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Title:RF injection-locking of terahertz quantum cascade lasers

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Abstract:It is demonstrated that the cavity resonance frequency - the round-trip frequency - of terahertz quantum cascade lasers can be injection-locked by direct modulation of the bias current using an RF source. Metal-metal and single-plasmon waveguide devices with round-trip frequencies up to 35GHz have been studied, and show locking ranges above 200MHz. A square-root dependence of the locking range with RF-power was found to be in agreement with classical injection-locking theory. Inside this locking range the laser round-trip frequency is phase-locked, with a phase noise determined by the RF-synthesiser, leading to the generation of modelocked pulses with low timing jitter.

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