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LASER ASSEMBLY, SPECTROMETER AND METHOD FOR OPERATING A LASER

A new technique enables the stabilization of frequency modulated (FM) type semiconductor laser frequency combs, while maintaining the intermodal coherence and phase profile to make them more controllable and more robust against various types of noise, fluctuations and drifts, as well as optical feedback.

BACKGROUND

Compact optical frequency combs are extremely important sources, as they enable various techniques while providing the possibility of miniaturization. Especially in the mid-infrared, they can enable miniaturized, as well as high speed optical spectrometers for various application in analytical chemistry.

TECHNOLOGY

Microscope image of an interband cascade laser frequency comb chip with optimized radio-frequency injection contacts.

The presented technique is a cost-effective method to generate and stabilize optical frequency combs with different types of semiconductor lasers, e.g. interband cascade lasers and quantum cascade lasers. This technique enables the stabilization of forced FM type combs, free-running FM type combs or FM type combs oper-ating in the high phase noise regime, while maintaining the intermodal coherence and phase profile to make them more robust against various types of noise, fluctuations and drifts, as well as optical feedback. This enables much sim-pler optical setups without the need of optical insulators. In particular it enables dual-comb spectrometers, where a part of the emitted light is reflected back from the scene that contains the analyte into the lasers. Such a setup is scalable and can potentially be realized on a single chip.

ADVANTAGES

- Gaining more control over the FM combs
- More stability against thermal and current fluctuations
- Higher stability against optical feedback
- Enables cost-effective implementation

REFERENCE:
M027/2018

DEVELOPMENT STATUS:
Labscale proof-of-concept
TRL 4-5

APPLICATIONS:
High precision dual-comb / spectroscopy /
optical communication

KEYWORDS:
frequency modulated combs, frequency comb stabilization, semiconductor laser

IPR:
EP patent pending
US patent pending
WO2020/030772 A1

OPTIONS:
R&D cooperation,
Development partnership,
License agreement

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