



Colloids, Coffee Rings and Phonons

Arjun G. Yodh

University of Pennsylvania

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Abstract

I will discuss soft condensed matter experiments with colloidal suspensions which reveal new phenomena associated with a surprisingly broad range of problems. Using colloids, we can visualize many statistical effects and processes that are otherwise extremely difficult to study. Experiments from my lab, for example, have enabled us to learn about first steps of crystal melting [1], to create geometrically frustrated colloidal "anti-ferromagnets" [2], and to learn about phonons in disordered systems such as glasses [3]. I will also discuss experiments that explore the ways in which colloidal particle shape can modify the so-called coffee ring effect [4].

References

- [1] A.M. Alsayed, M.F. Islam, J. Zhang, P.J. Collings, A.G. Yodh, *Science* 309, 1207 (2005).
- [2] Y. Han, Y. Shokef, A. Alsayed, P. Yunker, T.C. Lubensky, A.G. Yodh, *Nature* 456, 898 (2008).
- [3] Chen, K. et. al, *Phys. Rev. Lett.* 107, 108301 (2011); Zhang et. al., *Phys. Rev. Lett.* 107 208303 (2011).
- [4] P.J. Yunker et. al., *Nature* 476, 308 (2011); P.J. Yunker et. al., *Phys. Rev. Lett.* 108, 228303 (2012); P.J. Yunker, et. al., *Phys. Rev. Lett.* 110, 035501 (2013).

About the Speaker

Arjun G. Yodh is the James M. Skinner Professor of Science and the Director of The Laboratory for Research on the Structure of Matter (LRSM) at the University of Pennsylvania. Physics & Astronomy is his home department and he has a secondary appointment in the Department of Radiation Oncology in the Medical School. Professor Yodh received his B.Sc. from Cornell University, and his Ph.D. from Harvard University. He joined the University of Pennsylvania faculty in 1988, following a two-year postdoctoral fellowship at AT&T Bell Laboratories. His current interests span fundamental and applied questions in condensed matter physics, medical and biophysics, and the optical sciences. Areas of ongoing research include: soft materials, complex fluids and networks, carbon nanotubes, laser spectroscopy, optical microscopy & micromanipulation, biomedical optics, functional imaging and spectroscopy of living tissues, photodynamic therapy and nonlinear optics.