“Optical nanoscopy” observing dynamics of life at single molecule level

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Since its foundation in the 17th century, every major advance in optical microscopy has enabled breakthrough discoveries across the natural sciences. In this talk, the evolution of optical microscopy will be presented, starting from its early developments to the most recent nanoscopic techniques. I will outline key principles and milestones, including contrast-enhancing modalities such as phase, polarization, fluorescence, and dark-field imaging. The main focus will be on techniques behind the super-resolution revolution, where optical imaging beyond the diffraction limit enables the study of the structure and function of biological matter at the nanometer scale. The seminar will conclude with recent work from the Laboratory of Nano Optics at the Institute of Photonics and Electronics, highlighting interferometric scattering microscopy as a powerful label-free approach to study the dynamics of single molecules.