STATUS OF THE NΞSIE NEAR-IR SPECTROGRAPH

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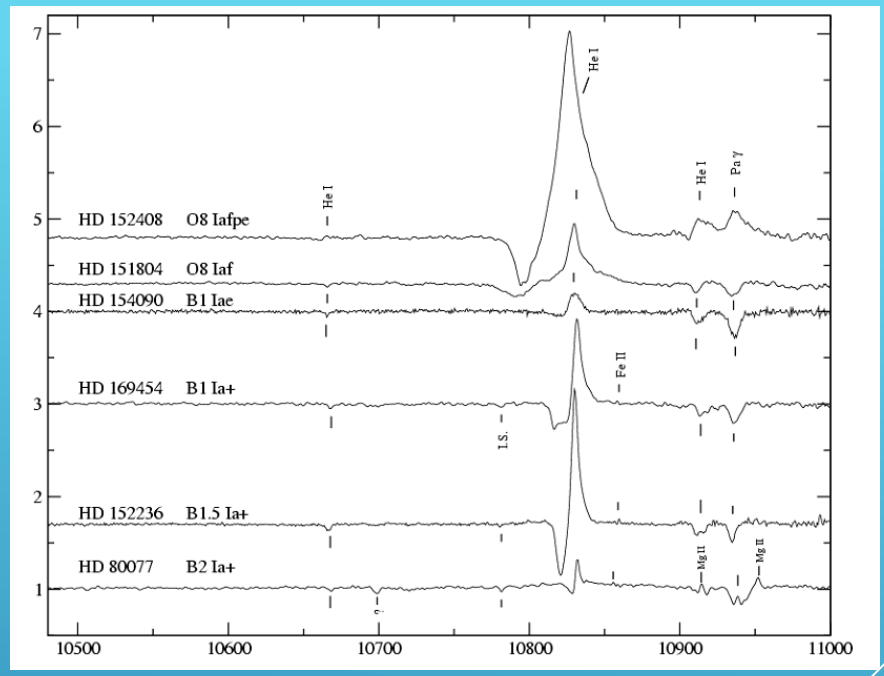
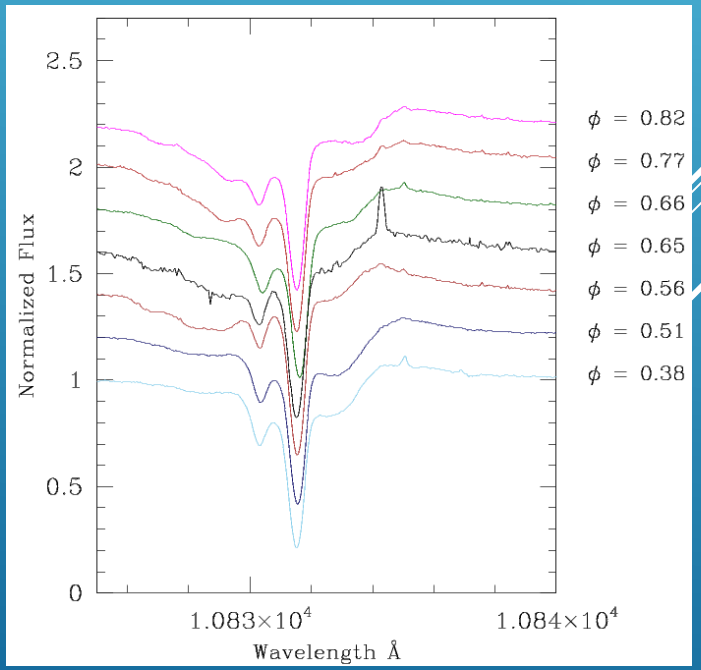
SCIENTIFIC INTEREST OF THE SPECTRAL RANGE NEAR 1 MICRON

He I λ 10830: dynamics of massive stars' winds and wind interactions (Andrillat & Vreux 1979, A&A 75, 93; Vreux et al. 1990, A&A 238, 207; Groh et al. 2007, A&A 465, 993, Stevens & Howarth 1999, MNRAS 302, 549, see also Yaël's talk).

Chromospheric He I λ 10830 emissions in M dwarfs and solar-type stars = proxies of a strong flaring activity (Short & Doyle 1998, A&A 353, 666; Liefke et al. 2007, MmSAI 78, 258; Choudhary et al. 2008, AGUFM SH23A-1622), elusive chromosphere or winds (Cuntz & Luttermoser 1990, ApJ 353,L39, Dupree et al. 1992, ApJ 387, L85).

