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Statistical Mechanics of Jammed Matter[1]

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Jammed systems consist of large numbers of macroscopic particles. As such, they are inherently statistical in nature. However, in general, key assumptions of ordinary statistical mechanics need not apply. For instance, energy does not flow in a meaningful way from a thermal bath to such systems. And energy need not be conserved. However, experiments and simulations have shown that there are well defined distributions for such important properties as forces, contact numbers, etc. And new theoretical constructions have been proposed, starting with Edwards et al. The present symposium highlights recent developments for the statistics of jammed matter. This talk reviews the overall field, and highlights recent work in granular systems[1]. Brian Tighe[2] will describe new results from a force ensemble approach proposed recently by Snoeijer et al. Silke Henkes will describe a different force-based ensemble approach that yields a generalized partition function[3]. Eric Corwin will describe state-of-the-art experiments on dense emulsions[4]. And Matthias Schröter will present novel experiments on fluidized suspensions that address the issue of jamming and glassy behavior[5]. So, do we have a complete description of jammed matter? Not yet, but these talks, as well as other exciting developments in the field, show that there has been enormous progress, towards that end.

[1] T. S. Majmudar et al., Nature **435**, 1079 (2005); Phys. Rev. Lett. **98** 058001 (2007).
[2] B. P. Tighe, A. R. T. van Eerd, and T. J. H. Vlugt , Phys. Rev. Lett. 100, 238001 (2008).
[3] S. Henkes, C. O'Hern and B. Chakrabory, Phys. Rev. Lett. 99, 038002 (2007).
[4] J. Brujić et al., Phys. Rev. Lett. 98, 248001 (2007).
[5] M. Schröoter, D. I. Goldman, and H. L. Swinney, Phys. Rev. E 71, 030301(R) (2005).

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