SUPER-RESOLUTION BY STRUCTURED-ILLUMINATION-AXIAL-TOMOGRAPHY (SIAT)

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Since the first developments of super-resolution-microscopy (SRM), methods allowing to circumvent ("break") the Abbe limit, a variety of different complementary SRM techniques were implemented. Due to differences in the mode of operation, a further optimization of super-resolution imaging can be achieved by appropriate combinatorial strategies.
One of these is the combination of Structured-Illumination-Microscopy (SIM) and Micro-Axial-Tomography (AT) [1,2]. Both of these microscopy methods operate in the visible range spectrum and have been demonstrated to be excellently suitable for live-cell imaging, due to very low illumination intensities.

While SIM allows for a resolution-improvement of a factor of two along all spatial directions (3D), together with appropriate image processing, SIM-AT is expected to achieve an isotropic effective resolution down to the 100nm region.

We present an experimental realization of the combination of the two techniques together with first results. A major benefit of the SIAT microscope is that is provides super-resolution imaging without challenging conditions on the fluorophores, and that works well also on label-free (autofluorescent) samples.

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