Soutenance de thèse

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Imaging beyond the diffraction limit - STED and SAF microscopy

An understanding of cellular processes on membranes has been precluded by the poor imaging resolution offered by conventional techniques. Circumventing the diffraction limit in fluorescence microscopy has now become possible by exploiting the molecular transitions of the fluorophore. In this context, I would present our work on the instrumental development of two complementary techniques for realizing nanometric all-optical resolution and axial sectioning, namely STimulated Emission Depletion (STED) and Supercritical Angle Fluorescence (SAF) microscopy.

STED microscopy is an elegant method that has allowed us to break the diffraction barrier with light microscopes and has achieved resolutions of the order of 20 nm (transverse) in biological samples. In this technique, we exploit the molecular transitions of the fluorescent marker to overcome the resolution limit due to diffraction. In this context, the instrumental realization and the imaging performance of a home-built STED microscope will be presented and its application in neurobiology will also be discussed.

While STED microscopes offer improved lateral resolution, an isotropic gain in resolution usually comes at the cost of complex instrumentation. In this regard, we demonstrate SAF microscopy as a simple yet powerful tool that achieves an axial sectioning of the order of 150 nm purely by exploiting the emission characteristics of a fluorophore near an interface. A combination of the two imaging techniques offers a new tool to study molecular phenomena on the biological membranes at a nanometric scale.

Attention ! Jour et heure inhabituels

Mercredi 11 juin 2014 à 9h30

Bât 210 – Amphi 1 (2ème étage)

Université Paris-Sud, 91405 Orsay Cedex

La soutenance sera suivie d'un pot auquel vous êtes chaleureusement conviés.
Bât. 210 (Amphi 2)