He I λ10830: indicator of topology of accretion regions in cTTs (Kwan et al. 2007, ApJ 657, 897; Podio et al. 2007, MmSAI 78, 693).



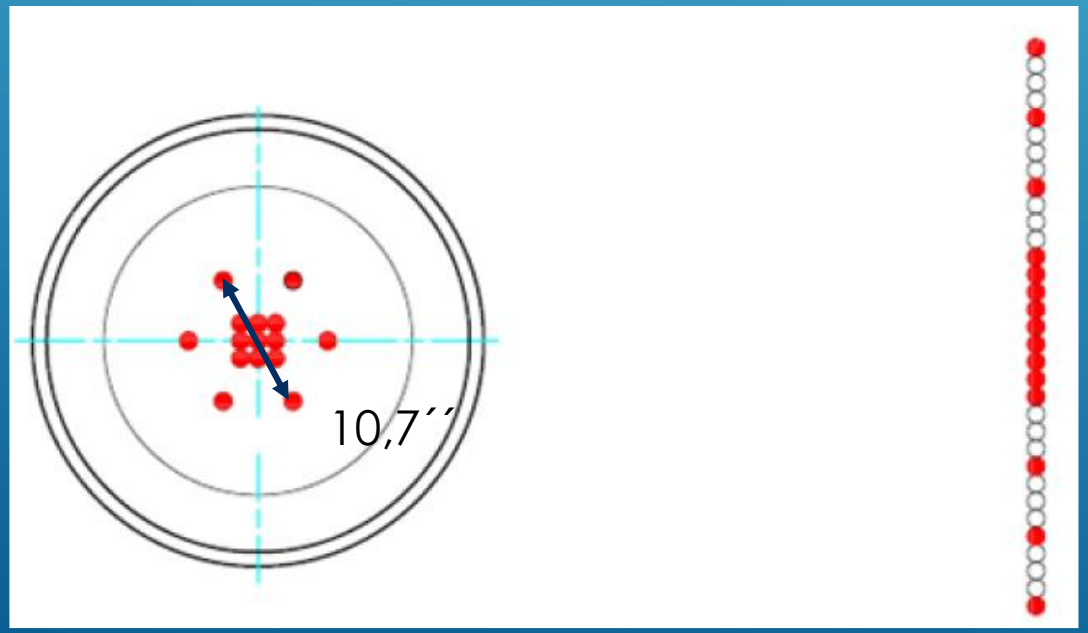


DESIGN OF THE INSTRUMENT

Fibre-fed near-IR long-slit spectrograph with possibility to simultaneously record the spectrum of the sky.

Bundle of fibres (50 µm core, 125 µm cladding): 3 x 3 fibres to sample the source + 6 satellite fibres to sample the sky background.

No microlenses implemented to preserve spectral resolution.



	Requirement	Goal
Spectral range	1.0 – 1.1 µm	0.95 – 1.4 µm (échelle mode)
Resolving power	10 000	20 000
Target magnitudes	J < 7	J < 9
S/N in continuum (30 min exposure @ TIGRE telescope)	100 @ J=6	100 @ J=7
Typical exposure time	15 min	15 min
Wavelength calibration accuracy	0.05 Å	0.025 Å

