



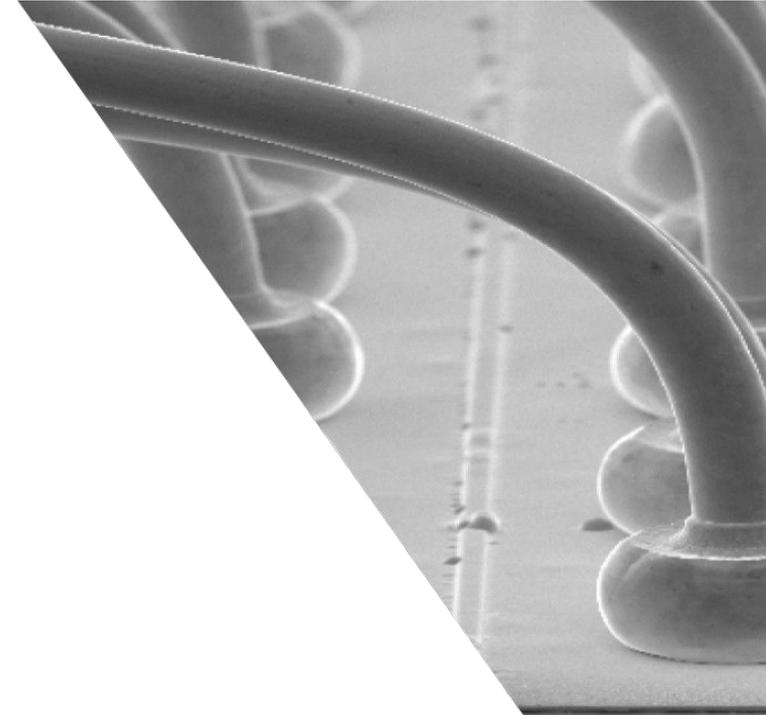
# Overview of Mid-IR Products at Alpes Lasers

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## Outline

- Company presentation
- Laser sources
- Mounting and packaging
- Projects and custom systems
- Q&A



**ALPES LASERS**

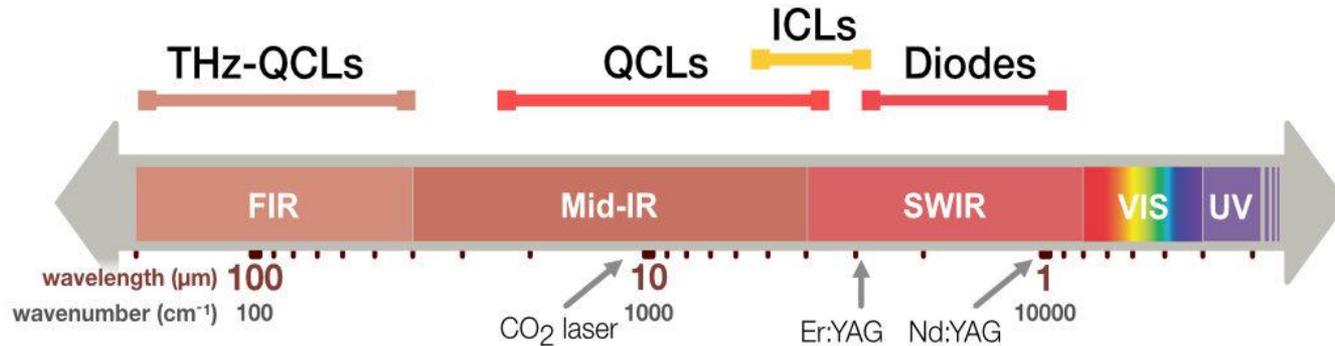
Quantum Cascade Technologies



## Design & production of infrared photonics

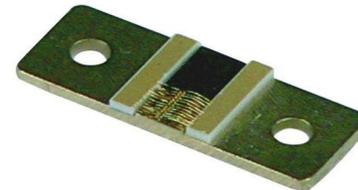
- First company to produce QCLs (founded 1998)
- Located in Neuchâtel, Switzerland
- Innovation driven
- High-level team of experts
- IPR - 12 major patents in QCLs

