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Phase-locking in Y-coupled Quantum Cascade Lasers GOTTFRIED STRASSER, SUNY at Buffalo, NY, L.K. HOFFMANN, S. SCHARTNER, M. AUSTERER, E. MUJAGIC, M. NOBILE, W. SCHRENK, A.M. ANDREWS, P. KLANG, TU Vienna, Austria — A variety of spectroscopic applications call for powerful coherent light sources in the mid and far infrared spectrum [1]. In the past decade this demand has promoted quantum cascade lasers (QCLs) to become crucial light sources for sensing chemical components in the gaseous and liquid phase [2]. Waveguide coupling has pushed forward major developments to fulfill the demands of today's spectroscopers, such as high power output, stable single longitudinal mode operation, narrow spectral linewidth, and frequency tunability. In this work, a monolithic coupling scheme in which two active waveguides merge into a single waveguide is presented for GaAs/AlGaAs quantum cascade lasers [3]. The evolving fields interfere and a constant phase is observed in the Y-shaped laser cavity, resulting in a far field profile of a double slit. The mode distribution is comprehensively derived by matching the farfield profiles to simulated values and shows a weak temperature and current dependence. The concept enhances the output power of a single facet coherent mid-infrared emitter and opens possibilities for monolithic interferometric sensing devices. [1] F. K. Tittel et al., Top. Appl. Phys. 89, 445(2003). [2] G. Wysocki et al., Appl. Phys. B 81, 769 (2005). [3] L. K. Hoffmann et al., Appl. Phys. Lett. 91, 17 (2007).

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