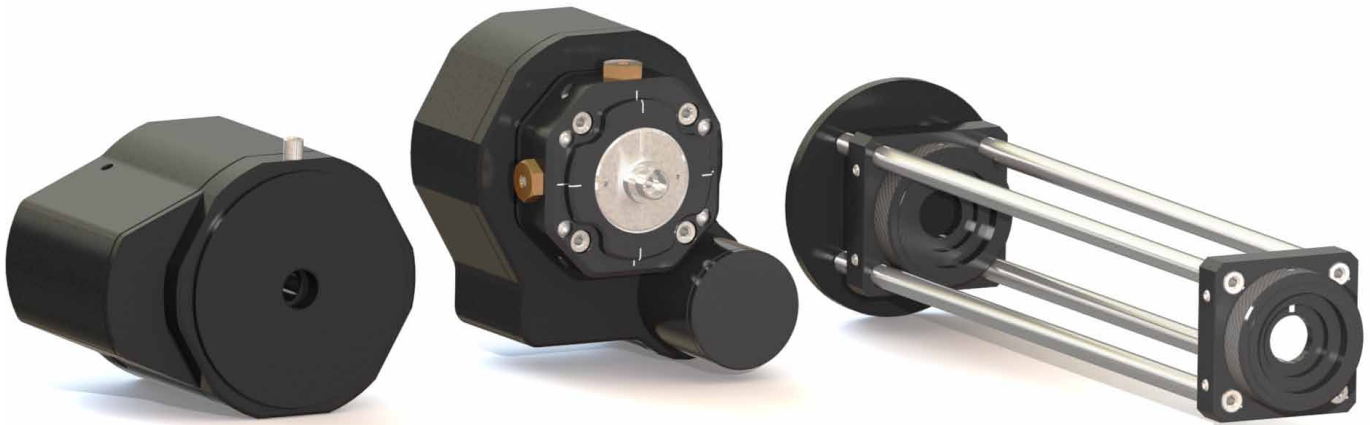


## LLTF CONTRAST OPTIONS & ACCESSORIES



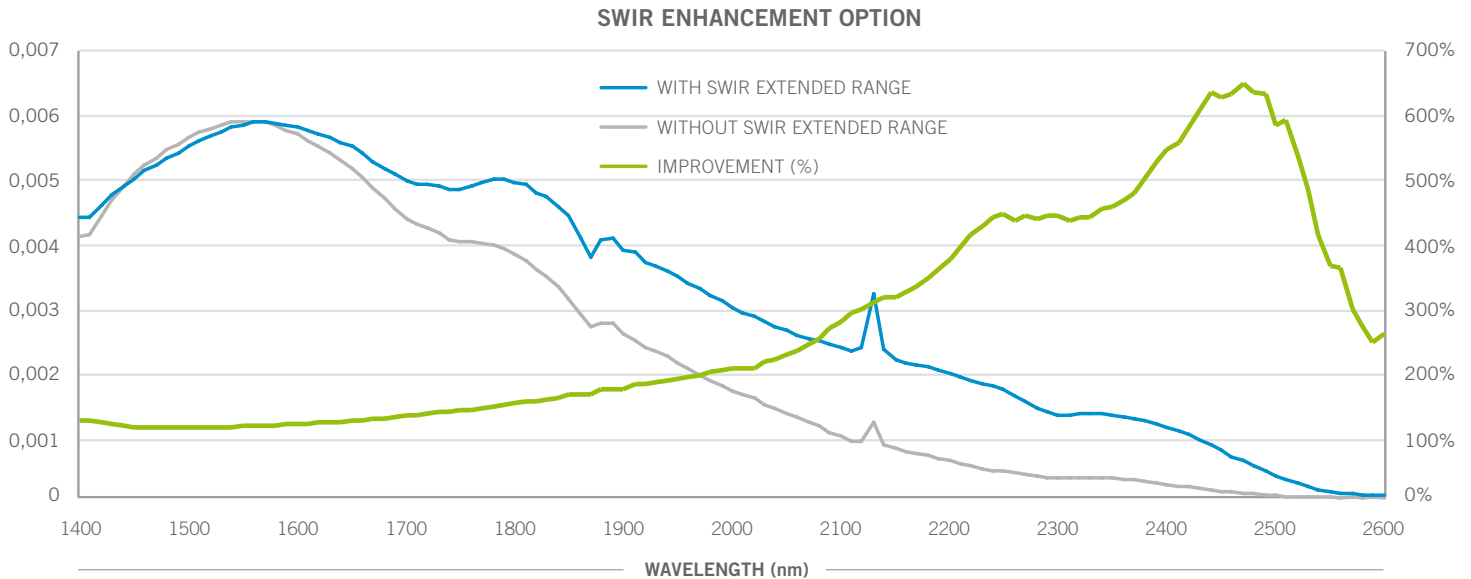
### LLTF DESCRIPTION

The LLTF is a non-dispersive tunable bandpass filter that transmits a single laser line while blocking unwanted lines. It delivers the highest signal throughput in the industry. Output pointing is very stable, removing the need to realign optical setup. It is also ideal as a premonochromator for triple spectrograph. The LLTF is compatible with any VIS-NIR broadband source, but is optimized to fit Fianium's supercontinuum sources. Depending on the application, a series of options are available and described below.

