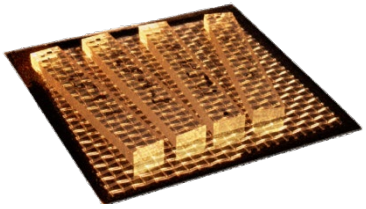
PicoPulse™ Chromatic Dispersion Compensation - Stretch Compress Filters

Replacements for Ruled Gratings and Fiber Bragg Gratings (FBGs) in Ultrafast Laser Systems and Chromatic Dispersion Compensation systems

PicoPulse™ CVBG filters are robust, solid-glass volume Bragg gratings (VBGs) engineered for compressing or stretching fast pulses of light in applications such as chirped pulse amplification (CPA) and chromatic dispersion compensation. By replacing bulky dispersive diffraction grating pairs, they enable significant miniaturization and simplification of CPA architectures. This makes them an ideal compact alternative to ruled gratings and fiber Bragg gratings (FBGs), suitable for both ultrafast pulse management and dispersion control, including compensation after long fiber runs.

Operating in free space, PicoPulse filters accommodate larger input beams and offer orders of magnitude higher power handling than FBGs or gel-based VHG technologies. Each filter is fabricated in a proprietary glass formulation with high efficiency and low loss, ensuring stable compression, stretching, and dispersion compensation across a wide range of temperatures and operating conditions.

Optimized solutions provide distortion-free, round output beam profiles after stretching and compression, preserving near-diffraction-limited performance. An integrated mounting platform further simplifies alignment while reducing footprint and opto-mechanical sensitivity.



FEATURES

- Easily configured as a stretcher or compressor by rotating the input facet 180°
- Environmentally stable under high temperature and humidity
- No performance degradation over time, even under high-power illumination
- Free-space diffraction efficiency >90%
- Low spatial chirp
- Zero stitching errors
- Highly repeatable performance
- Near-diffraction-limited beam quality
- Polarization insensitive

APPLICATIONS

- Temporal Stretching/Compression of Ultrafast Optical Pulses
- Chromatic Dispersion Compensation
- Telecommunications / Datacom
- Time resolved spectroscopy
- Fiber delivered ultra-fast lasers
- Fiber based multiphoton spectroscopy

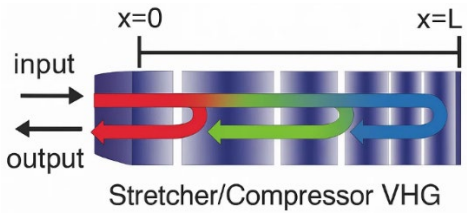
COHERENT

Specifications

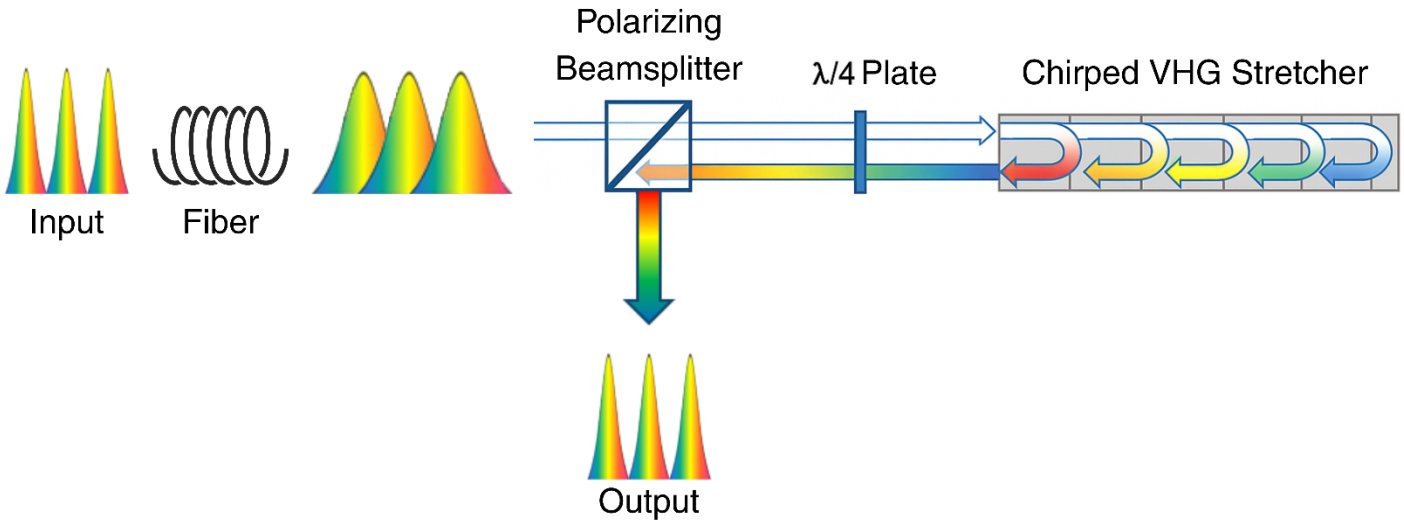
Parameter	PicoPulse™ Filter Performance
Center Wavelength Range	800 to 1600nm
Dispersion Rate	Typical 10-100ps/nm
Spectral Bandwidth	Typical: 1-10nm
Diffraction Efficiency	>90% in free space
Grating Length	3mm to 50mm
Aperture Size	Standard: 2mm x (5-15) mm

