

These experimental data files have been obtained by Dr Dmitry Revin (EEE department, The University of Sheffield, UK) in 2021 while working on the EPSRC (UK) project (EP/S025944/1) "Multi-band optical coherence tomography platform for the development of novel atopic dermatitis treatments".

These files have been used in preparation for the paper "Fast-sweeping continuous wave quantum cascade laser operating in an external cavity with polygon mirror" published in Optics Express (2022). For all the details and comments please refer to this paper.

*.atb files - the detector output signals (2 detectors) in time (only when the quantum cascade (QC) laser emits) which were recorded/processed by a 12-bit, 2 channels, 1 kS/s – 500 MS/s waveform ATS9350 digitizer (AlazarTech. Inc., Canada). All the detector signals have been measured with AC coupling, however, there is some DC level between the laser sweeps.

How to read *.atb files – see the MatLab example files in the folder "MatLab files to read .atb files".

For Fig.2:

The file: pol206.atb – the detector signals for the QC laser output when the polygon mirror is rotating at 24,000 RPM. 1 second, 4,000 records, 6,240 points in each record, sampling rate: 125 MS/s (8 ns between the points).

Laser current: 0.86 A, laser voltage: 10.38 V, temperature: 15 C, ND filters: N3 & N4, digitizer range: +/-2 V.

The file: 13_15 - water transmission spectrum, measured with an FTIR.

For Fig.3:

The detector signals for the QC laser output when the polygon mirror is rotating at 6,000 RPM.

The file: pol062.atb – short to long wavelengths sweep, 6.1-6.5 um sweep,

The file: pol064.atb – long to short wavelengths sweep, 6.5-6.1 um sweep.

1 second, 1,000 records, 20,800 points in each record, sampling rate: 125 MS/s (8 ns between the points).

Laser current: 0.8 A, temperature: 18 C, ND filters: N2 & N3.

For Fig.4.

Michelson Interferometer set-up.

The detector signals for the QC laser output when the polygon mirror is rotating at 6,000 RPM. Each file is recorded for 1 mm gradual movement step of the interferometer mirror from 0 to 26 mm (changing the OPD (optical path difference) from 0 to 52 mm). OPD is equal to twice the mirror movement.

1 second, 1000 records, 24,960 points in each record, sampling rate: 125 MS/s (8 ns between the points), laser current: 0.86 A, laser voltage: 10.38 V, temperature: 15 C, ND filters: N2 & N3, digitizer range: +/-1 V.

The files are from pol207.atb to pol233.atb.

pol207.atb – OPD=0 mm, pol208.atb – OPD=2 mm, pol209.atb – OPD=4 mm, pol210.atb – OPD=6 mm, pol211.atb – OPD=8 mm, pol212.atb – OPD=10 mm, pol213.atb – OPD=12 mm, pol214.atb – OPD=14 mm, pol215.atb – OPD=16 mm, pol216.atb – OPD=18 mm, pol2170.atb – OPD=20 mm, pol2171.atb – OPD=20 mm, pol218.atb – OPD=22 mm, pol219.atb – OPD=24 mm, pol220.atb – OPD=26 mm, pol221.atb – OPD=28 mm, pol222.atb – OPD=30 mm, pol223.atb – OPD=32 mm, pol224.atb – OPD=34 mm, pol225.atb – OPD=36 mm, pol226.atb – OPD=38 mm, pol227.atb – OPD=40 mm, pol2271.atb – OPD=40 mm, pol228.atb – OPD=42 mm, pol229.atb – OPD=44 mm, pol230.atb – OPD=46 mm, pol231.atb – OPD=48 mm, pol232.atb – OPD=50 mm, pol233.atb – OPD=52 mm.

For Fig.5.

The file 12_33 (13_23) – the spectrum of the QC laser measured with an FTIR, old one which was used for a previous version of the figure (new one, which is used for the present version of the figure).

The file 13_15 – the water vapor transmission, measured with an FTIR.

For Fig.6.

Acetophenone transmission spectra.

The detector signals for the QC laser output when the polygon mirror is rotating at 24,000 RPM. 1 second, 4,000 records, 6,240 points each record, 125 MS/s (8 ns between the points). Laser current: 0.86 A, laser voltage: 10.38 V, temperature: 15 C, ND filters: N2 & N4.

The file pol253.atb – empty path for the calculation of the matching functions for two detectors.

The file pol254.atb – through 10-micron thick (between 5-mm thick CaF2 windows) acetophenone positioned before one of the detectors.

The file: Mon Oct 11 14-29-06 2021 (GMT+01-00) – transmission spectrum through 10-micron thick (between 5-mm thick CaF2 windows) acetophenone, measured by an FTIR.