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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  $\approx$  6  $\times$  11 $^\circ$ ) divergence. A similar device with 40 apertures shows more than 5 mW of optical power with slope efficiency  $\approx$  140 mW/A at 10 K pulsed operation.  $\copyright$  2012 Optical Society of America.

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