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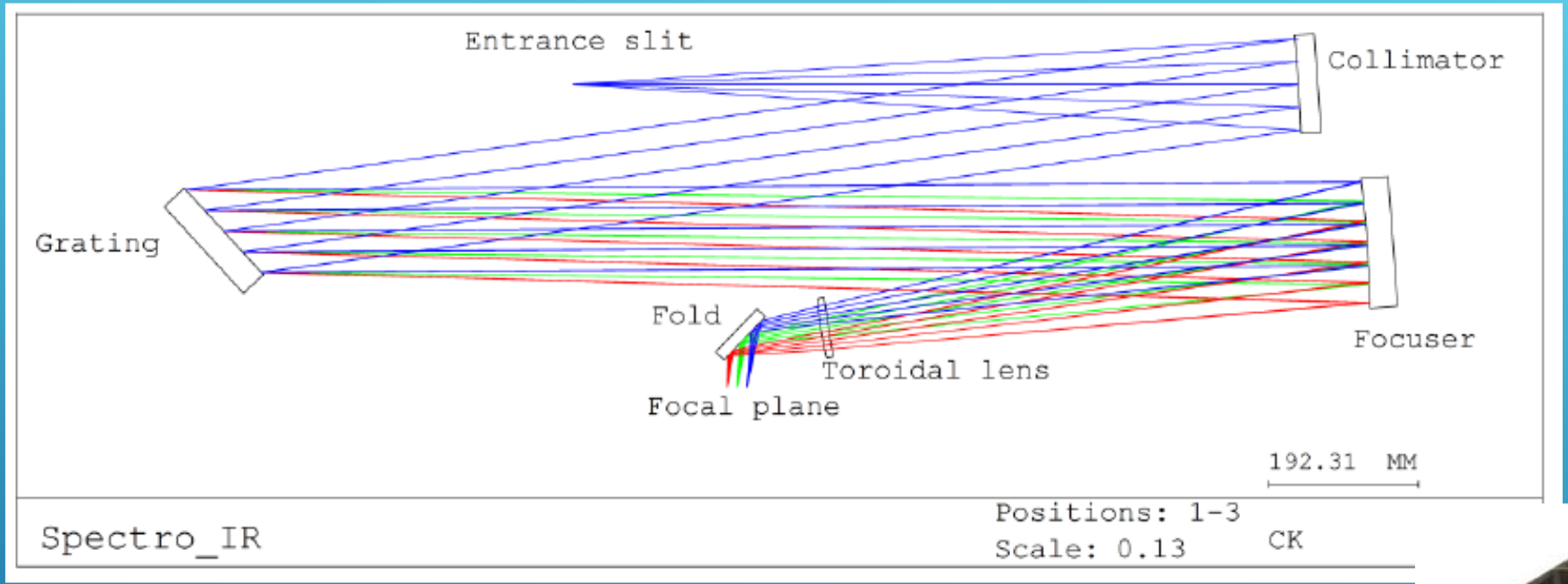
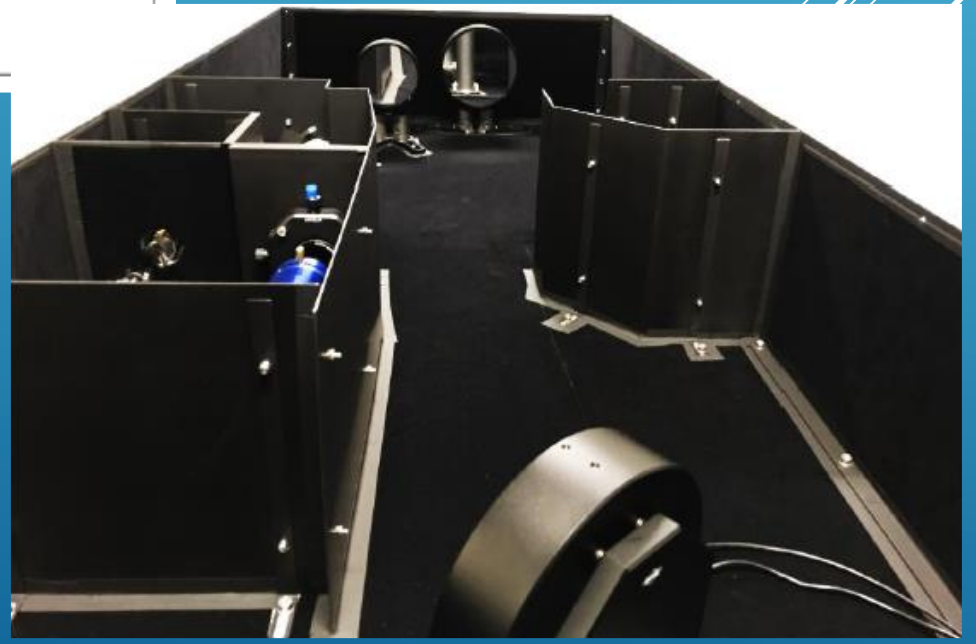


Spectrograph design based on Bingham (1979, QJRAS 20, 395), see Kintziger et al. (2017, JATIS 3, 5002).

