

## **AOtools: A generalised implementation of adaptive optics using deformable mirrors**

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Optical aberrations significantly reduce the achievable image quality and resolution of microscopy systems and are intrinsic to any biological imaging process.[1] Implementing adaptive optics (AO) has been shown to significantly reduce the aberrations present thereby improving both the image resolution and the achievable imaging depth of a microscope.[2] However, implementing adaptive optics is a complex task with many stages, including calibration, wavefront sensing, aberration detection and aberration correction. Control software for doing any of these is often esoteric and not easily transferred between systems. There is a need for a robust, accurate, easy-to-use, general implementation of adaptive optics for microscopy.[3]

Here we present **AOtools**, a Python addition to the **Microscope** hardware control software. **AOtools** provides an implementation of AO techniques using deformable mirrors that is transferable between systems and easily extensible. We also demonstrate several different correction strategies on multiple different imaging systems and samples. Crucially, **AOtools** can be used effectively to allow general biological scientists to perform AO correction and image quality improvement without extensive training or supervision.

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