SISSA COLLOQUIUM

Stefan W. Hell

FAR-FIELD OPTICAL NANOSCOPY principles and recent advancements

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Throughout the 20th century it has been widely accepted that, at the end of the day, a light microscope relying on conventional lenses (far-field optics) cannot discern details that are finer than about half the wavelength of light (> 200 nm). However, in the 1990s, it was discovered that overcoming the diffraction barrier is realistic and that fluorescent samples can be resolved virtually down to molecular dimensions. Stefan W. Hell will discuss the simple yet powerful principles that allow neutralizing the resolution-limiting role of far-field optical diffraction1,2. In a nutshell, features residing closer than the diffraction barrier are prepared in different molecular (quantum) states so that they are distinguishable for a brief detection period. As a result, the resolution-limiting role of diffraction is overcome, and the interior of transparent samples, such as living cells and tissues can now be imaged non-invasively at the nanoscale using focused light in 3D.

STEFAN W. HELL

Stefan W. Hell is a scientific member of the Max Planck Society and a director at the Max Planck Institute for Biophysical Chemistry in Göttingen, where he currently leads the Department of NanoBiophotonics. He is an honorary professor of experimental physics at the University of Göttingen and adjunct professor of physics at the University of Heidelberg. Since 2003 he has led the High Resolution Optical Microscopy division at the German Cancer Research Center (DKFZ) in Heidelberg. He is a member of the board of directors of the Göttingen Laser Laboratory as well as a member of the Academy of Sciences of Göttingen and Heidelberg.

WHEN

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WHERE

SISSA, Aula Magna
Via Bonomea, 265
Trieste (Italy)

INFO

PRESSOFFICE@SISSA.IT
040-3787557
WWW.SISSA.IT