We present the IsoSense adaptive optics approach that improves image-based aberration measurement using structured illumination. This approach is ideally suited to 3D structured illumination fluorescence microscopy [1], where live cell imaging can be enabled by implementation of adaptive optics (AO) aberration correction. The set-up relies on both sensor-based interferometric wavefront sensing for deformable mirror control and on image quality based sensorless adaptive optics for non-common path and sample aberration correction.

Artefact reduction and robust imaging within live cells is enabled through sensorless adaptive optics with the “IsoSense” illumination strategy. IsoSense solves a common limitation of sensorless AO where image-based quality metrics lead to sub-optimal correction due to inadequate sampling of the optical transfer function caused by either preferential orientation of object structures, lack of sharp features, or poor signal-to-noise ratio in the image. Also, we enable precise mirror control and fast deformable mirror flattening, by employing an interferometric wavefront sensor prior to imaging.

We demonstrate the performance of our method in a custom built structured illumination microscope for imaging live *Drosophila* macrophage cells. Our method was effective in improving the accuracy of AO correction [2].