# OPTIONS

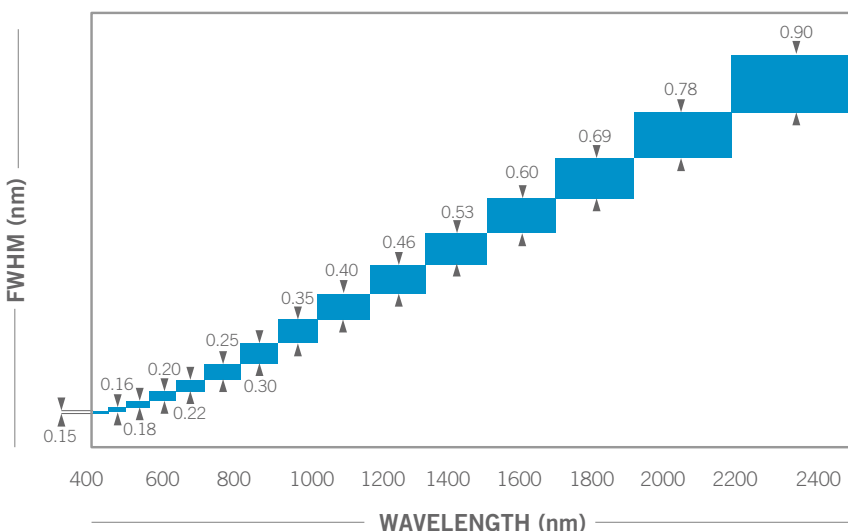
## ENHANCED SWIR

The Enhanced SWIR option allows to reach higher output power and to extend the spectral range of the LLTF up to 2500 nm. As shown below, the standard version of the LLTF Contrast SWIR (in grey), combined with a 4W supercontinuum source, already offers an interesting output power, but this can still be a limitation for certain demanding applications. The wide range of possible supercontinuum power output can of course solve this, but at a version high cost when compared to the Enhanced SWIR option. Also, the spectral window of the Enhanced SWIR option gives access to the complete spectrum of the supercontinuum source used, a great advantage over the standard LLTF Contrast SWIR.



\* Measured with WL-SC400-4 Fianium Supercontinuum Laser

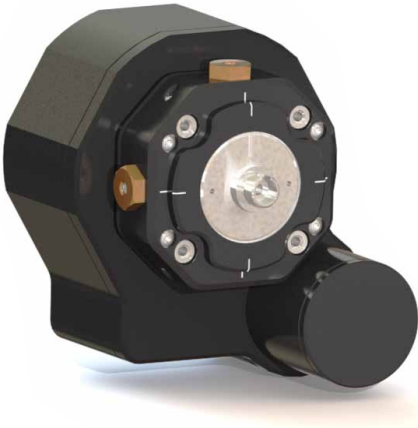
## HIGH-RESOLUTION



The high resolution option offers the possibility to reach a sub-nanometer bandwidth (FWHM). The spectral window covered will be reduced, but can still reach unmatched ranges for such narrow bandwidths. The figure shown here presents the typical evolution of the FWHM over the VIS and SWIR range. We can customize the LLTF to cover up to 5 of these ranges. Please contact us for more details.