External dimensions: 175 x 77 x 27 cm³



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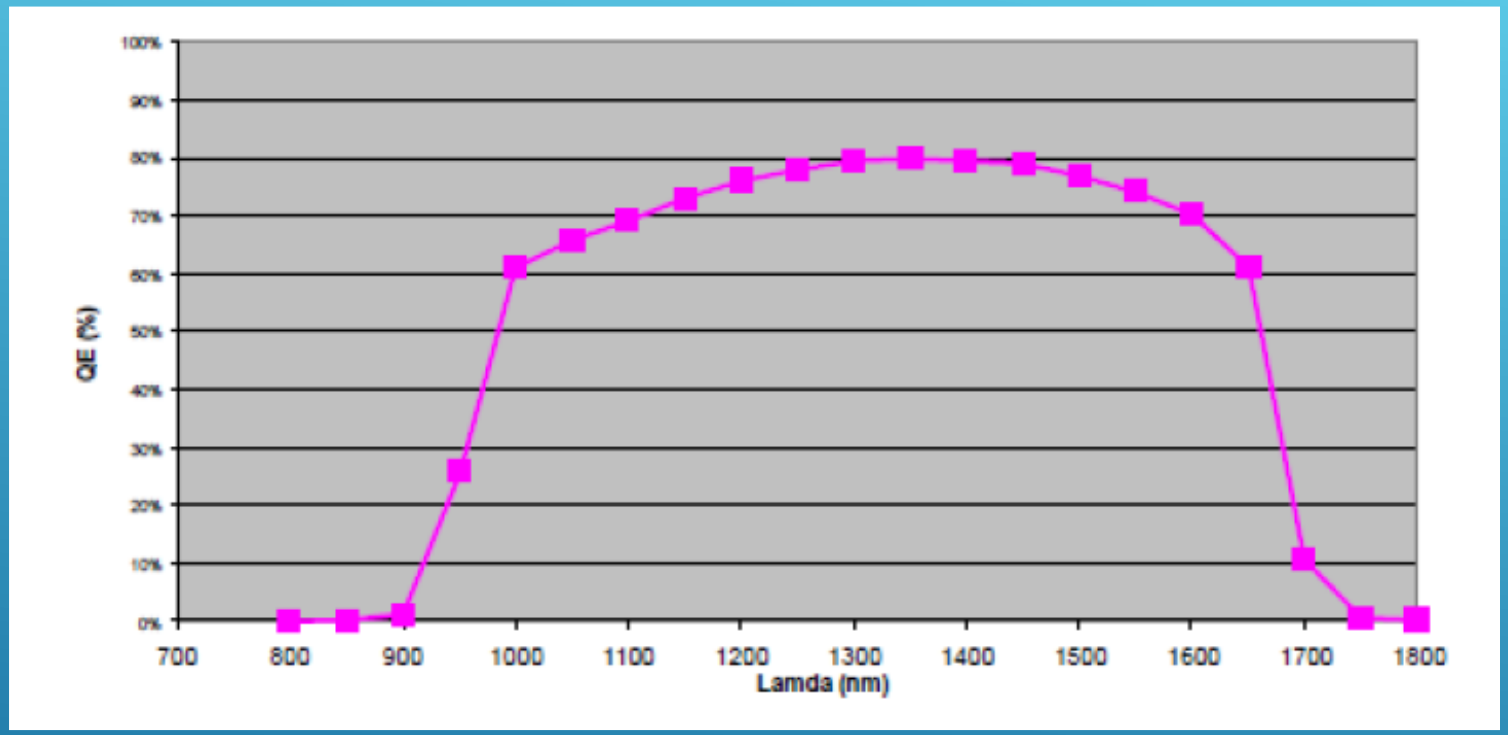
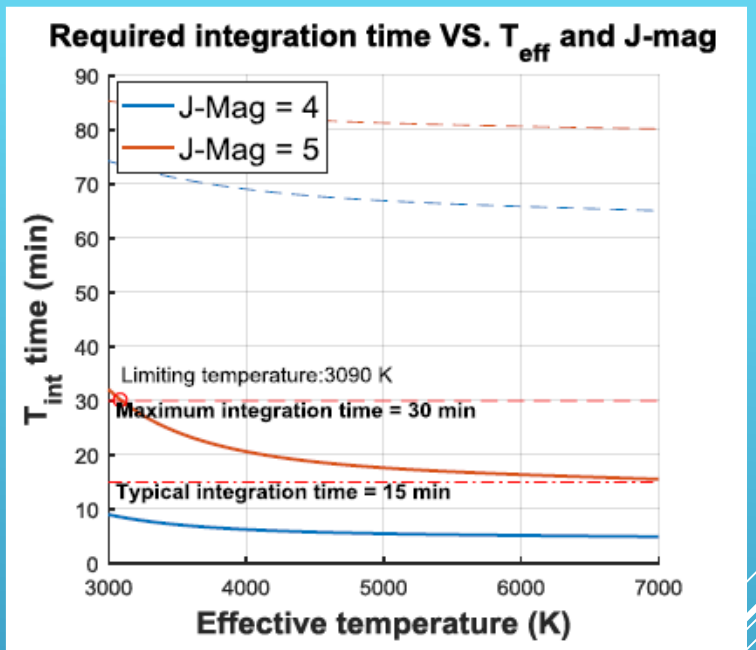


