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Max Delbruck Prize in Biological Physics Talk: Zoom into life at the nanoscale with STORM

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Powered by its molecule-specific contrast and live-cell compatibility, fluorescence microscopy is one of the most widely used imaging methods in biological research. The resolution of fluorescence microscopy is classically limited by the diffraction of light to several hundred nanometers. This resolution limit is substantially larger than the typical molecular length scales in cells, preventing detailed characterization of most sub-cellular structures. Here, I describe a new imaging method, stochastic optical reconstruction microscopy (STORM), which breaks the diffraction limit and allows for super-resolution imaging. STORM uses single-molecule imaging and photo-switchable fluorescent probes to temporally separate the spatially overlapping images of individual molecules, thereby allowing each molecule to be localized with high precision and a super-resolution image to be reconstructed from the numerous measured positions of the molecules. Using this approach, we have imaged cellular structures with nanometer-scale resolution. In this talk, I will discuss the general concept, recent technical advances, and various biological applications of STORM.