



# To the industrial prototype of the repeater station

June 2, 2014

Florent Lyphout

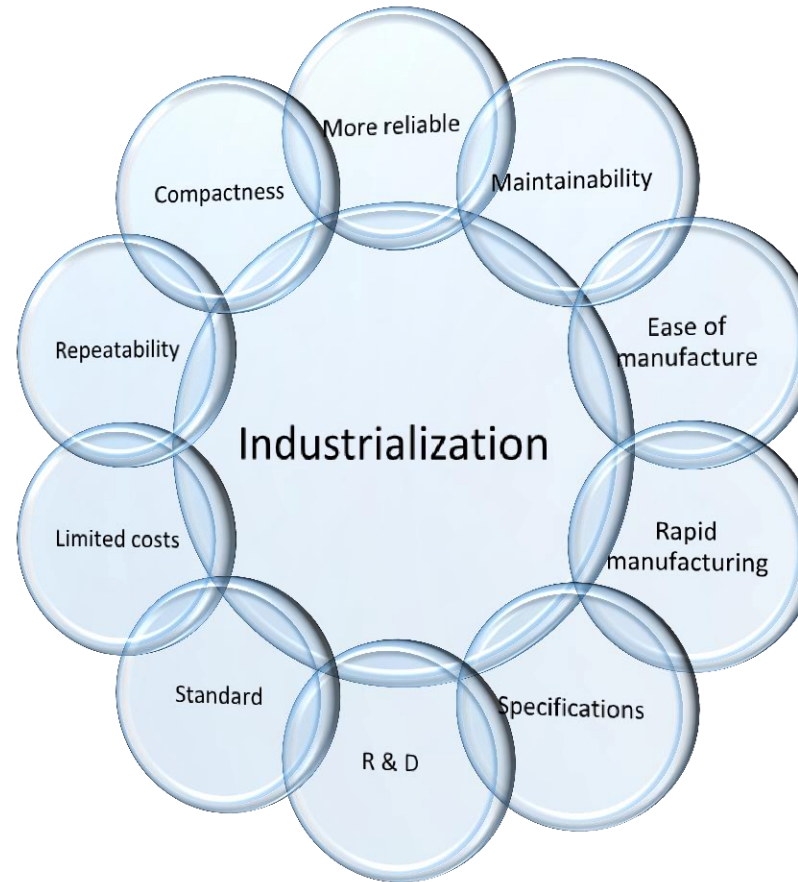


*System & components for science & industry*

# Summary

- Industrialization
- Interferometer
- Laser Source
- Laser lock

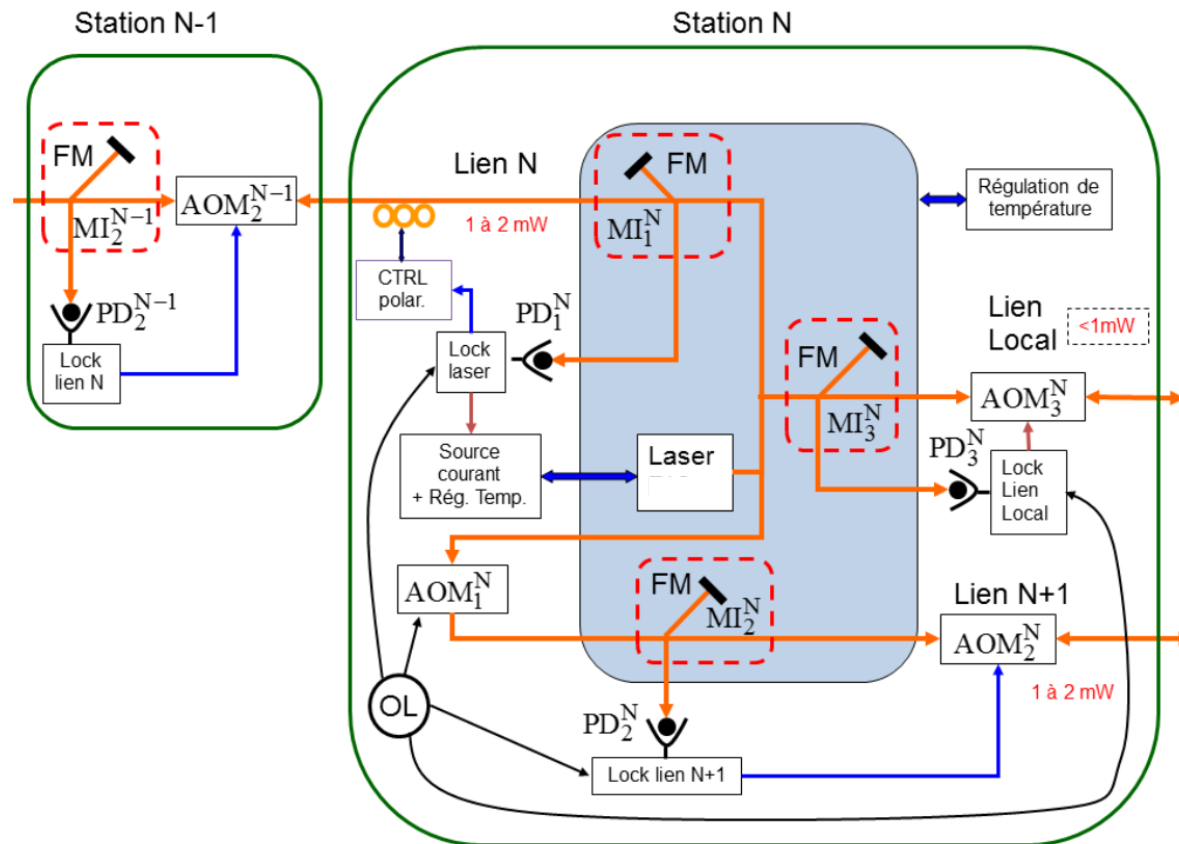
# Industrialization



*System & components for science & industry*

# Interferometer

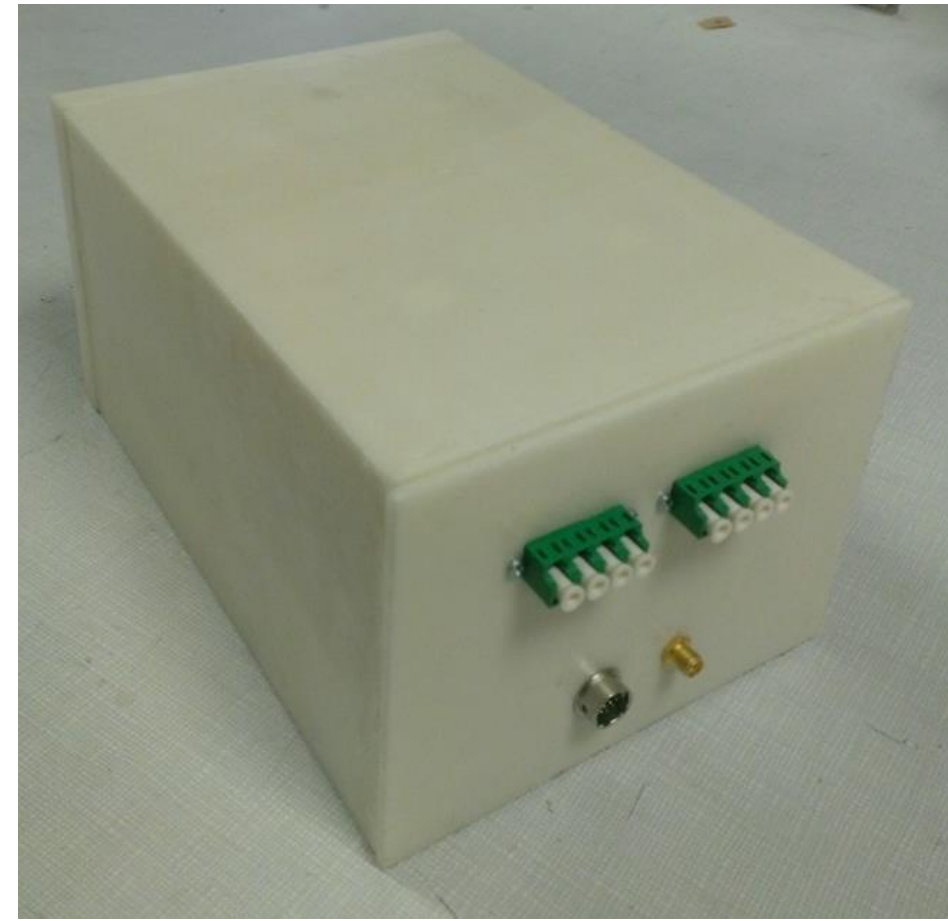
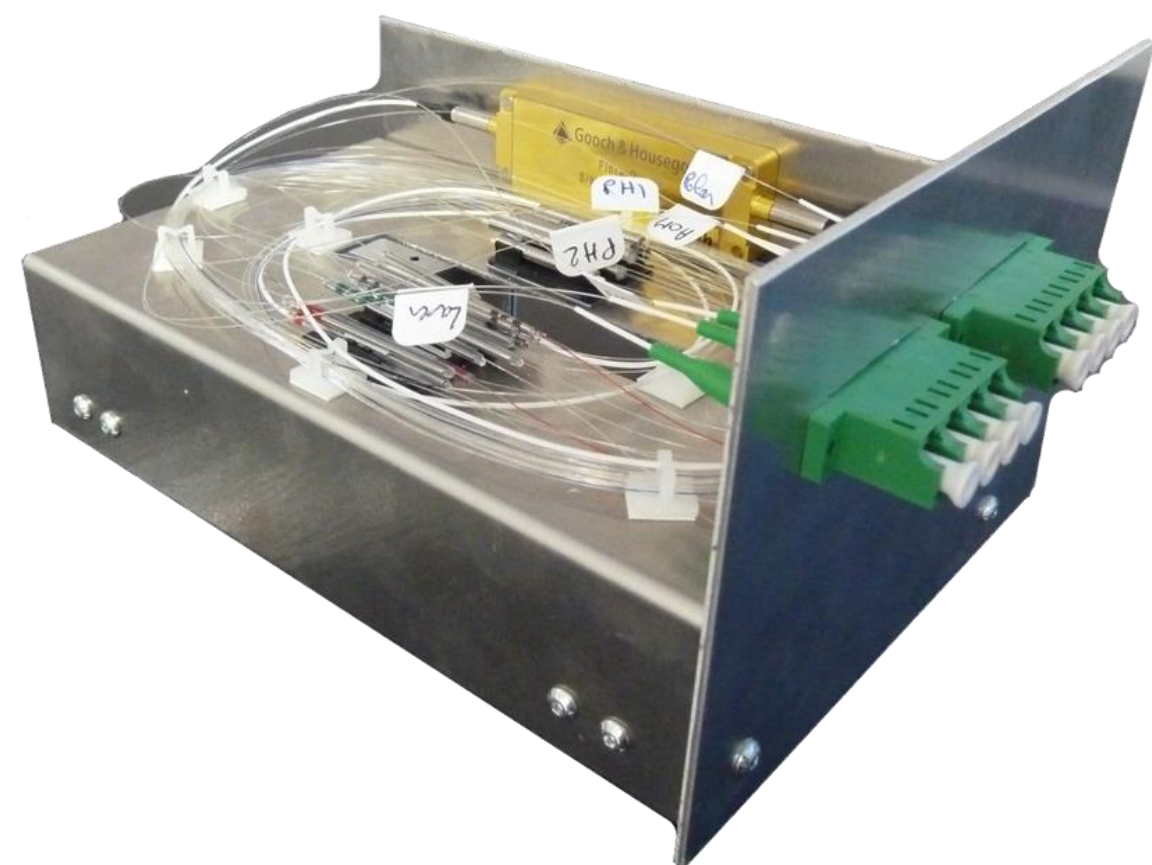
- The interferometer generates beatnotes that will be used for locking



# Interferometer

- Manufacturing objective
  - Less than 1 day of production by an operator for the optical assembly
- Technical objective
  - Less than 10 cycles/°C or 50 fs/°C
  - Rejection temperature of the box 10

# Interferometer



System & components for science & industry

# Interferometer

- Manufacturing result
  - Production of the first interferometer took 1.5 days
- Technical results
  - Fluctuation measured is 15 fs/°C
  - Rejection temperature of the box 6
- Improvement
  - The next interferometer will be manufactured in 1 day
  - The fluctuation can be improved by changing the pattern of the interferometer
  - A modification of material and of the structure of the box should enable us to increase the rejection temperature



*System & components for science & industry*

# Laser source

- Linewidth of the laser should be  $< 5$  kHz
- Temperature stable but tunable
- Control of the diode :
  - current
  - temperature
- Automatic frequency locking
- A compact design
- Embedded diagnostic tools