# ACCESSORIES

## FIBERED OUTPUT



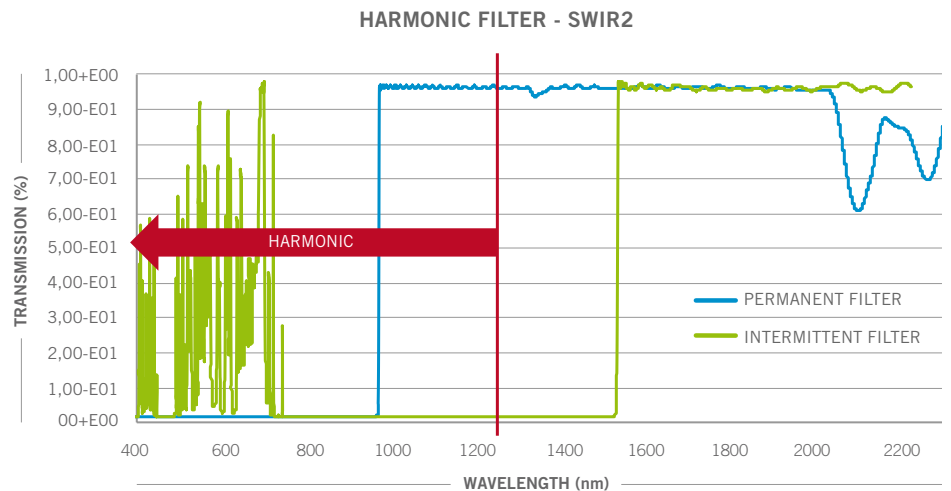
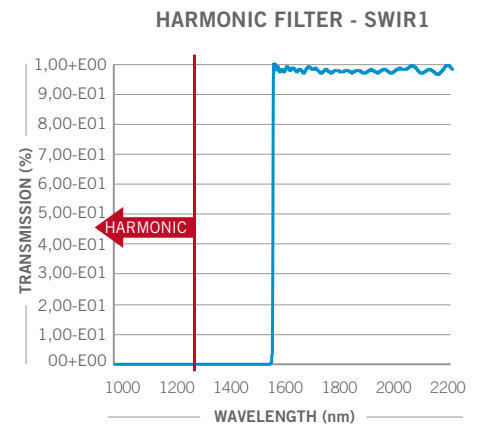
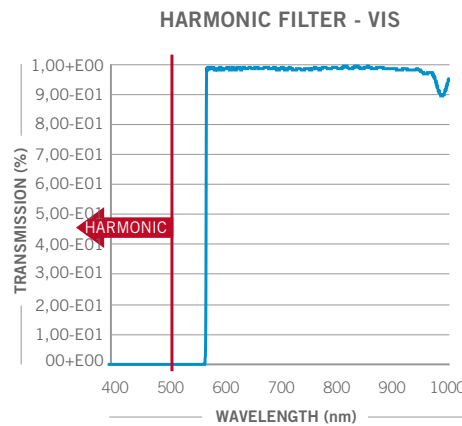
The LLTF Contrast, in its basic configuration, delivers a collimated free-space output beam. The fibered output option takes this beam and couples it into a fiber to fit the needs of various applications. An X-Y-Z translation adjustment allows coupling optimization. The FC APC output is available with the following fibers:

- 1) 9/125  $\mu\text{m}$  (single mode)
- 2) 50/125  $\mu\text{m}$  (multimode)
- 3) 105/125  $\mu\text{m}$  (multimode)

## HARMONIC FILTER



Our filtering technology is based on the use of resonant gratings. Thus, 2<sup>nd</sup> harmonics of a given wavelength will not be blocked completely. The harmonic filter is a highpass filter that allows blocking this 2<sup>nd</sup> harmonic. The harmonic filter for the LLTF Contrast VIS-2 blocks the harmonics coming from the region 400-500 nm. It will deploy automatically when it is enabled and the filter is set to concerned wavelengths (800-1000 nm). The harmonic filter for the LLTF Contrast SWIR, when enabled, also allows blocking automatically the harmonics coming from the region 1000-1250 nm when the filter is set to wavelengths in the range 2000-2500 nm. Finally, the harmonic filter VIS-SWIR combines a permanent highpass filter to block harmonics coming from the region 400-1000 nm and the automatic SWIR harmonic filter for the region 1000-1250 nm.



# ACCESSORIES

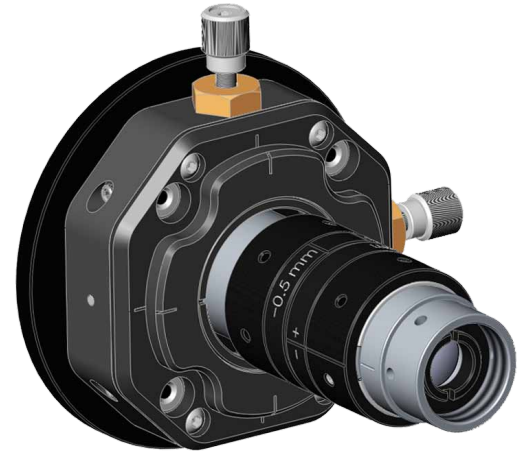
## BACKGROUND SUPPRESSOR

The purpose of the background suppressor is to remove unwanted reflections of light coming from the inside of the LLTF. This whitish halo is inherent to the core LLTF technology. The halo surrounds the filtered beam, but is not colinear. This phenomenon appears only when using the filter in its free-space configuration, and becomes more apparent as the power of the laser source increases. Using any focusing system (e.g. Fiber Output option) naturally removes this unwanted halo.



Beam Profile Through background suppressor

Even if the halo appears only in small spectral regions and decreases rapidly in intensity over distance, it could be problematic for some applications. The spectral averaged intensity is indeed relatively low (few 10th of nW/nm at 30 cm from the LLTF output port), but will be completely removed by the background suppressor accessory if needed. It is to be noted that the laser beam quality ( $m^2$ ) will not be significantly affected by this accessory.



## ALIGNMENT KIT (FOR FREE-SPACE)



In free-space (input/output) configuration, the alignment of the input laser into the LLTF is a challenging task without the proper tools. The alignment kit allows the user to rapidly find the correct alignment. Two irises, mounted on removable posts, are easily placed at the entrance of the filter. The laser beam then simply needs to follow the path created by the irises.

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