CONICAL DIFFRACTION MICROSCOPY (CODIM): AN INNOVATIVE AND FLEXIBLE SUPER RESOLUTION MICROSCOPY MODALITY

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One of the main challenges of existing super resolution techniques is to maintain the integrity of biological samples whilst improving resolution. Additionally, a simple intuitive workflow and minimal changes in sample preparation are required to integrate super resolution into the biology mainstream. Here, we report on Conical Diffraction Microscopy (CODIM) based on both proprietary hardware and algorithms. This add-on module to existing microscopy systems, aims to overcome these challenges. CODIM uses a powerful beam shaper generating compact light distribution patterns and a point scanning illumination. Images with a resolution in the range of 100 nm are retrieved after processing. Furthermore, samples are scanned with very low laser power imposing minimal photo-toxicity and negligible photo-bleaching. Hence, CODIM effectively allows a straightforward access to super-resolution microscopy, and can readily upgrade most conventional microscope setups with a flexible and effective one-step workflow. We will report here on a large speed improvement, and display latest biological results. CODIM helps in gathering key results at a molecular level from intensively studied dynamic sub-cellular processes such as endocytosis, microtubule network dynamics or mitochondria morphogenesis. Thus, this technology can be benefitial to medical research, fundamental biology and can also accelerate drug discovery.