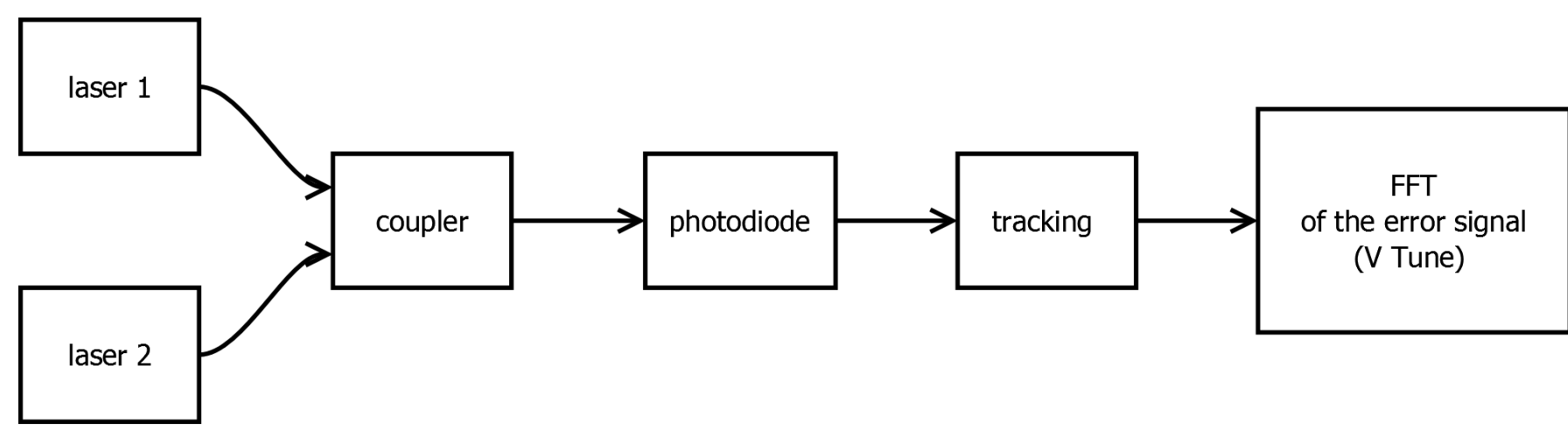
*System & components for science & industry*



