

How to sharpen wavefront shaping by itself?

All optical systems have to deal with design and manufacturing limitations that cause **optical aberrations**, worsening the performance of the system. However, if these aberrations are kept under control, the system is limited by waves behavior: diffraction.

To correct aberrations, it is possible to design and buy expensive optics and align them very carefully, or to correct them via a phase modulation device such as a **Spatial Light Modulator (SLM)**. The latter is called **Adaptive Optics**, and is used primarily to correct atmospheric distortion using known point sources or wavefront analyzers.

In our case, we want to further employ our SLM in a complex optical setup with many possible sources of aberration. Notably, **our light source is the output slit of a monochromator sweeping over infrared wavelengths**, which makes it difficult to properly measure and correct aberrations.

How to correct the point-spread function (PSF) without access to it?

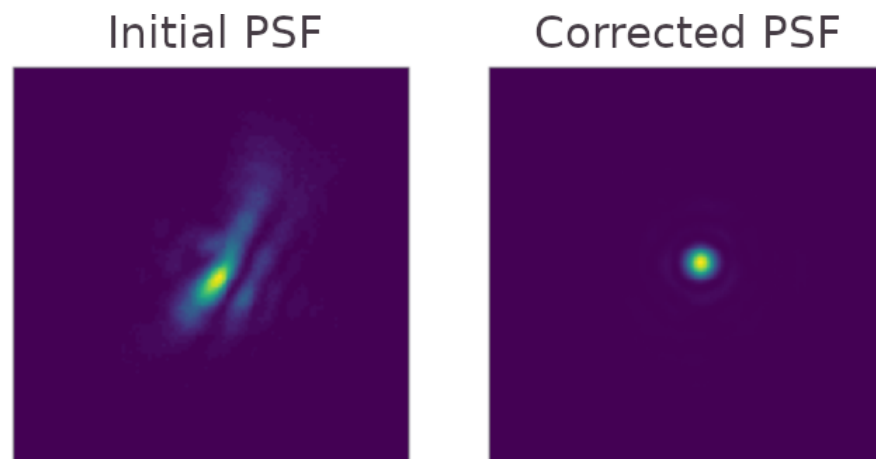


Figure 1. Corrected PSF (right) and initial PSF (left). Monochromatic point source.

In this project, we will perform studies with an existing setup, adding a way to calibrate and correct aberrations for a non-trivial broadband source. Hence we will use a SLM. This will involve research, design, and programming. After improving the setup, we will be able to better illuminate and sharply image 3D Photonic Band-Gap Crystals Superlattices!

References:

1.

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