- Single-mode (DFB, QC-XT)
- Multi-mode (FP, Broad-gain, External Cavity, Combs)
- High-power (HP)



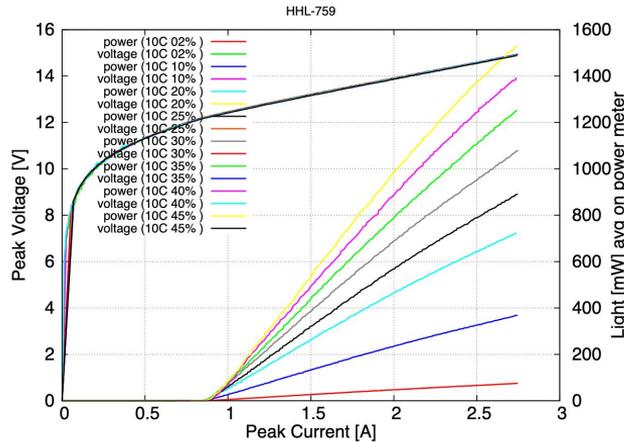
## Laser Sources - Single-mode QCLs

- Wavelength range from 4 to 16  $\mu\text{m}$
- Optical power from 1 - 100 mW
- Linewidth (Pulsed 300 MHz, CW  $\sim$ 1 MHz)
- Operation at room temperature or cooled
- 8 week lead time

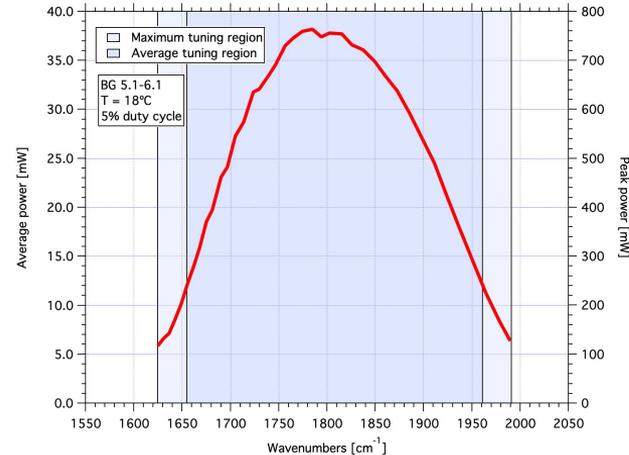


## Laser Sources - Multi-mode QCLs

- Optical power from 1 mW to 1 W (HP). Wavelength in range 4 - 14  $\mu\text{m}$ .
- Broad-gain devices (up to 250  $\text{cm}^{-1}$  spectral width)
- 8 week lead time



