) energy dissipation, for the collective motion of the microspheres. We use laser heating to maintain the monolayer at a constant temperature, under liquid-like conditions without shear flow. The motion of microspheres is recorded by a high-speed video camera. Image analysis yields particle positions in each video frame, which are used as inputs for calculating $S(k, \omega)$. We plan to compare our experimentally measured $S(k, \omega)$ with theoretical models including those of Mithen *et al.* [3]

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[3]J. P. Mithen, J. Daligault, B. J. B. Crowley, and G. Gregori, Phys. Rev. E, 84, 046401 (2011).

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