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Manipulating frequency comb regimes in semiconductor ring lasers

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Abstract

It is a well-established truth that spatial hole burning (SHB) in a standing-wave cavity is an essential single-mode instability mechanism for multimode operation of quantum cascade lasers (QCLs). We discovered recently that another instability mechanism—phase turbulence—is capable of triggering an onset of previously unseen types of frequency combs in traveling-wave ring cavity QCLs in absence of SHB. This new regime of laser operation reveals a connection with Kerr combs and paves the way to manipulation and engineering of comb states in QCLs.

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