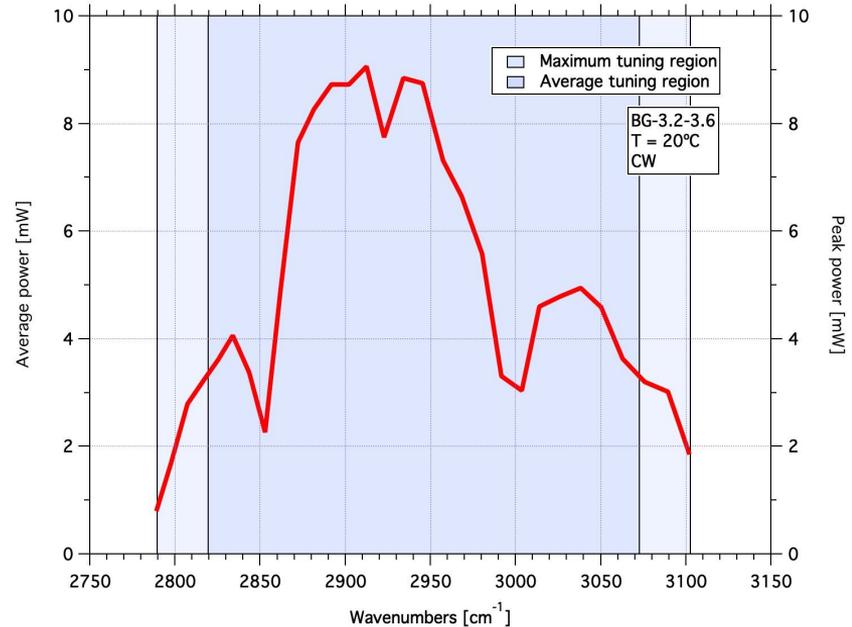
*High-power QCL in HHL*



*Broad-gain QCL in Alpes' External Cavity*

## Laser Sources - ICLs (New!)

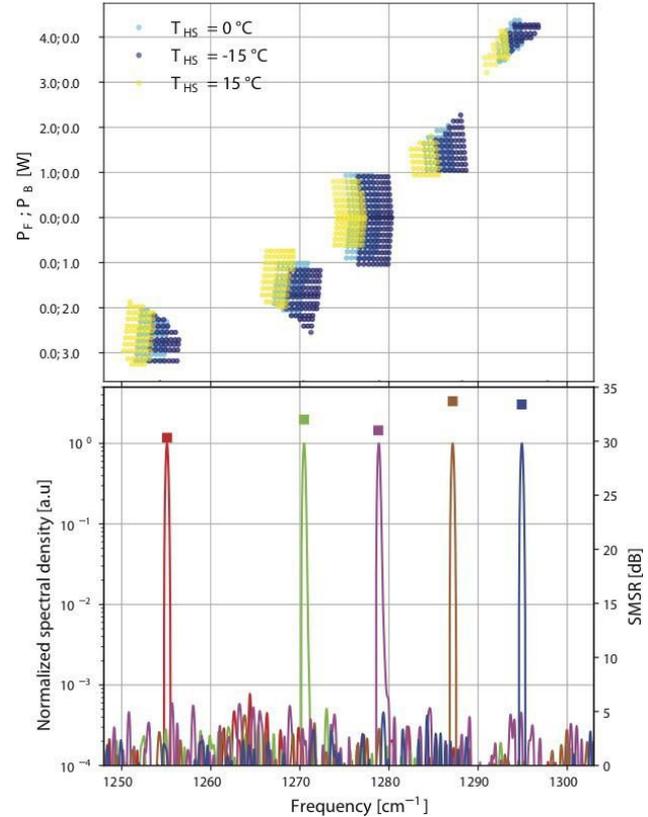
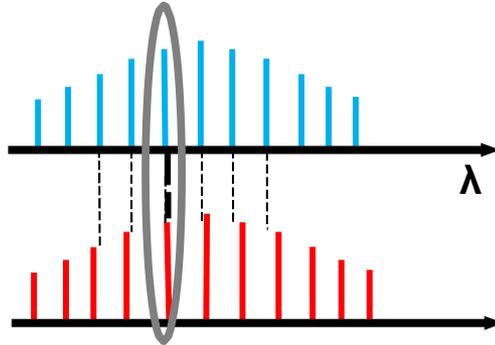
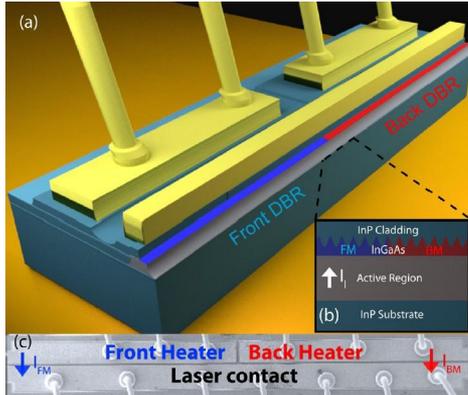
- Wavelengths from 3.2 - 3.6  $\mu\text{m}$
- Optical power up to 10 mW
- Broad-gain ICLs for first iteration
- Single-mode being tested
- 8 week lead time



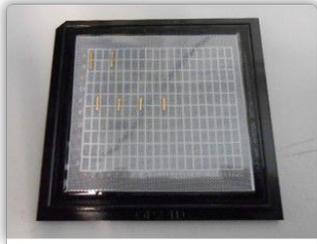
*ICL performance in Alpes' External Cavity*

