IANAO
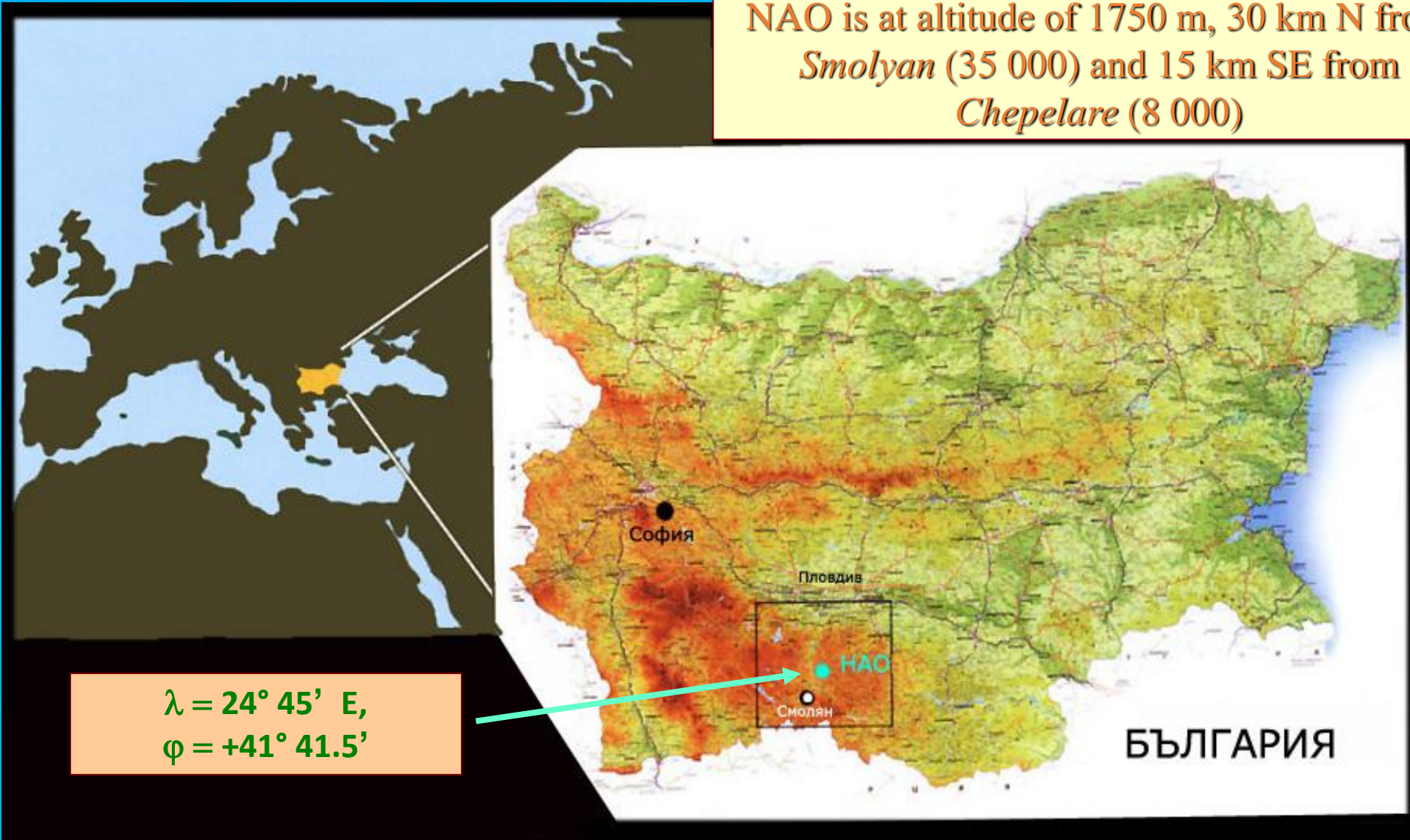## Institute of Astronomy and National Astronomical Observatory –Rozhen Bulgaria

Ivanka Stateva
TA manager

National Astronomical Observatory – Rozhen
Where we are?

