



Yoav Shechtman

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Yoav Shechtman is an Associate Professor at the faculty of Biomedical Engineering at the Technion- Israel Institute of Technology. Yoav's Ph.D. was at the Technion's Faculty of Physics with Mordechai Segev, and his postdoctoral training was at Stanford University with William E. Moerner. The Shechtman lab is focused on the development and application of novel optical and signal processing methods for observing life on the nanoscale. The lab's team is highly interdisciplinary, with expertise ranging from molecular biology, through optical design to deep learning. The group relies on this unique blend of backgrounds to design the next generation of optical nanoscopy, and to demonstrate the new developments on biologically relevant problems. Among Yoav's recognitions are the Krill Prize for Excellence in Scientific Research (2021), Young Investigator Prize and Medal of the International Union for Pure and Applied Biophysics (IUPAB, 2020), ERC starting grant (2018) and more.

Abstract: Deep Learning as a Design Tool in Localization Microscopy

Deep learning has been demonstrated to be extremely useful in solving microscopy-related image processing challenges in recent years, in applications such as denoising, deconvolution, and more. Specifically, in localization microscopy, deep learning has been used for dense localization, point-spread function characterization, and information decoding including emitter depth and color. I will discuss these applications and more: beyond image *processing*, deep learning has been showing great promise as a tool for optical system *design*; it can be used where traditional design metrics are more elusive, or tricky to calculate. I will focus on the application of deep learning to PSF engineering, including how to design an optimal PSF for encoding emitter-depth in a fluorophore-dense environment, an optimal PSF for encoding color on a grayscale camera, or an optimal set of PSFs for simultaneous multi-channel imaging.