## Laser Sources Showcase - QC-XT

- DFB performance with eXtended Tuning
- High CW power ( $> 100\text{mW}$ )
- Highly compact (single chip)
- Several lasers in one

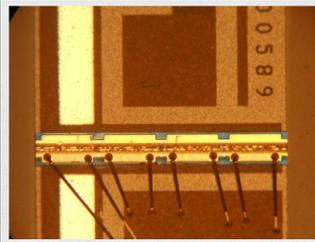


## Mounting and Packaging - pt. 1/2



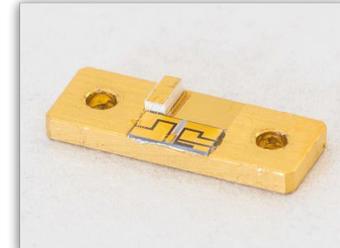
Bare chip

- Tested in pulsed mode
- Provided in Gel-Pak
- Ideal for large volumes



AlN submount

- Tested in pulsed and CW
- Improved heat transfer
- Easy product integration



Cu submount

- AlN on Cu
- Screw mounts
- Easy handling with LLH
- Different submounts based on needs

## Mounting and Packaging - pt. 2/2



TO3

- TEC + Lens
- Up to 3 W dissipation
- 38.8 x 25.4 x 20.5 mm
- For SWIR, TO66 used



HHL

- TEC + Lens
- Up to 15 W dissipation
- 44.5 x 31.7 x 19 mm
- Heat-sink with W/C available



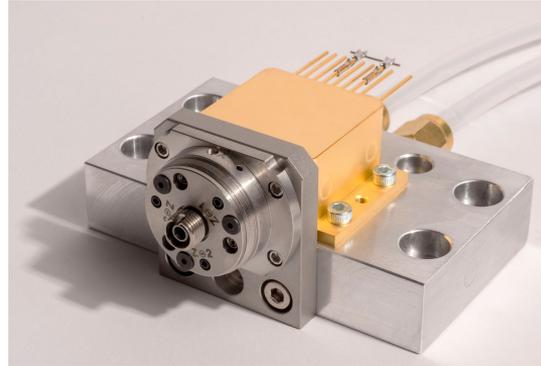
LLH

- TEC only
- Replaceable laser chip
- Watercooling circuit
- 100 x 50 x 50 mm

- External cavity laser kit (ECLK)
- High-compliance laser drivers
- Pigtailed lasers
- HHL heat sinks



*S2 QCL Pulser*



*Pigtailed HHL on heat sink*



*ECLK Exterior*

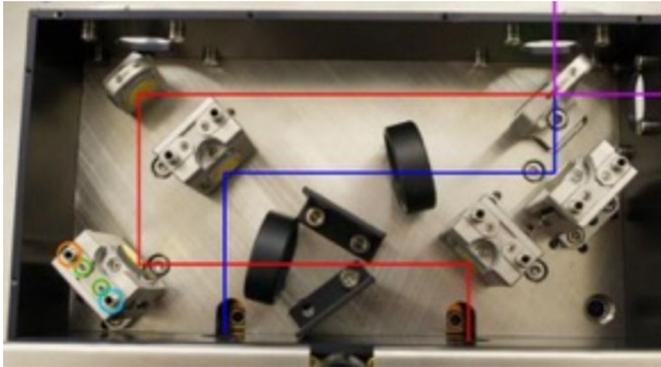
## R&D Projects and Custom Systems

- Raised over **11 M euro of project funding** in the last 4 years.
- Currently participating in **15 active EU Grants**, most active SME in Switzerland.
- Ideal for developing custom systems with specific needs.

