

Engineered point spread functions for recording volumes in scanning microscopy

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Using pixelated detectors in scanning microscopy allows for collecting sample information at high data rates. In Image Scanning Microscopy, this is used for constructing high resolution images at high light collection efficiency.

If the point spread function of a scanning microscope is suitably modified, this data surplus can also be used to collect additional information from the sample, such as its 3D structure. Here we introduce the concept together with a multi-view deconvolution approach that allows for reconstructing volumetric sample information from the raw data. We provide an outlook on the advantages of independently shaping excitation and detection PSFs.

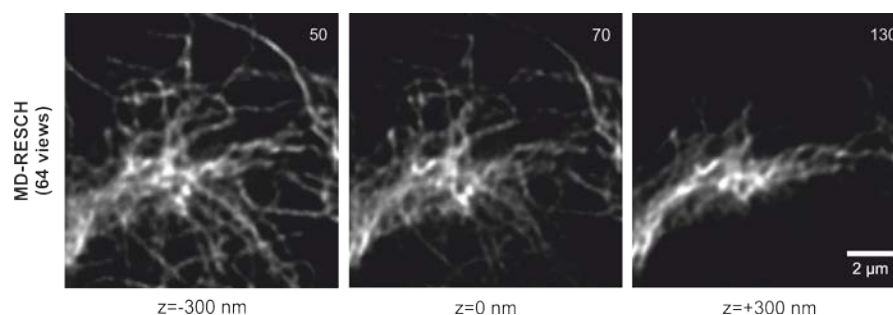


Figure 1: Fluorescently labelled microtubules in fixed COS-7 cells. The three image planes are reconstructed from data taken in single 2D image scan. NA=1.25, wavelengths: exc./em=640/660 nm.