

# SINGULAR LIGHT

A diamond-based universal multi-mode to single-mode laser converter.

*Singular Light: Integrated Single Mode Laser Converter, is an efficient, simple device that relies on Raman laser conversion for generating a single longitudinal mode (SLM) laser output.*



*The configuration offered by Singular Light not only offers a more robust generation of SLM lasers compared to conventional techniques, but it also allows ease of adjustment of the output laser frequency. These characteristics make the technology a perfect fit to answer the requirements of many areas of optical metrology and interferometry, from data storage to optical communications. With the advent of diamond quantum computing, Singular Light also presents a unique opportunity for the integration of compact laser sources on a diamond photonic chip.*

## FEATURES

- Efficient generation of a single longitudinal mode (SLM laser with a very small linewidth and low phase noise, already demonstrated an enhancement of 100x of peak power spectral density with > 40% average power conversion efficiency.
- Laser output exhibits a rather long coherence length (from 10 up to 1000 metres), with a Fourier limited output of ~100 MHz linewidth.
- Frequency-shifted laser output, with respect to the laser pump input by 30 - 50 nm, providing access to new wavelengths.
- Ease of adjustment of the output laser frequency via length tuning of monolithic diamond resonator via angle or temperature.
- Extremely simple optical configuration, compared to conventional methods of generating SLM lasers
- Resilient against mode competition thanks to spectral hole burning free Raman gain technology.
- Robust to external disturbances, thanks to complete integration of laser into a diamond host and no need for free-space optical components.
- Single mode in both the longitudinal and transversal direction.

## IP STATUS

- The Singular Light technology was co-developed by CERN and Macquarie University, Australia. It stemmed out of the necessity of achieving a simple, efficient and agile multi-mode to single mode converter.
- The technology was further developed through a CERN KT Fund project (2019 – 2020).
- The IP is owned by CERN and a patent application has been filed on the technology in 2 020.

## CONTACT

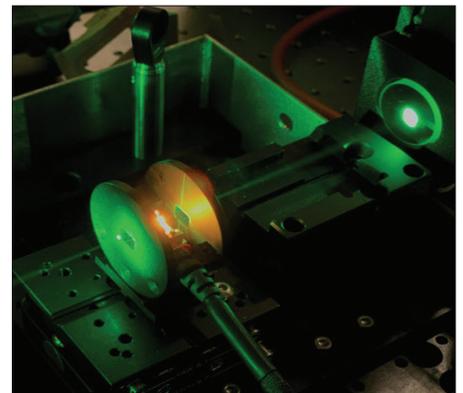
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## APPLICATIONS

- Optical metrology and interferometry
- Light detection and ranging (LIDAR)
- High-resolution spectroscopy
- Optical data storage
- Optical communications
- On-chip diamond light sources
- Quantum computing and memory
- Holography



technology

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