

High-efficiency external-cavity quantum-cascade-laser sources for high-precision gas analysis

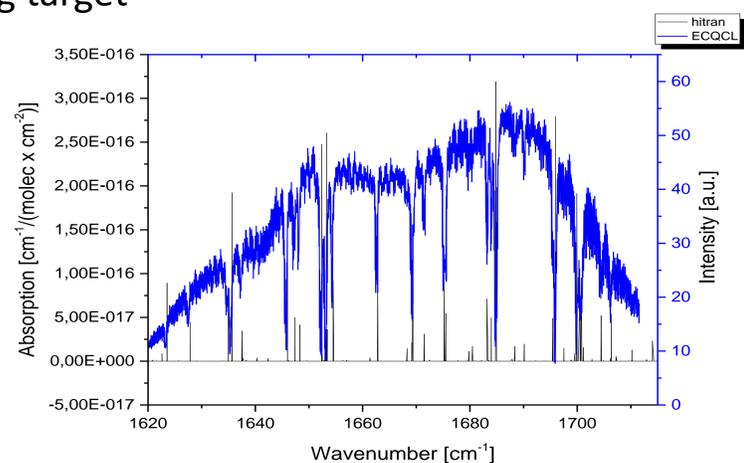
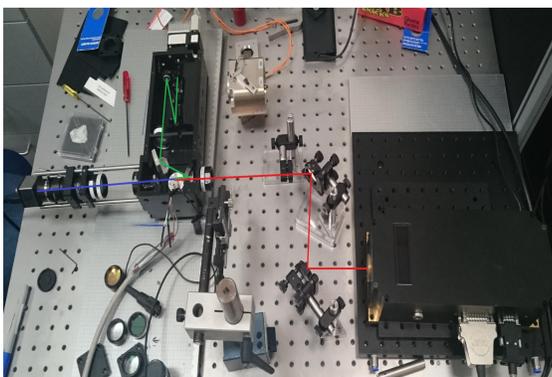
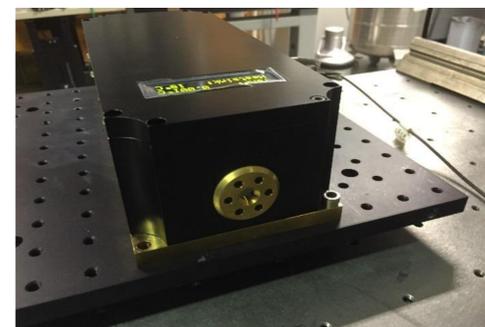
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Long-term goals:

- ❖ Realize an **external cavity quantum cascade laser (ECQCL)**
- ❖ Based on feedback provided by our partners, **optimize the next design** with focus on efficiency, beam quality, and stability
- ❖ Investigation of **transverse mode hopping** and the low-frequency signal/noise in QCLs toward implementation in high-sensitivity signal detection.
- ❖ Working with partners to **optimize signal/noise** in detection of MIR sources.

Achieved results:

- ✓ Characterized and **delivered an ECQCL** at 6 μm (D2.2)
 - Tunable from 5.78 to 6.19 μm
 - Average power up to 4.5 mW
- ✓ Performed set of **experiments with our partners** at DTU and EXON
 - Successful up-conversion throughout entire tunability range of the laser
 - Successful capture of fine details on imaging target



Current work:

- In process of making **another laser** with improved anti-reflection (AR) coating and superior beam quality at a different wavelength
- **Continue making measurements** with the current laser
- Investigation of **waveguide** designs

Secondments:

- ✓ **DTU** – M 20 – 2 weeks : Hyperspectral imaging, planned joint publication
- **ULUND** – M 30 – 1 month
- **QUA (PO)** – M33 – 1 month