

Capturing the First Image of a Black Hole & Designing the Future of Black Hole Imaging

This talk will present the methods and procedures used to produce the first image of a black hole from the Event Horizon Telescope, as well as discuss future developments for black hole imaging. It had been theorized for decades that a black hole would leave a "shadow" on a background of hot gas. Taking a picture of this black hole shadow would help to address a number of important scientific questions, both on the nature of black holes and the validity of general relativity. Unfortunately, due to its small size, traditional imaging approaches require an Earth-sized radio telescope. In this talk, I discuss techniques the Event Horizon Telescope Collaboration has developed to photograph a black hole using the Event Horizon Telescope, a network of telescopes scattered across the globe. Imaging a black hole's structure with this computational telescope required us to reconstruct images from sparse measurements, heavily corrupted by atmospheric error. This talk will summarize how the data from the 2017 observations were calibrated and imaged, and explain some of the challenges that arise with a heterogeneous telescope array like the EHT. The talk will also discuss future developments, including how we are developing machine learning methods to help design future telescope arrays.



Speaker Biography:

Katherine L. (Katie) Bouman is a Rosenberg Scholar and an assistant professor in the Computing and Mathematical Sciences and Electrical Engineering Department at the California Institute of Technology. Before joining Caltech, she was a postdoctoral fellow in the Harvard-Smithsonian Center for Astrophysics. She received her Ph.D. in the Computer Science and Artificial Intelligence Laboratory (CSAIL) at MIT in EECS. Before coming to MIT, she received her bachelor's degree in Electrical Engineering from the University of Michigan. The focus of her research is on using emerging computational methods to push the boundaries of interdisciplinary imaging.



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