# Laser source

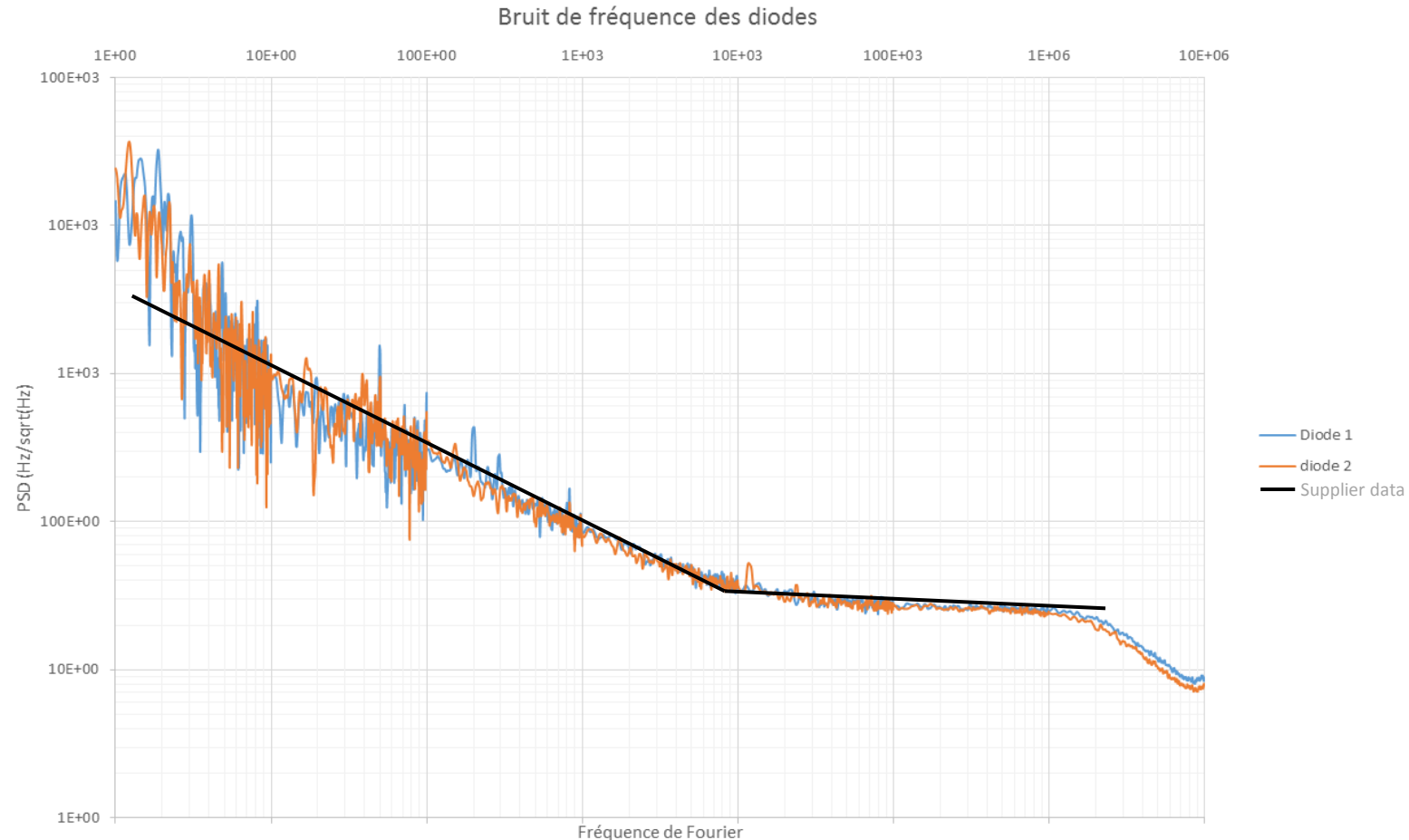
## Laser noise measurement

- The sum of the noise of the two lasers is measured