NAO is at altitude of 1750 m, 30 km N from *Smolyan* (35 000) and 15 km SE from *Chepelare* (8 000)

$\lambda = 24° 45'$ E,
$\varphi = +41° 41.5'$

NAO Rozhen
What we have?

2-m Ritchey-Chretien
Coude telscope
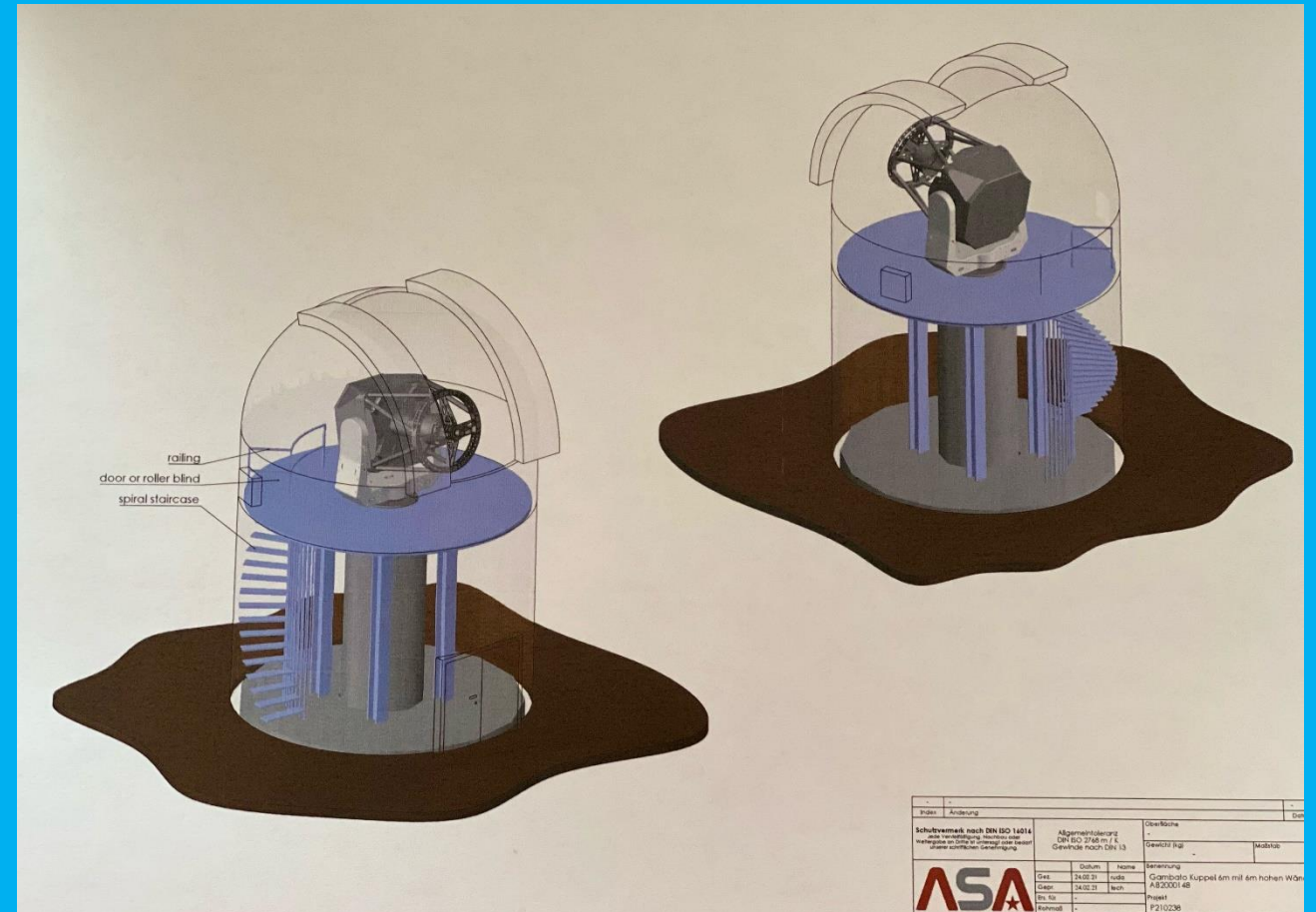
50/70 cm Schmidt
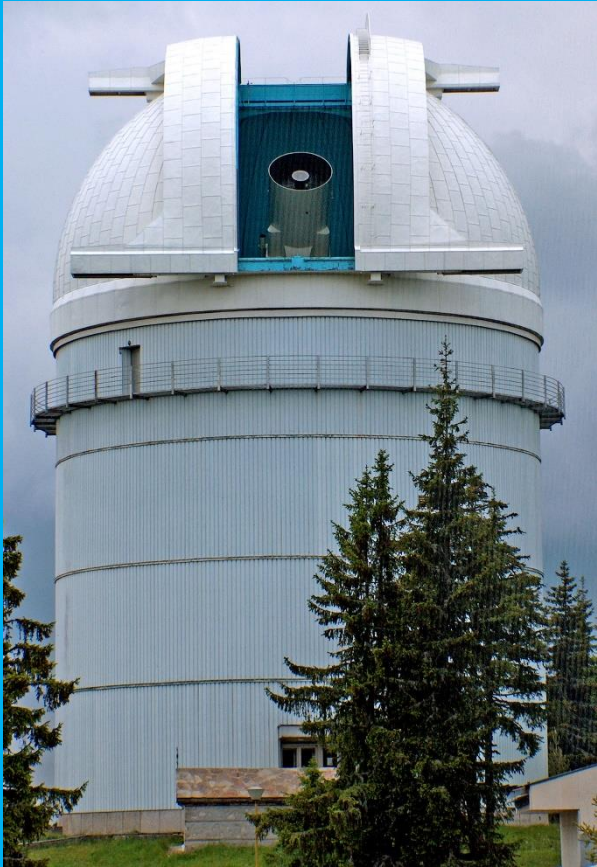telescope

