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Accession number:20123715436815

Title:Frequency and amplitude stabilized terahertz quantum cascade laser as local oscillator

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Source title:Applied Physics Letters

Abbreviated source title:Appl Phys Lett

Volume:101

Issue:10

Issue date:September 3, 2012

Publication year:2012

Article number:101111

Language:English

ISSN:00036951

CODEN:APPLAB

Document type:Journal article (JA)

Publisher:American Institute of Physics, 2 Huntington Quadrangle, Suite N101, Melville, NY 11747-4502, United States

Abstract:We demonstrate an experimental scheme to simultaneously stabilize the frequency and amplitude of a 3.5 THz third-order distributed feedback quantum cascade laser as a local oscillator. The frequency stabilization has been realized using a methanol absorption line, a power detector, and a proportional-integral-derivative (PID) loop. The amplitude stabilization of the incident power has been achieved using a swing-arm voice coil actuator as a fast optical attenuator, using the direct detection output of a superconducting mixer in combination with a 2nd PID loop. Improved Allan variance times of the entire receiver, as well as the heterodyne molecular spectra, are demonstrated. © 2012 American Institute of Physics.

Number of references:16

Main heading:Quantum cascade lasers

Controlled terms:Mass spectrometry - Methanol - Molecular spectroscopy

Uncontrolled terms:Allan variance - Amplitude stabilization - Direct detection - Distributed feedback - Experimental scheme - Frequency stabilization - Incident power - Local oscillators - Methanol absorption - Molecular spectra - Optical attenuators - Power detectors - Proportional integral derivatives - Superconducting mixers - Terahertz quantum-cascade lasers - Third-order - Voice coil actuators

Classification code:741.3 Optical Devices and Systems - 744.1 Lasers, General - 801 Chemistry -

804.1 Organic Compounds

DOI:10.1063/1.4751247

Database:Compendex

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