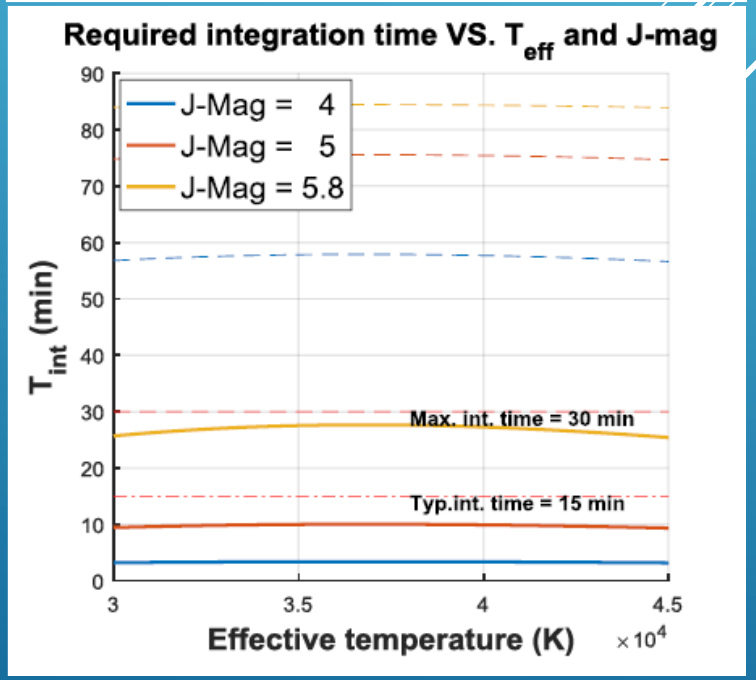
Detector: 640 x 512 InGaAs (Photonic Science Snake camera)

