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【181】Engineering the spectral bandwidth of quantum cascade laser frequency combs

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Quantum cascade lasers facilitate compact optical frequency comb sources that operate in the mid-infrared. Enhancing the optical bandwidth of these chip-sized lasers is important to address their application in broadband high-precision spectroscopy. We provide an investigation of the comb spectral width and show how it can be optimized to obtain its maximum value. The interplay of nonoptimal values of the resonant Kerr nonlinearity and the cavity dispersion can lead to significant narrowing of the comb spectrum. The implementation of highlosses is shown to be favourable and finally injection locking of QCLs around the roundtrip frequency provides a stable knob to control the FM state and recover the maximum width.

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