- Lasers are unlocked



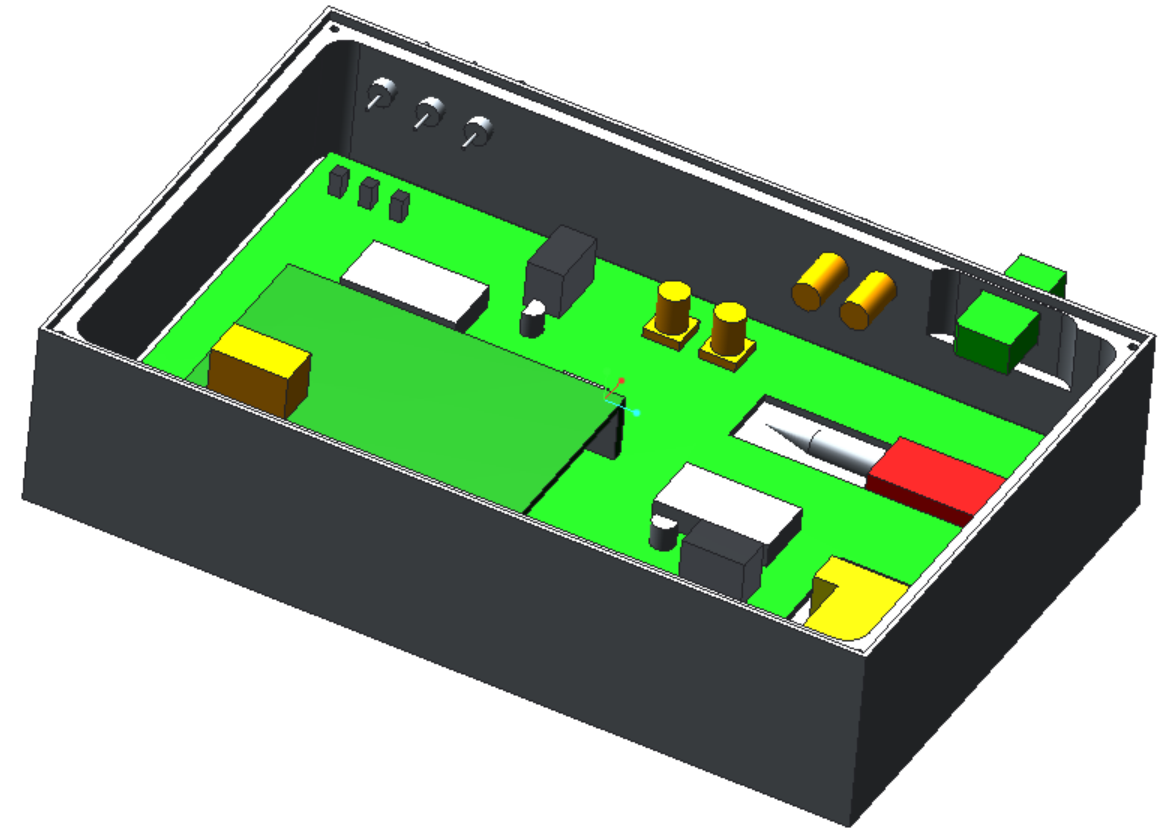
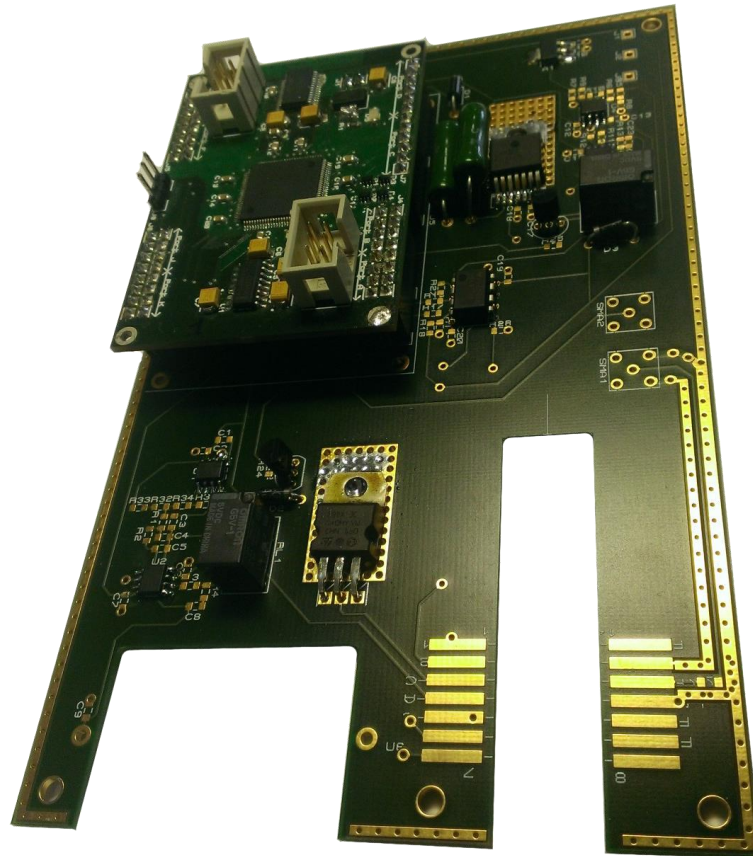
# Laser source

