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[413] Generation of pure amplitude and frequency modulation in a quantum cascade laser using an integrated heater

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Sensitive spectroscopic methods for trace gas detection in the mid-infrared range often involve a modulated quantum cascade laser (QCL). Pure frequency modulation (FM) or amplitude modulation (AM) is preferable, while modulating the QCL current results in a combined AM-FM. Here, we demonstrate pure AM or FM realized with a QCL equipped with an integrated resistive heater (IH). By applying modulation signals with proper amplitude and phase to the QCL and IH currents, we show a reduction of the AM by more than 20 dB at two characteristic modulation frequencies of 1 kHz and 10 kHz, resulting in a pure FM, or vice-versa.

Author: Mr SHEHZAD, Atif (University of Neuchatel)

Co-authors: MULLER, Antoine (Alpes Lasers SA); Mr BROCHARD, Pierre (University of Neuchatel); Mr MATTHEY, Renaud (University of Neuchatel); Mr MAULINI, Richard (Alpes Lasers SA); Dr SCHILT, Stephane (University of Neuchatel); Mr BLASER, Stéphane (Alpes Lasers SA); Prof. SÜDMEYER, Thomas (University of Neuchatel); Mr GRESCH, Tobias (Alpes Lasers SA)

Presenter: Mr SHEHZAD, Atif (University of Neuchatel)

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