

## COMPARISON OF I<sup>5</sup>M- AND 4PI-MICROSCOPY

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To improve the axial resolution in fluorescence microscopy substantially, 4Pi-microscopy [1, 2] and more recently I<sup>5</sup>M-microscopy [3, 4] have been developed. The two techniques bear striking resemblances to each other in several aspects. Both microscopes use two opposing objective lenses to exploit the interference of the excitation light that can be combined with the interference pattern of the coherent detection from both sides. This way they achieve a 3- to 7-fold improvement in the axial resolution below 100 nm [5]. In fact, by exchanging the illumination source and the detection unit each of the microscope setups can be changed into the other. While 4Pi-microscopy scans laterally with a single focal spot or an array of spots, the I<sup>5</sup>M-microscope uses a spatially incoherent light source, e.g. a lamp, and a CCD camera as usually used in a widefield microscope.

Apart from the fact that in I<sup>5</sup>M-microscopy the combination of coherent illumination with coherent detection is mandatory which is only optional in 4Pi-microscopy, I<sup>5</sup>M has the advantage of being able to use a conventional lamp for illumination.

A novel and compact setup is presented, that allows convenient switching between beam-scanning 4Pi-microscopy of type C and I<sup>5</sup>M-microscopy. Experimental results achieved with this setup will be shown to highlight the *pros* and *cons* of both techniques in the practical application. The results are compared with numerical calculations. The capabilities and limitations of both techniques will be extensively treated.

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