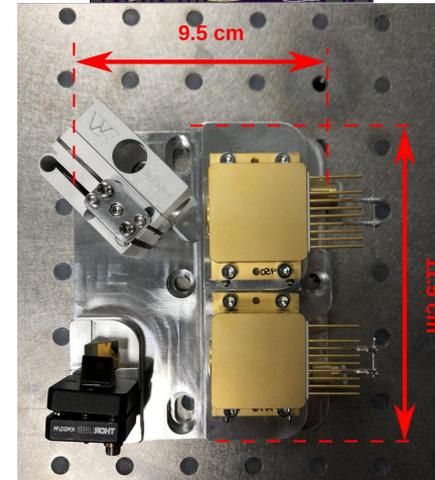
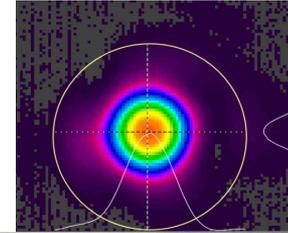


## Project Showcase - Hydroptics

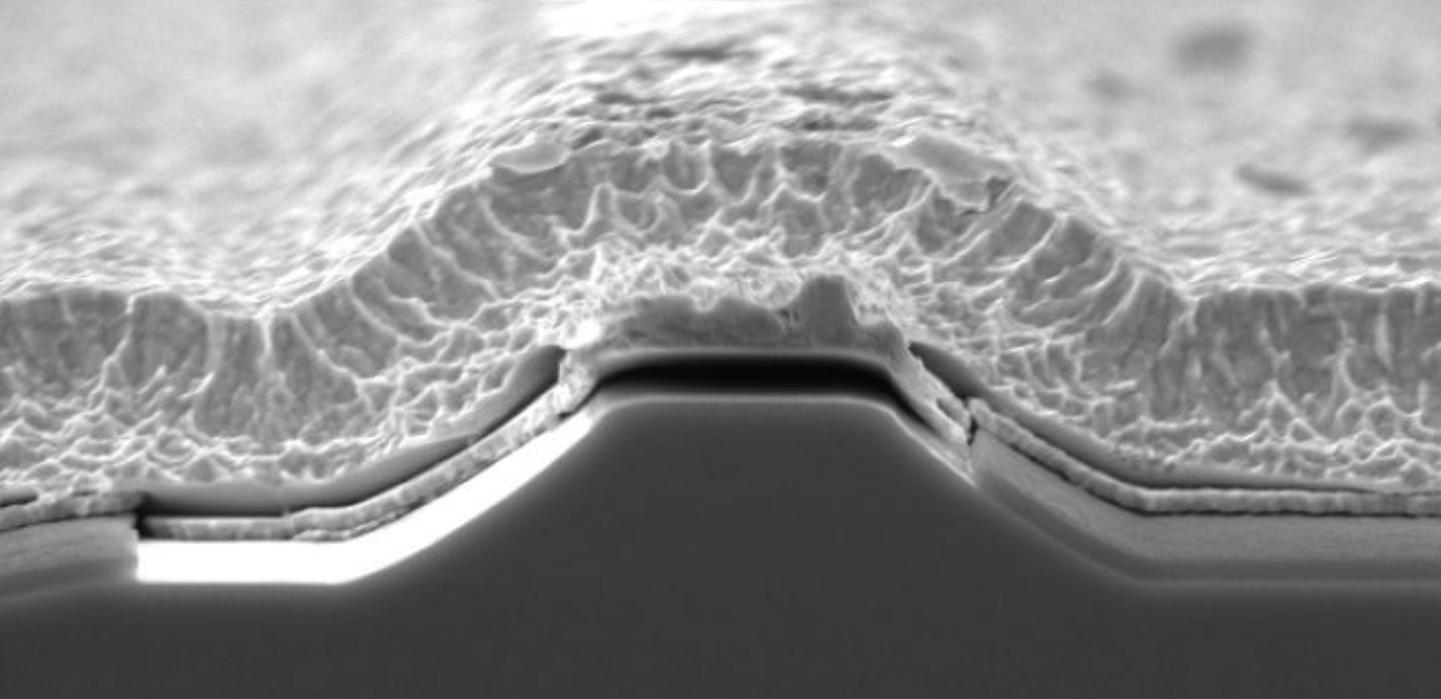
- Custom needs can be met with new systems
- Alpes offers expertise and manufacturing capability
- Exploration of new use cases in photonics
- Looking for partners for new projects!



*Internal view of comb beam combiner prototype used in Hydroptics project*



*DFB beam combiner used in Hydroptics project*



**ALPES  
LASERS**

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