High, uniform QE. ☺

Dark current: 215 e^-/s/pix. ☹

Water-cooling to ΔT = 55°C. ☹





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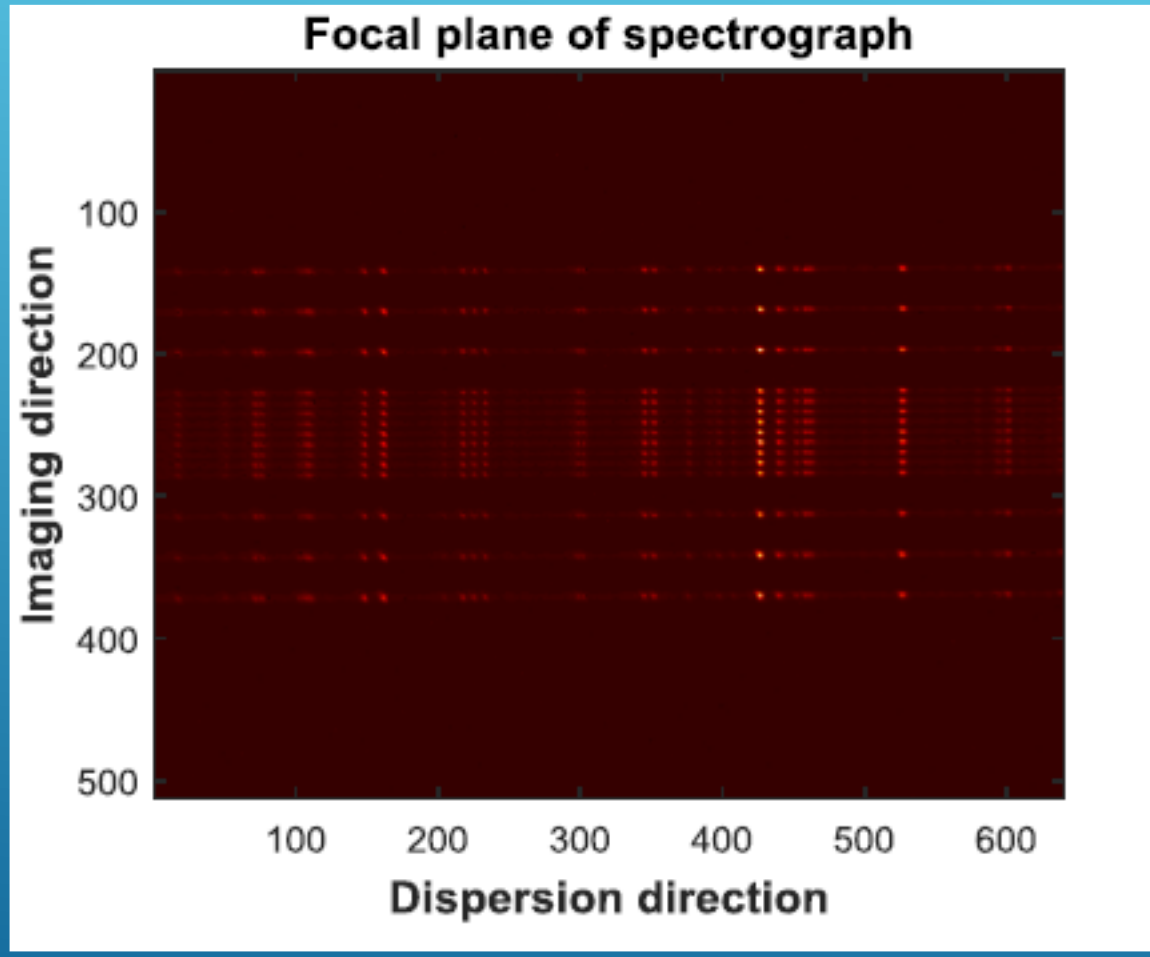
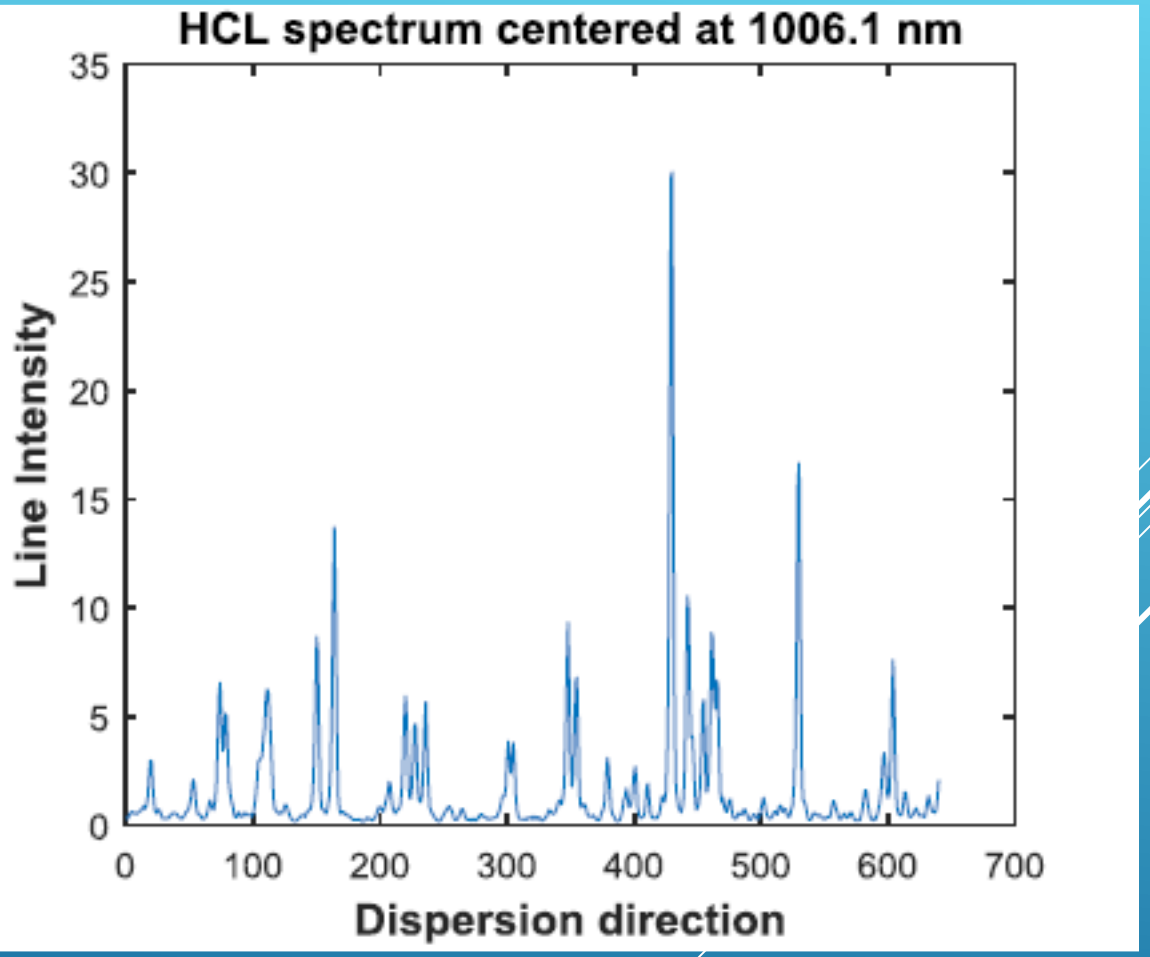




Calibration unit: UNe HCL + halogen lamp.

