

3D IMAGE RESTORATION USING POINT-SPREAD-FUNCTION MODELING AND WEB-BASED APPROACH.

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“Power-up your Microscope” is a software package designed and realized for the optimization of three-dimensional optical microscopy image quality using the Internet and inverse problems computational approaches[1]. The package is mainly devoted to Confocal microscope users also providing tools for wide-field computational optical sectioning microscopy and two-photon excitation microscopy imaging[2]. So far, the main goal of our project is to provide the microscopy community with an extremely easy and comparatively powerful access to some advanced image restoration methods[1]: such methods are usually hardly usable by microscopists, in that they require a mathematical, physical and often also computer science knowledge that goes beyond their scientific background and research interests. Core of the computational section are the optical system modelling and inverse deconvolution implementation. Since the optical system is completely described by its point spread function the system elaborates a model based on the knowledge of key-parameters of the microscope being used. Moreover, a feedback is given by experimental point spread function measurements performed utilizing polyelectrolyte-based fluorescent nano-test objects tested on different commercial systems.

- 1) M. Bertero, P. Boccacci, Introduction to inverse problems in imaging, IOP publishing, Bristol (1998).
- 2) A.Diaspro (ed.), Confocal and Two-photon microscopy: Foundations, Applications and Advances, Wiley-Liss, New York (2002)