

Fluorescence nanoscopy

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KEY WORDS: resolution, diffraction, STED, 4Pi, RESOLFT, photoswitching, isomerization

Since the discovery of the diffraction resolution barrier by Ernst Abbe in 1873, the spatial resolution of a focusing light microscope has been limited to ~200 nm. In this lecture, we discuss physical concepts that have fundamentally broken the diffraction barrier and lead to far-field microscopy resolution at the molecular scale (< 20 nm). Special emphasis is given to STED microscopy¹ and the RESOLFT concept utilizing photoswitchable proteins and organic compounds as molecular markers. Finally, we show applications in which nanoscale fluorescence ‘nanoscopy’ was key to solving problems in cell biology² and beyond.

1. G. Donnert, et al, *Proc. Natl. Acad. Sc. USA* **103**, 11440 (2006).
2. K. I. Willig, S. O. Rizzoli, V. Westphal, R. Jahn & S. W. Hell, *Nature* **440**, 935 (2006).