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Maria Amanti animera un séminaire le 18 mars prochain.
Vous pouvez diffuser cette information à des collègues pouvant être intéressés par cette conférence.

Séminaire Foton / équipe Systèmes Photoniques
le mercredi 18 mars 2015, 11h-12h (salle 110I)

High frequency modulation of Quantum Cascade Lasers

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Quantum cascade lasers are today very attractive powerful semiconductor light sources in a wide frequency range, spanning from the THz region up to 3µm wavelength in the mid-infrared. High frequency modulation and microwave injection at the round trip frequency of these sources are extremely interesting for application as free space communications and high resolution spectroscopy. In this work we present the design of QC laser dielectric guide embedded in a micro strip line. In this structure the modulation field oscillating at GHz frequency experiences reduced losses and it has an improved overlap with the optical mode respect to standard QCL. We present experimental results on direct modulation of these devices demonstrating a flat frequency response up to 14 GHz. We present the locking of the laser inter-mode spacing to an external stable source and its tuning in the MHz range. Properties of self-stabilization of these cavities are also studied: narrow beating signal at the round trip frequency are presented with typical width of less than 100 kHz, more than one order of magnitude lower than in standard guide. This phenomenon will be presented in the frame of a nonlinear formalism based on the cascading of two second order susceptibilities. This process is demonstrated to be enhanced respect to other cavities by the specific double metal design presented in this work.

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