

Temporal coherence of a photonic crystal microcavity laser

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Temporal coherence of an optically pumped continuous-wave photonic crystal (PhC) nanocavity laser is investigated using interference experiments at room temperature. The laser operates at $1.3\ \mu\text{m}$ with InAs quantum dot gain material [1] and has a spontaneous emission coupling factor $\beta = 0.9$. The coherence around the laser threshold of such a high- β laser is interesting because spontaneous emission efficiently couples to the lasing mode. The output power dependence of the coherence length of the PhC microcavity laser shows linearity at and above threshold according to the Schawlow-Townes relation. This result indicates that the high- β laser has high first order coherence even at the threshold, due to better coupling of spontaneous emission into the cavity mode.

[1] M. Nomura, S. Iwamoto, Y. Arakawa, *et al.*, *Opt. Exp.* **14**, 6308 (2006).

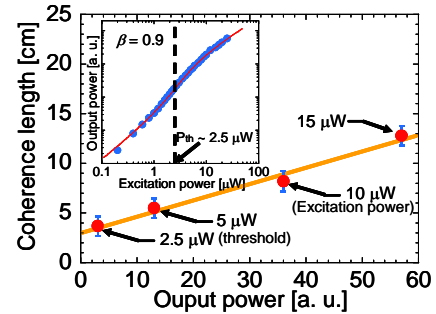


Fig. Coherence lengths measured at various output power. The inset shows light-in versus light-out plots.