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Light Instability in Pulsed Quantum Cascade Lasers[1] YUTING HUANG, Princeton University, YU YAO, Princeton University and MIRTHE, KAIS AL-NAIMEE, National Institute of Applied Optics, University of Florence, Florence, Italy, CLAIRE GMACHL, Princeton University and MIRTHE, MIRTHE TEAM — The instability observed in the light output of high power, pulsed Quantum Cascade (QC) lasers is investigated for potential periodic behavior. We built a set-up to monitor the real-time pulse shape of up to 5,000 sequential light pulses at a fixed pulsed current. In analyzing the data, we use the Fast Fourier Transform to find their frequency components. We found likely quasi-periodic behavior, as well as a broader range of frequencies around the fundamental pulse frequency. To also research a potential spatial component in the laser instability, i.e. beam steering, we modified the set-up to split the beam spatially into two parts, each monitored in real-time over 5,000 pulses. A correlation between the two pulse trains on the two detectors separates the spatial and pure power components of the instability. Subsequently eliminating this instability will help to achieve QC lasers with optimal performance.

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