

2019 Soft Matter REU Colloquia Series

Tuesday, June 25, 11:30am, WH 405



DNA cannons or complex gene machines? A physicist's journey toward understanding viruses

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Abstract: As an undergraduate researcher and REU participant, I used experimental methods to study soft matter and biophysics systems. This sparked an interest in multidisciplinary research, which led me to focus on physical virology while pursuing my PhD. In my doctoral research I studied the incredible and unique physical properties of viruses by considering them as pressurized nano-containers packed with DNA. I used laser light scattering to quantify rapid DNA ejection from virus populations, and tested the rugged nature of viral capsids by breaking them with an AFM needle. Before long, I was curious about the complex biology of viruses. This led me to the University of Pittsburgh, where I am currently immersed in bacteriophage research in the Hatfull Lab. With a team of undergraduate researchers, I have developed a multidisciplinary pipeline to characterize phage proteins of unknown function. I am now applying this method to assess the protein populations of phages with therapeutic potential against tuberculosis.

Biography: Krista Freeman received her BS Honors in Physics from Cleveland State University, where she was active in SPS leadership, outreach, teaching, and research. She went on to earn her Masters and PhD in Physics at Carnegie Mellon University, where she was funded with an NSF Graduate Research Fellowship. During her PhD she travelled the world for neutron/x-ray scattering, electron microscopy, and AFM experiments, served as the Chair of the American Physical Society's Forum on Graduate Student Affairs, and represented the USA at the 2015 Lindau Nobel Laureate Meeting. For her postdoctoral research at the University of Pittsburgh, Krista took a disciplinary

detour to pursue virology from the perspective of biology. Her current research focuses on characterizing virus proteins of unknown function using a multidisciplinary approach.