Principle of Operation

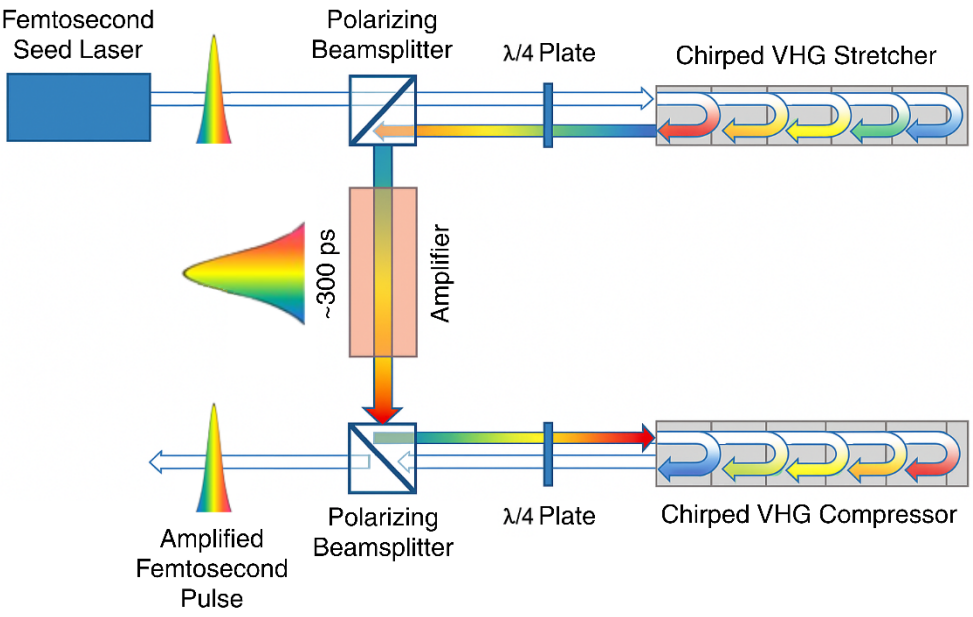
As with FBGs, short and long spectral components of the pulse are diffracted at different points within the CVHG due to the smooth grating chirp, creating a linearly varying group delay.



Chromatic Dispersion Compensation

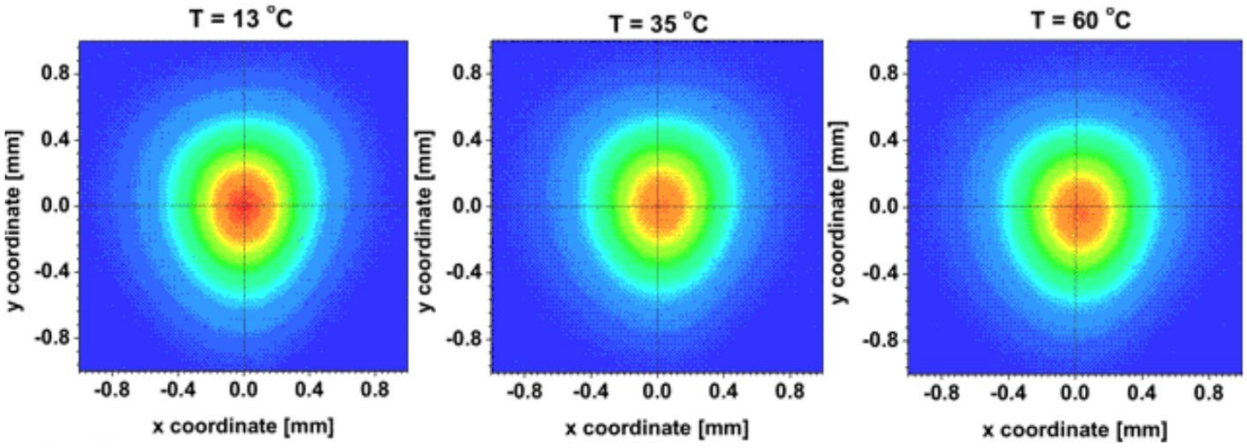


Chirped Pulse Amplification System with 2 PicoPulse™ Filters



Stable Output Profile Across a Wide Range of Temperatures

The output beam reflected from PicoPulse™ gratings after both stretching and re-compression maintains the high quality of the input mode. Spatial profile and free-space efficiency remain stable even over a wide range of temperatures. The images below show the output beam profiles measured after 1.5m of free-space propagation at 13°C, 35°C, and 60°C.



Smoothly Varying Linear Chirp