Materials Science and Engineering Department

Winter Seminar Series

Thermodynamics of the Glassy State: The Final Frontier

Prof. Hillary Smith
Department of Physics
Swarthmore College

February 28, 2024
11AM-12PM | Hill Seminar Room (LeBow 240)

The glass transition and undercooled liquid phase in amorphous materials is a fundamental question in condensed matter physics that shapes our theories of phase transitions and states of matter. Theories of crystalline solids are robust and can even be used to predict materials' properties, leaving glass theory as the final frontier in condensed matter physics. The brief timescale available to probe the metastable liquid phase that forms above the glass transition has severely limited the information that can be gained from traditional experimental tools because of a strong thermodynamic driving force towards crystallization. This talk will discuss the development of new operando neutron scattering techniques to probe the vibrational and dynamical properties of a series of glasses with varying fragilities. We will discuss an emerging correlation between excess vibrational entropy in the undercooled liquid and liquid fragility. Finally, these new results will be put in the context of a universal understanding of fragility and vibrational contributions to the thermodynamics of the glass transition.

Hillary Smith is an Assistant Professor of Physics at Swarthmore College where she studies glasses and materials for energy storage applications. Prior to her arrival at Swarthmore, Dr. Smith worked as a Senior Researcher in the Applied Physics & Materials Science Department at Caltech. Dr. Smith obtained her B.A. in Physics and Chemistry from Bryn Mawr College and Ph.D. in Materials Science from Caltech. Her current work is funded by a DOE Early Career Research Award.

DREXEL UNIVERSITY
College of
Engineering

FOR MORE INFORMATION

Email: kn52@drexel.edu
drexel.edu/materials