60-cm Cassegrain
telescope

The new telescope:

1.5 m Richie-Chretien
fully robotized
first observational tests – Summer 2022

for observations of fast variable objects
international campaigns for small bodies of solar system, variable stars, quasars etc.

Funded by the Roadmap for scientific infrastructure 2017-2023 coordinated by the Ministry of Education and Science
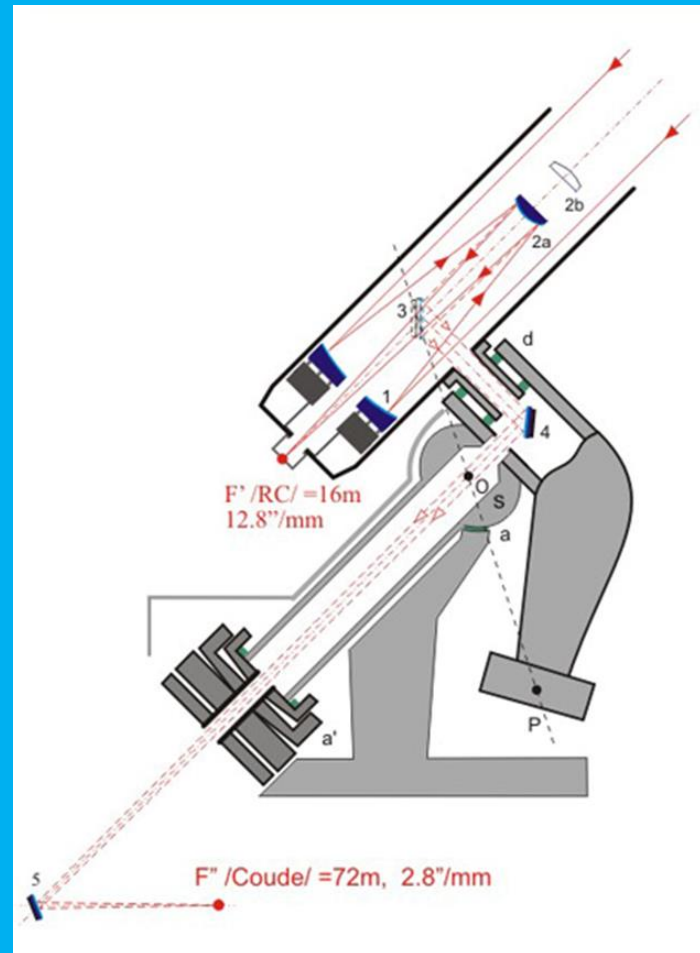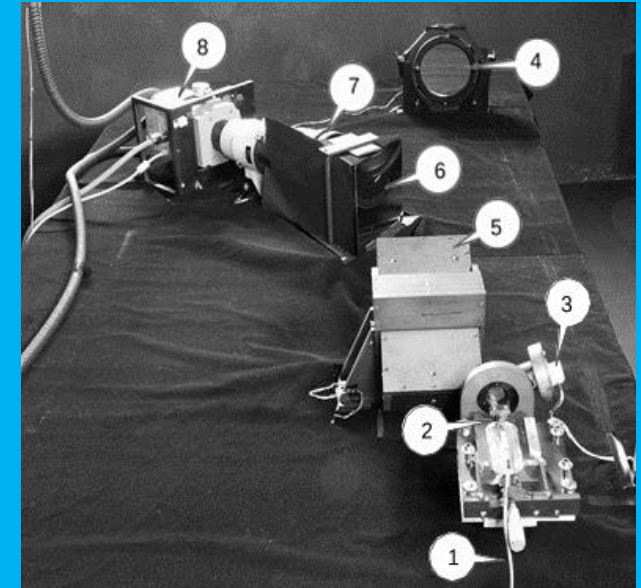
2-meter RCC telescope

• Manufacturer: Carl Zeiss Jena

• Equatorial mounting

• Diameter of the primary mirror D=2m

• Two focusi: primary, RC; secondary, Coudé

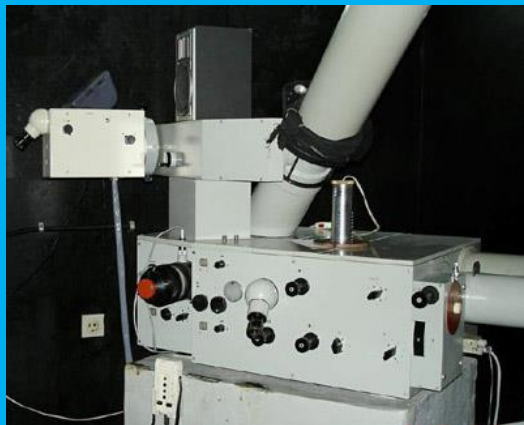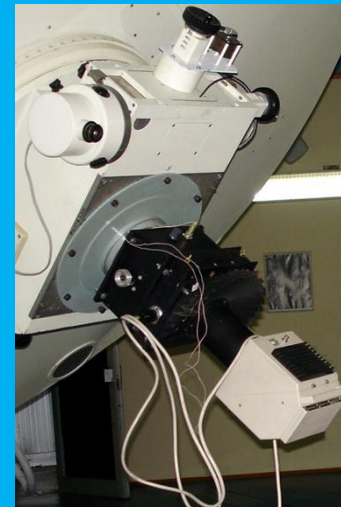# 2m telescope – oprtical scheme and instruments