## Laser noise measurement





# Laser source



*System & components for science & industry*

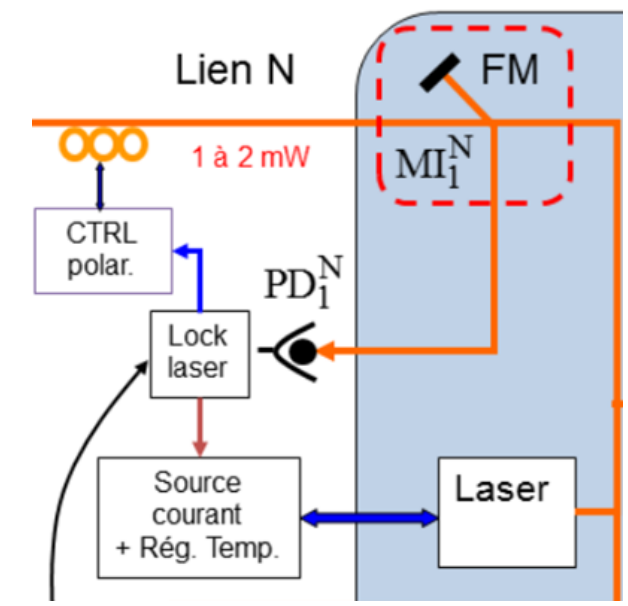
# Laser source

- Results

- The current source does not add noise
- The tunability of the laser diode is 2 GHz
- Controllable diode (On / Off, temperature, ...) via internet
- Size of the laser module (172 \* 112 \* 40 mm)

# Laser lock

- The bandwidth of the laser lock is 250kHz
- The laser scans and locks automatically
- The polarization is optimized
- Industrialization of the laser lock is in progress



# Questions

Merci pour votre attention



*System & components for science & industry*