

iSCAT Microscopy: Label-free Protein Sensing, Nanoparticle Sizing, and 3D Imaging of Structure and Dynamics in Live Cells

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Abstract— Since its introduction in 2004, interferometric scattering (iSCAT) microscopy has found applications in a wide range of applications. I will discuss the use of machine learning for pushing single-protein sensing down to 10 kDa, precision sizing of nanoparticle polydispersions, and 3D label-free imaging of live cells.

Vahid Sandoghdar obtained his B.S. in physics from the University of California at Davis in 1987 and Ph.D. in atomic physics from Yale University in 1993. After a postdoctoral stay at the Ecole Normale Supérieure in Paris, he moved to the University of Konstanz in Germany, where he started a new line of research to combine single molecule spectroscopy, scanning probe microscopy and quantum optics. In 2001, he took on a professorship at the Laboratory of Physical Chemistry at ETH in Zurich, Switzerland. In 2011, he became director at the Max Planck Institute for the Science of Light in Erlangen and Alexander von Humboldt Professor at the University of Erlangen-Nuremberg in Germany. Sandoghdar is one of the pioneers of the field of *Nano-Optics*,



which merges various research areas to investigate the interaction between light and matter at the nanometer scale. His current research encompasses a wide range of areas such as molecular quantum photonics, plasmonics, cryogenic super-resolution microscopy and interferometric scattering (iSCAT) microscopy, with a special emphasis on controlled biophysical studies.