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High-speed Membrane Imaging with Digital Holography
THOMAS DIMIDUK, AMY CHEN, LAURA ARRIAGA, VINOTHAN MANOHARAN, Harvard — Lipid membranes can change on timescales faster than traditional three dimensional imaging tools can follow. Digital holography offers a the potential to observe observe membranes in 3D at 1000 Hz or greater to resolve dynamics down to thermal fluctuations. This works because holography encodes 3D information into a single 2D image, allowing imaging limited only by camera speed. However, precise quantitative interpretation of holograms has proved challenging for samples of any complexity. To address this limitation, I am developing methods based on the discrete dipole approximation and a new mathematical approach to solving inverse problems. I will present these methods and preliminary measurements of membrane dynamics using holography.

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