**Broadband Multimode Emission of Quantum Cascade Lasers in Strong Magnetic Fields**

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An external magnetic field applied to a quantum cascade laser (QCL) structure in the direction of the epitaxial growth splits all two-dimensional subbands in the upper and lower laser levels as well as the injector/collector bands into a discrete set of Landau sublevels and leads to quantization of the electron in-plane motion [1-5]. This feature offers a possibility to tailor the relaxation, scattering and diffusion rates on the active laser levels and thus to impact the QCL lasing dynamics, which is an especially handful tool for shaping the multimode self-pulsation or QCL frequency comb regimes. One well-known example is the lowering of the QCL lasing threshold in a magnetic field. Another case, which we studied here is the use of the magnetic field to favor the multimode Risken-Nummedal-Graham-Haken (RNGH) self-pulsations seen in the optical spectrum as two very broad modulations sidebands at the Rabi flopping frequency [6]. Our recent studies showed that the excitation threshold for the broadband multimode RNGH self-pulsations is mainly conditioned by the net relaxation rates of the carrier coherence and population gratings due to the inter-subband relaxation, scattering and diffusion of carriers [7,8]. In this work, we show that the Landau quantization in an external magnetic field slows down the effective decoherence and diffusion rates. The pump current required to reach the broadband multimode RNGH self-pulsations (or a QCL frequency comb regime) is lowered with the magnetic field strength while the Rabi flopping frequency and the overall optical spectrum width remains practically unchanged. Our theoretical results indicate that an external magnetic field can be a valuable tool for achieving high-power broadband QCL frequency comb emission in practice.

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