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# To the industrial prototype of the repeater station

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#### Summary

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- Industrialization
- Interferometer
- Laser Source
- **ELECTRONICS** Laser lock



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### Industrialization



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## Interferometer

• The interferometer generates beatnotes that will used for locking



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## 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



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#### Interferometer







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## Interferometer

- Manufacturing result
  - Production of the first interferometer took 1.5 days
- Technical results

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- 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



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#### Laser source

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- 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



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#### Laser source Laser noise measurment

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





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#### Laser source LASERS & AMPLIFIERS Laser noise measurment







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#### Laser source



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#### Laser source



- 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)



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## Laser lock

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- 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





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#### Questions



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#### Merci pour votre attention



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