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Title:Terahertz quantum-cascade laser with active leaky-wave antenna

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Abstract:We report the demonstration of a one-dimensional waveguide for terahertz quantum-cascade (QC) lasers, which acts as a leaky-wave antenna and tailors laser radiation in one dimension to a directional beam. This scheme adapts microwave transmission-line metamaterial concepts to a planar structure realized in terahertz metal-metal waveguide technology. The active leaky-wave antenna is fed by a master oscillator QC-laser with a mode that propagates with an effective phase index smaller than unity, such that it radiates in the surface direction. The direction of emission of main beam is governed by the antenna dispersion characteristic. 25° of beam steering is observed as the lasing frequency of the QC-laser is varied from 2.65-2.81 THz.

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