

# **EELT-HIRES K-Band spectrograph**

Wolfgang Gaessler

Max-Planck-Institut for Astronomy, Heidelberg (MPIA)

# The Institute - MPIA

Max-Planck Institute for Astronomy  
Königstuhl, Heidelberg, Germany

Nearly 300 employees

Long history in instrumentation

Galaxies and Cosmology

Planet and Star Formation

Atmospheric Physics of Exoplanets (since 2020)



# The Situation

MPIA took over task to study K-band spectrograph end of November 2021.

Therefore,

- still setting up the team
- in progress to get familiar with the existing documents on design and science

Approach:

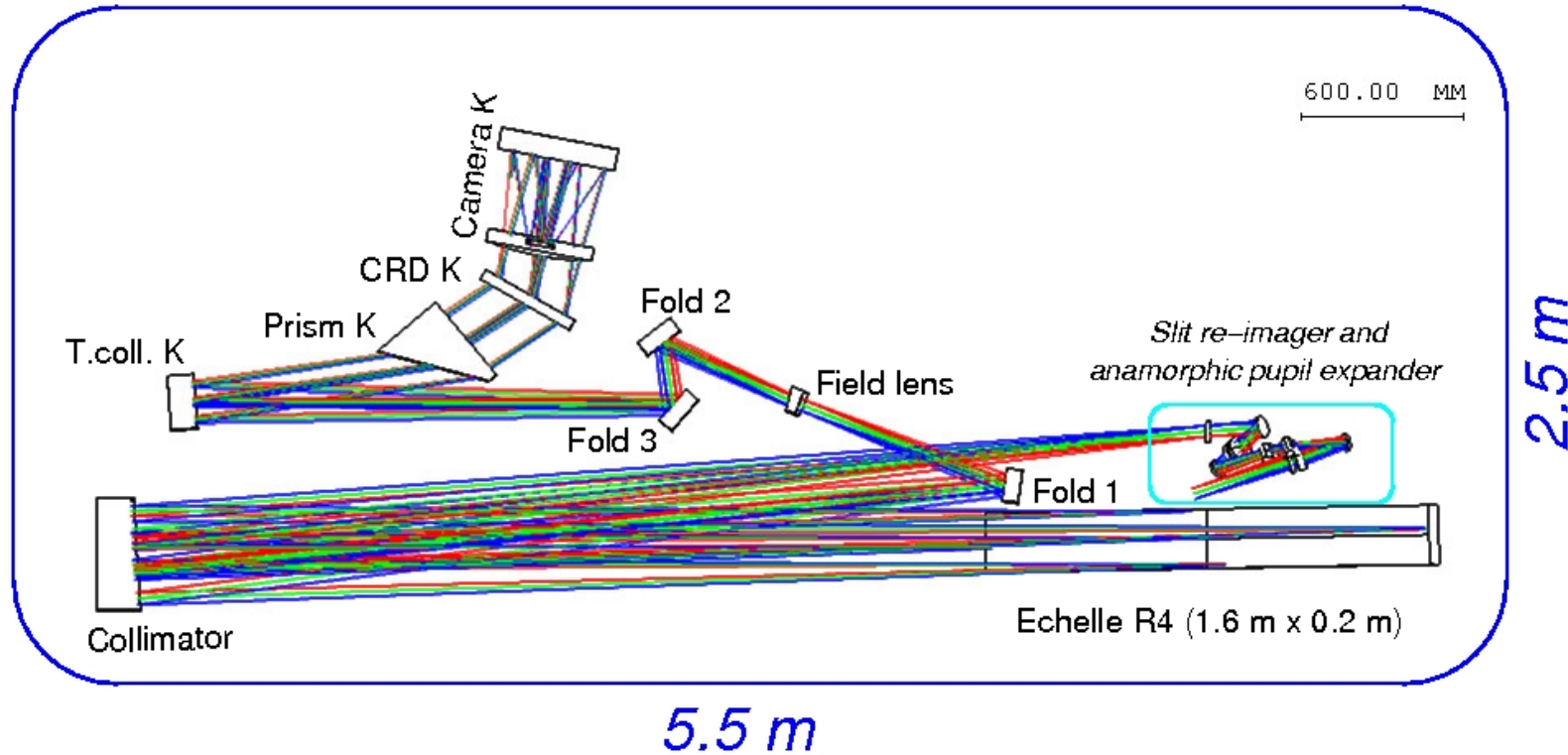
- Re-evaluate the science cases to constrain the requirements
- Re-evaluate the existing design to understand, where to improve

# Phase A summary on K-band

From: E-HIRES-SYS-DER-0001 issue 1.0 02/10/2017 Appendix C

- Same requirements as for ZYJH channel but from 1.8 to 2.5  $\mu\text{m}$
- Same slit length and dispersion  $\rightarrow$  same optical approach but just one camera
- Coude room with fibres:
  - $\rightarrow$  135 m fiber with 0.05dB/m (ZBLAN, AIF3 fibres) = 6.75 dB = 79% loss
- Detector: H4RG same as for ZYJH ( $\rightarrow$  same thermal background needs)
- Initial dimensions, mass and power estimate exist
- Dimensions are dominated by the beam on the echelle grating
- Initial power budget and a summary of electronics exist

# K-band spectrograph optical design



# Impression to what to look into first

**Coude room with fibers:** 135 m fiber with 0.05dB/m (ZBLAN, AIF3 fibers) = 6.75 dB = 79% loss

→ **move to Nasmyth platform?**

→ needs probably more compact optical design

→ what about stacking spectrographs on top of each other?

