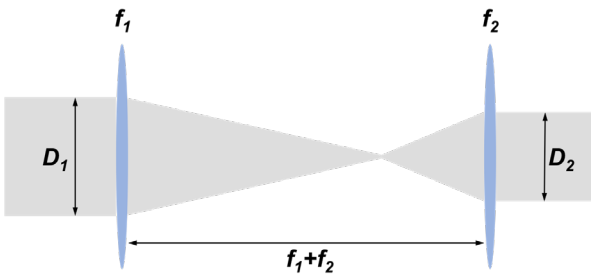
Tunable Broadband Telescope with 3DoptiX

BACKGROUND

The optical telescope also known as beam expander (or reducer) is ubiquitous in optical setups and is useful in various applications spanning from microscopy to beam shaping to fourier optics.
Its layout can be seen in figure 1 below and the magnification/ reduction is simply dictated by the ratio M:



$$M = \frac{f_2}{f_1}$$

Figure 1: Schematic of a telescope

Although of simple layout, commercial telescopes or beam expanders are usually limited in their spectral coverage and their M ratio is usually fixed or barely tunable.
In this application note we introduce the 3doptix tunable broadband telescope that addresses and alleviates these limitations.

APPLICATIONS

- Tunable Broadband Telescope
- Microscopy
- Beam Filtering
- Holography

Thanks to its High Precision mechanics and its modular approach, the 3doptix tunable broadband telescope (Figure 2 below) offers a modular telescope base where the magnification ratio can be widely tuned over a broad spectral range while keeping the beam in-line and therefore with virtually no impact on the existing setup.

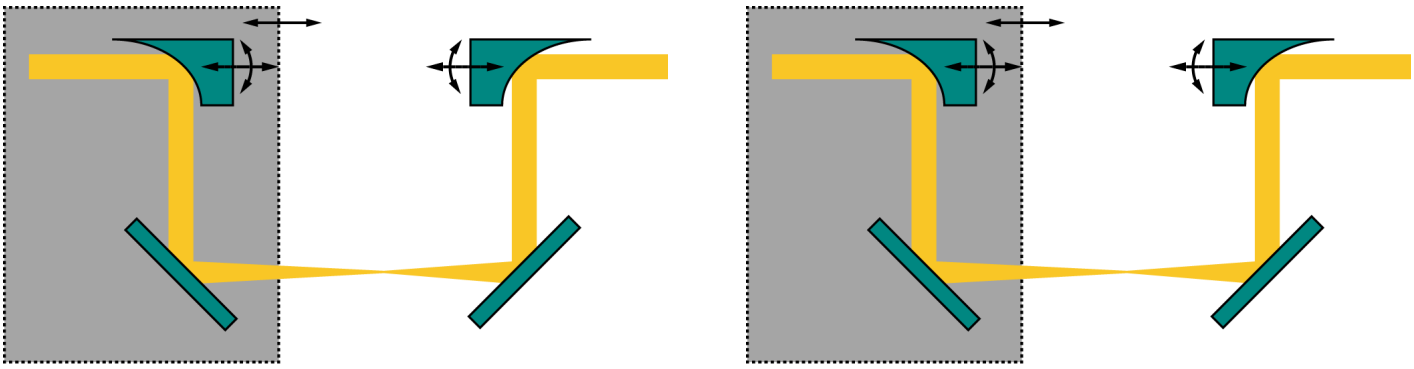


Figure 2: (left-up) 3DOptix Tunable Inline Telescope (left-bottom) Schematic with the available degrees of freedom (above_ list of the 3DOptix elements required.

In this application, parabolic mirrors are used to cover a wide range of wavelengths from visible to mid infrared. Moreover, the folded configuration can accommodate various magnification ratios by snapping in sets of different parabolic mirrors.
The achieved design reduces the # of degrees of freedom to its minimum while providing very high accuracy on the fixed parts.

This approach brings the alignment to a few minutes procedure. Also, thanks to the folded configuration, the resulting expanded (or reduced beam) is in-line to the incoming beam and therefore can be inserted “as-is” in an existing optical path.

Also, being highly modular and open, the telescope base can be the perfect solution to implement spatial filtering of gaussian beams (fig. 3) or inverted and upright microscopes.

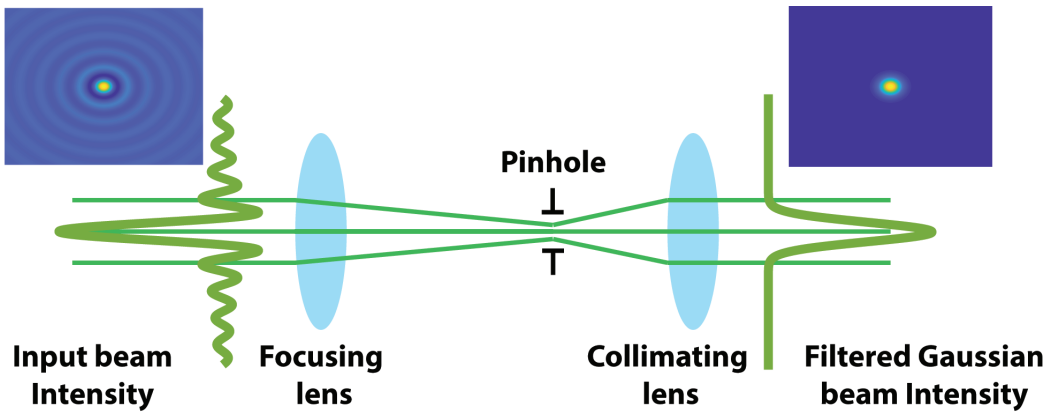


Figure 3: Application for Spatial filtering of beam