

Super-resolution with and without deep learning

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Single molecule localization microscopy (SMLM) has matured into a powerful and widely used super-resolution imaging method. This talk will highlight developments of our lab to address three challenges of SMLM by computation.

One challenge is 3D super-resolution imaging of entire cells. We present ZOLA-3D, a combined optical and computational method that enables versatile 3D super-resolution imaging over up to ~5 μm depth and was recently adapted to dual objective microscopy

A second challenge is to visualize cells at high resolution and with high throughput. SMLM delivers exquisite spatial resolution, but at the price of very low throughput. We present ANNA-PALM, a technique based on deep learning that after adequate training can reconstruct high resolution views from strongly under-sampled SMLM data, enabling considerable speed-ups without compromising spatial resolution.

A third challenge is to use and reuse SMLM data obtained by the community. We will highlight shareloc, an online platform designed to facilitate the sharing and reanalysis of SMLM data and illustrate its benefit by increased robustness of ANNA-PALM.