

Octave Photonics releases the Comb-Offset Stabilization Module (COSMO) simplifying frequency-comb stabilization

Louisville, Colorado — December 1, 2022 — Culminating years of research and development, Octave Photonics announces the release of the Comb-Offset Stabilization Module (COSMO), which provides a compact, convenient, and rugged solution for f - $2f$ self-referencing a laser frequency comb. Additionally, the COSMO allows the carrier-envelope-offset (CEO) frequency to be detected with exceptionally low pulse energies, enabling frequency combs with reduced power consumption and higher repetition rates.

Simplified Comb Stabilization: Laser frequency combs are critical for building optical atomic clocks and precision spectroscopy systems. Conventional methods of stabilizing a frequency comb's CEO frequency require considerable expertise to implement and greatly increase the size, weight, and power of the system, limiting field- and space-based applications. The COSMO is a ready-to-use module that contains a nanophotonic waveguide for supercontinuum generation, a second-harmonic generation material, and a detector, forming a compact and robust method for detecting the CEO frequency of a frequency comb.

Comb stabilization with ultra-low pulse energies: By using nanophotonic waveguides, the COSMO can detect the CEO frequency of a laser frequency comb with extraordinary low pulse energies. The COSMO can operate with as low as 120 pJ, an improvement of approximately 5 to 10x compared with previous techniques. This enables the stabilization of frequency combs with low average power and with high repetition rates.

Proven capabilities: Customers around the world are already turning to COSMO to construct their cutting-edge frequency combs. For example, projects constructing next-generation portable optical atomic clocks are using the COSMO as a key component. *"The COSMO has enabled us to dramatically reduce the optical power, and ultimately the electrical power consumption, of our portable frequency combs for use in real-world applications,"* reports Kevin Knabe, Director of Research and Development at Vescent Photonics.

Accessing higher repetition rates: Additionally, the COSMO facilitates the stabilization of lasers at GHz repetition rates. *"Self-referencing frequency combs can be challenging and often requires very specialized know-how,"* says Florian Emaury, CEO of Menhir Photonics, *"The COSMO is game-changer for the field of stabilized frequency combs because we finally have a commercial CEO frequency detector that is essentially turn-key, while providing better performance than conventional fiber solutions."*

Product availability: The COSMO is available for order now. Visit the Octave Photonics webpage for more information: www.octavephotonics.com. A video about the COSMO can be viewed on the Octave Photonics YouTube channel: <https://www.youtube.com/watch?v=PersBMHjVEs>.

Company: Founded in 2019, Octave Photonics is a pioneer in the development of ready-to-use devices based on nonlinear nanophotonic chips. Octave Photonics also manufactures fiber-optic-packaged devices for supercontinuum generation and electro-optic frequency combs at 5-to-30 GHz repetition rates. Octave Photonics assembles devices in their facility in Louisville, Colorado, USA.



Product Photo:

Caption: Photograph of the Octave Photonics Comb-Offset Stabilization Module. Light from the frequency comb enters the device via the optical fiber on the right side of the module. The electrical signal containing the carrier-envelope-offset (CEO) frequency is provided on the SMA connector on the left side of the module. The mini-DB connector on the front of the module is used to provide power to the detector and to interface with the (optional) thermo-electric cooler and temperature sensor, which can be used to stabilize the temperature of the nanophotonic chip for operation in extreme environments.

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