

Additionally, there are some issues one has to be very careful about. First, for the crystal thicknesses we are using (around 1 mm), the intensity must be kept under 10 GW/cm^2 in order to avoid high-order nonlinear effects in the crystal (SPM, XPM...). Second, the technique cannot be applied in the case of strongly focusing beams, since non-collinear processes can become significant in the SHG process. Finally, a good alignment of the system is crucial to obtain a correct result. As in any imaging system, it is necessary to ensure that the object and image planes are perfectly conjugated. Furthermore in this case, the alignment of the crystal is very important for a right result.

As a final point, even though the method has been applied to the retrieval of the phase in one axis (that is enough for defocus aberration), the procedure shown here is general and can be implemented in 2D. In this case, the use of a slit-based imaging spectrograph could allow following an analogous procedure to that described in this work. The 1D wavefront retrieval demonstrated here might be very useful in beams providing cylindrical symmetry and in the analysis and optimization of telescopic systems and collimation devices.

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