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Title:Perfectly phase-matched third-order distributed feedback terahertz quantum-cascade lasers

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Abstract:We report a novel laser cavity design in third-order distributed feedback (DFB) terahertz quantum-cascade lasers based on a perfectly phase-matching technique. This approach substantially increases the usable length of the third-order DFB laser and leads to narrow beam patterns. Single frequency emissions from 151 apertures (5.6 mm long device) are coherently added up to form a narrow beam with (FWHM &asyum; 6 × 11°) divergence. A similar device with 40 apertures shows more than 5 mW of optical power with slope efficiency ∼140 mW/A at 10 K pulsed operation. © 2012 Optical Society of America.