Electro-Optic Laser Frequency Combs

Summary: Electro-optic laser frequency combs (EO Combs) from Octave Photonics provide a reliable method for generating femtosecond frequency combs at repetition rates between 5 and 30 GHz. Octave Photonics specializes in building EO combs with ultra-low phase noise, octave-spanning bandwidth, and femtosecond pulse durations. Applications include spectrograph calibration and dual-comb spectroscopy.

Specification	Base EO Comb	Broadened EO comb
Repetition rate	5 to 30 GHz	5 to 30 GHz
Repetition rate tuning range	1+ GHz	5 MHz (typical)
Center wavelength*	1550 nm	1550 nm
Output power	Up to 5 Watts	Up to 5 Watts
Pulse duration	0.8 to 1.5 ps	As short as 20 fs
Dimensions**	0.65 x 0.3 x 0.2 m	2 x 1 x 0.5 m

*Contact Octave Photonics for additional custom wavelength options.

**Dimensions depend on configuration and do not include electronics rack.

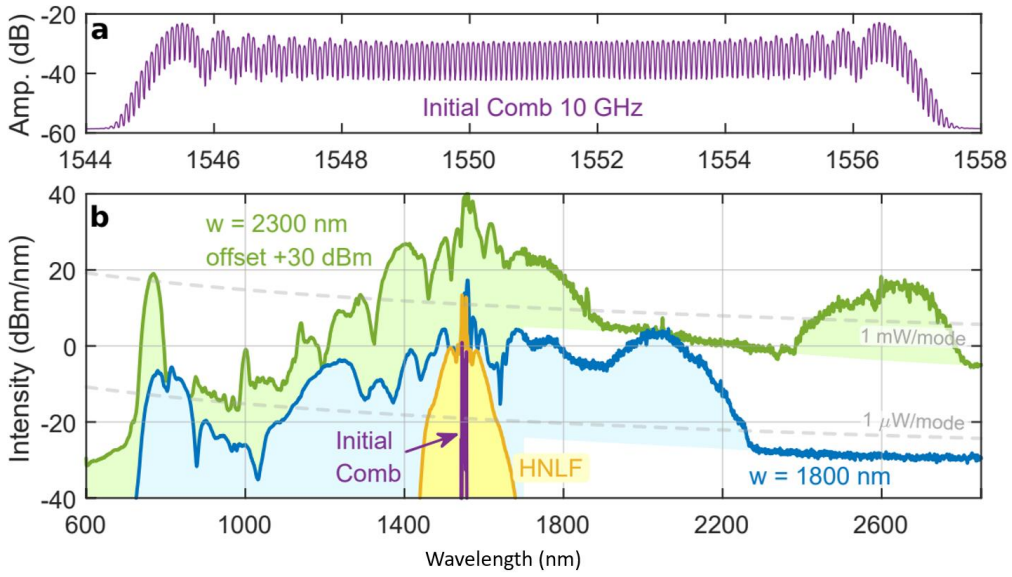
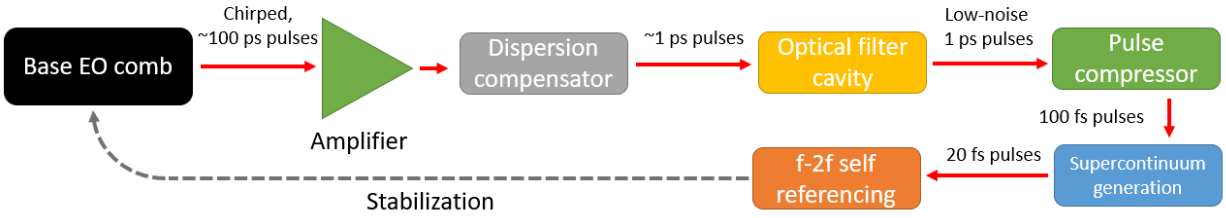


Figure 1. (Top) The spectrum of the base EO comb, with 10 GHz comb teeth visible. (Right) The green and blue lines show the EO comb spectrum after broadening in nanophotonic waveguides.

Customization

The EO combs from Octave Photonics are highly customizable, depending on the desired output. In full form, the base EO comb is combined with an amplifier, dispersion compensator to provide 1 ps pulses, which then pass through an optical filter cavity to produce a low-noise pulse train. These pulses then enter the pulse compressor, where their duration is reduced to 100 fs. Finally, supercontinuum generation in a nanophotonic waveguide produces an octave spanning spectrum, which is used for f-2f self-referencing and stabilization of the carrier-envelope-offset frequency of the EO Comb. Octave Photonics can also assist with the integration of EO combs with applications.



References

For more information about ultrashort pulses from ultrastable electro-optic combs, see:
Carlson et al., “Ultrafast electro-optic light with subcycle control,” *Science* **361**, 1358 (2018).
doi.org/10.1126/science.aat6451
arxiv.org/abs/1711.08429

To learn more about how EO combs can be used for exoplanet detection, see:
Metcalf et al., "Stellar spectroscopy in the near-infrared with a laser frequency comb," Optica **6**, 233-239 (2019).
doi.org/10.1364/OPTICA.6.000233
arxiv.org/abs/1902.00500