→ **Coude train?**

→ **Further improvement on fiber throughput?**

**Detector:**

→ MPIA has experience with H4RG but is doing also some development on the Geosnap

# MPIA Technical Departments

## • Electronic Department

- Houskeeping, Motor control, Vacuum control, Detector control
- Available

## • Mechanical Construction Department

- Mechanical design, CAD, experience with carbon fiber composite materials
- Will become available with some time in the next 0.5 years

## • Precision Workshop

- Procurement of mechanical parts with 5-axis milling machine, experience with aluminum steel, titanium, etc.

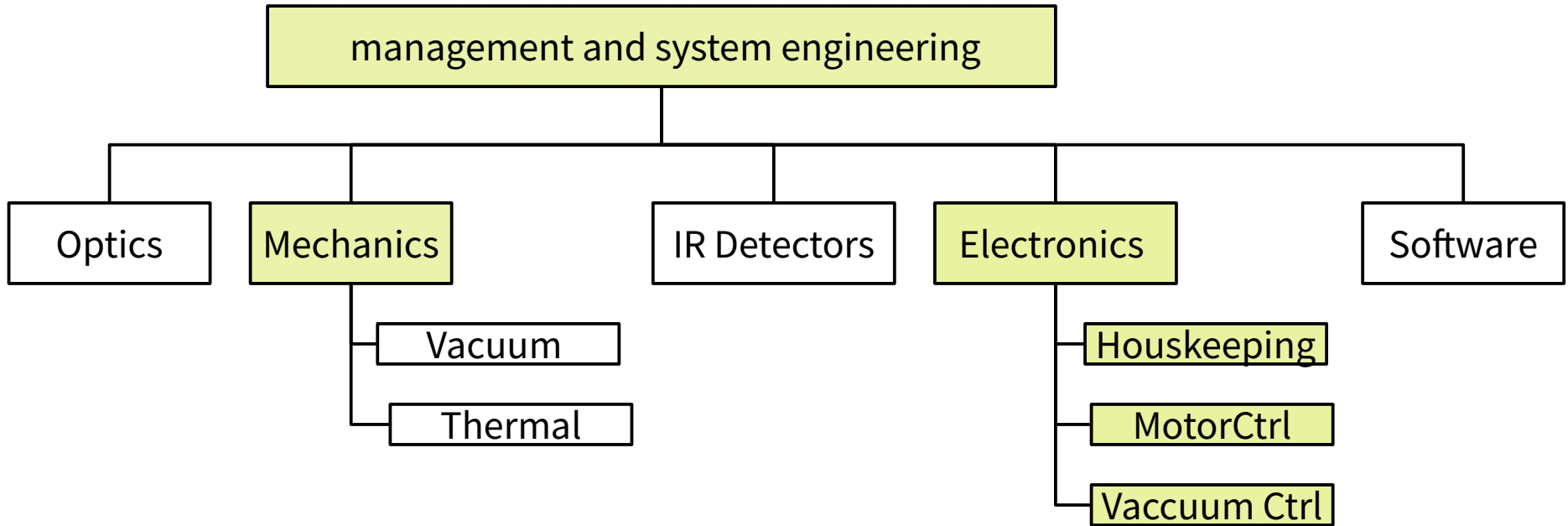
## • Instrumentation Software Department

- Experience with VLT software
- Will not become available within Phase B

## • Instrumentation Department

- Engineers in cryo, vacuum, optics, detectors
- Probably all not available during Phase B or only with low percentage

# K-band spectrograph work package breakdown



MPIA

?



# Current Team



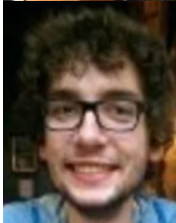
- **Laura Kreidberg – Local Project PI**

- MPIA director department: Atmospheric Physics of Exoplanets (APEX)



- **Wolfgang Brandner – Local Project Lead**

- Researcher with long standing experience in building IR instruments and scientific focus on brown dwarfs



- **Paul Mollier – Local Project Scientist**

- Researcher with scientific focus on simulation of exoplanet atmospheres



- **Wolfgang Gaessler – Local Project Manager**

- Astrophysicist with long standing experience in building astronomical instruments

**More people to come soon**

# Wanted

Partners who want to contribute to the K-band spectrograph are very welcome!

Point of contact:

`gaessler@mpia.de`