Measured resolving power ~ 27 000.

ON-SKY TESTS IN LIÈGE

From roof of CSL building using a C8 Schmidt-Cassegrain amateur telescope.

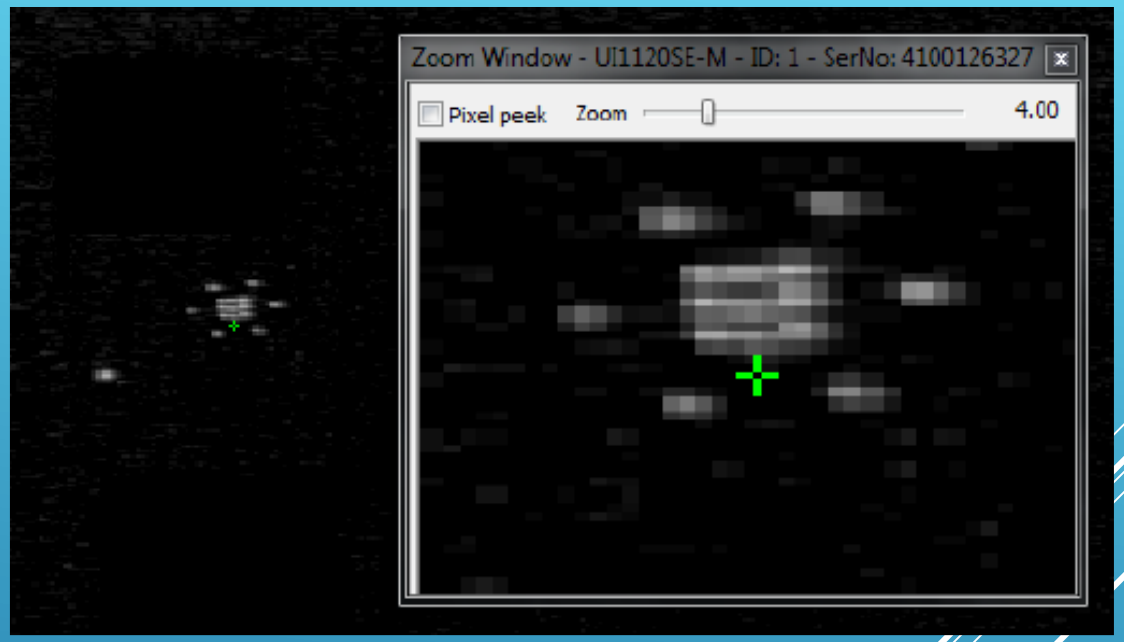
Half a dozen attempts between June 2017 and mid-October 2017.

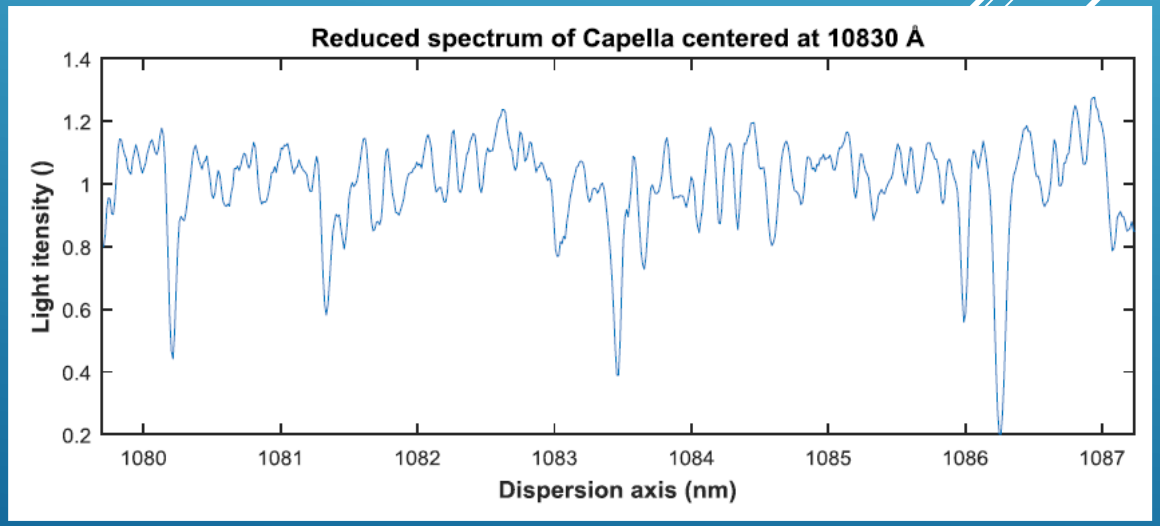
ON-SKY TESTS IN LIÈGE

Many problems encountered:

1. weather,
2. availability of suitable targets,
3. star positioning,
4. telescope pointing & tracking stability,
5. detector temperature and dark current,
6. …

First stellar light (Capella) recorded on 15 & 16 October 2017.





WHAT'S NEXT?

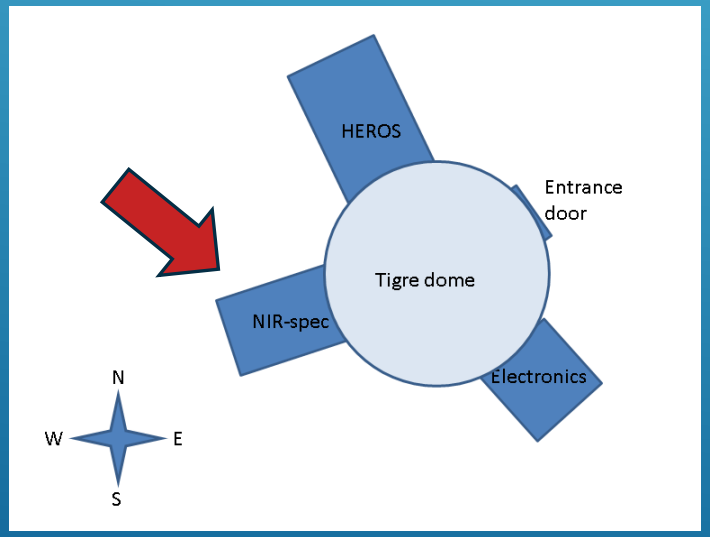
In Liège:

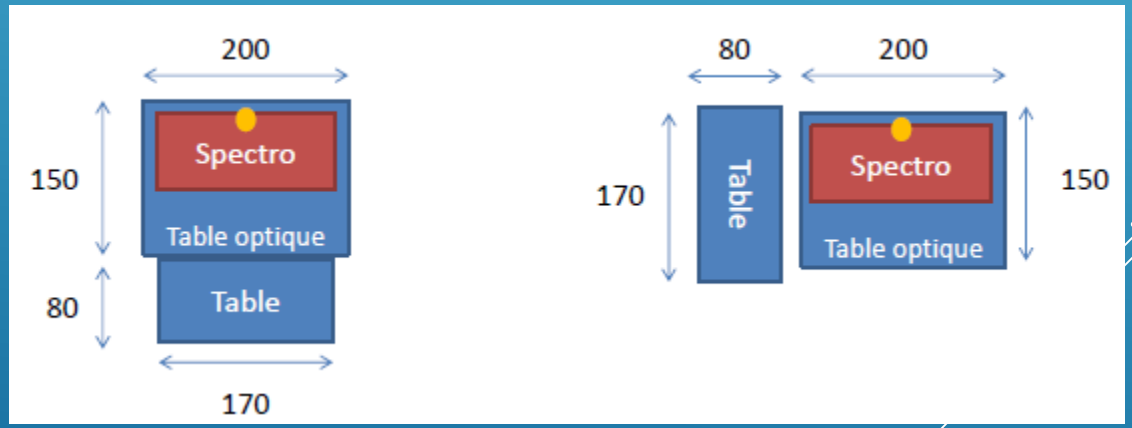
1. Move the spectrograph to the Astrophysics building.
2. Raise money for better detector (**before shipping to La Luz**) + manpower: applications under way (first deadline July 2,…).
3. Define and implement typical operation sequence.
4. Prepare data processing pipeline.
5. Etc…
6. Earliest possible shipping to La Luz: spring/summer 2019

WHAT'S NEXT?

In La Luz / Guanajuato:

1. Infrastructure: foundations for building and spectrograph table, electrical + internet connection, table, temperature control…
2. Paperwork for importation, ATA document for optical table with laser…
3. Etc…





CONCLUSIONS

The near-IR spectrograph is in principle ready for use. ☺

Test observations revealed the poor performances of the current detector. ☹

Further developments are needed both in Liège and La Luz before the instrument can be installed at TIGRE. ☹