single order
Coude spectrograph

echelle spectrograph

F' /RC/ =16m
12.8"/mm

F" /Coude/ =72m, 2.8"/mm

photometer

2-channel focal reducer

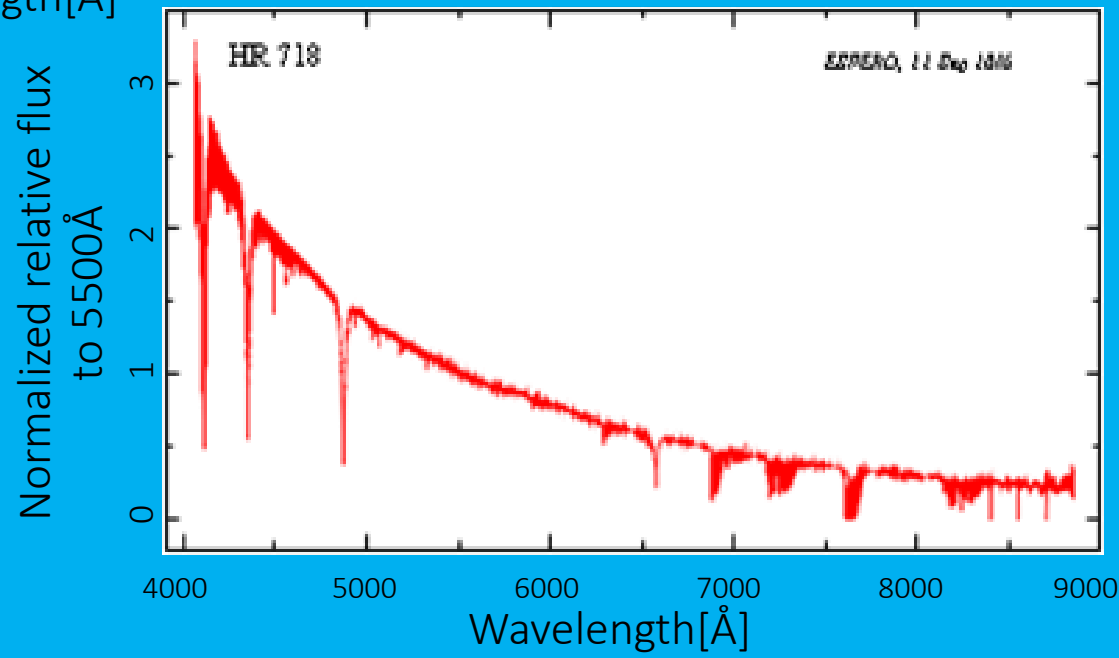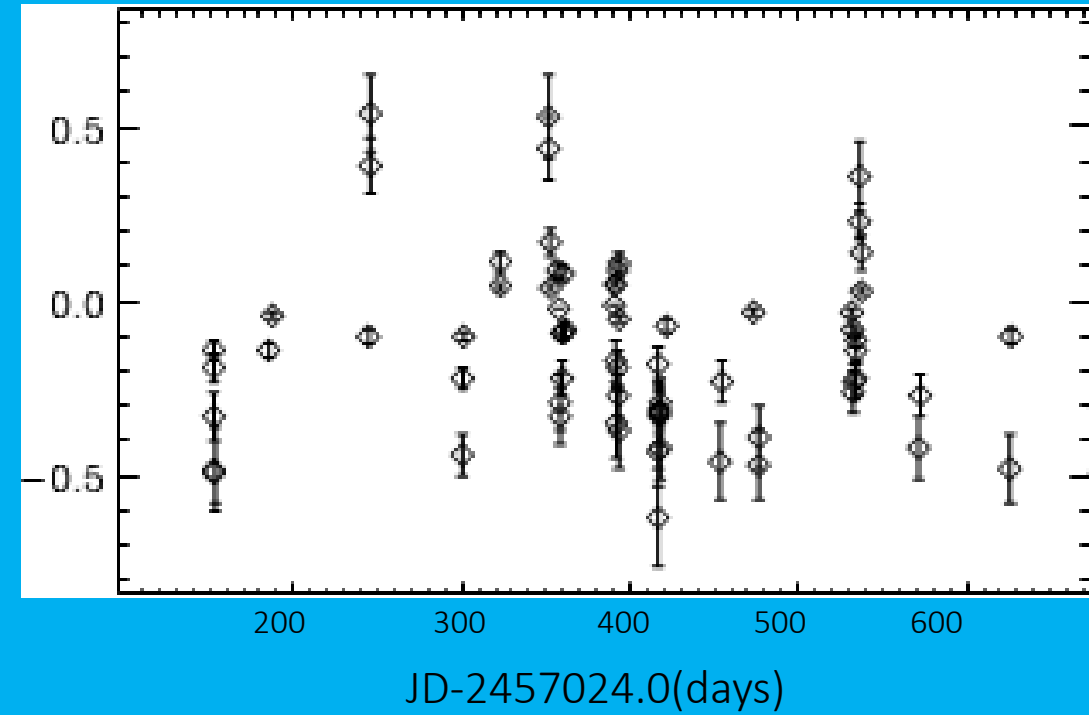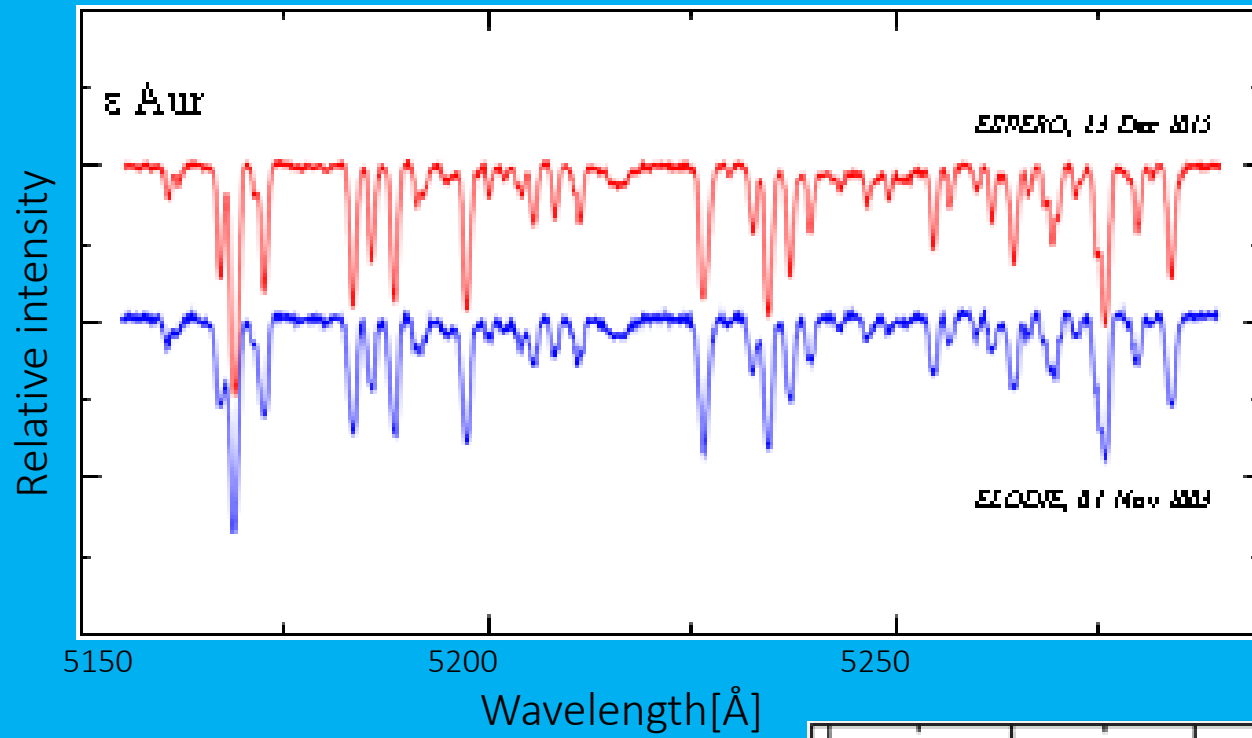# Coude spectrograph characteristics

- spectral range:
  - 4000-8000 ÅÅ

- spectral resolution:
  - 15,000 to 25,000 at H_α

- limit magnitude of about 12.0

ESpeRo characteristics

- spectral range:
  - 3900-9000 ÅÅ in 70 orders

- spectral resolution:
  - 35,000 at H_α

- limit magnitude of about 12.5-13.0
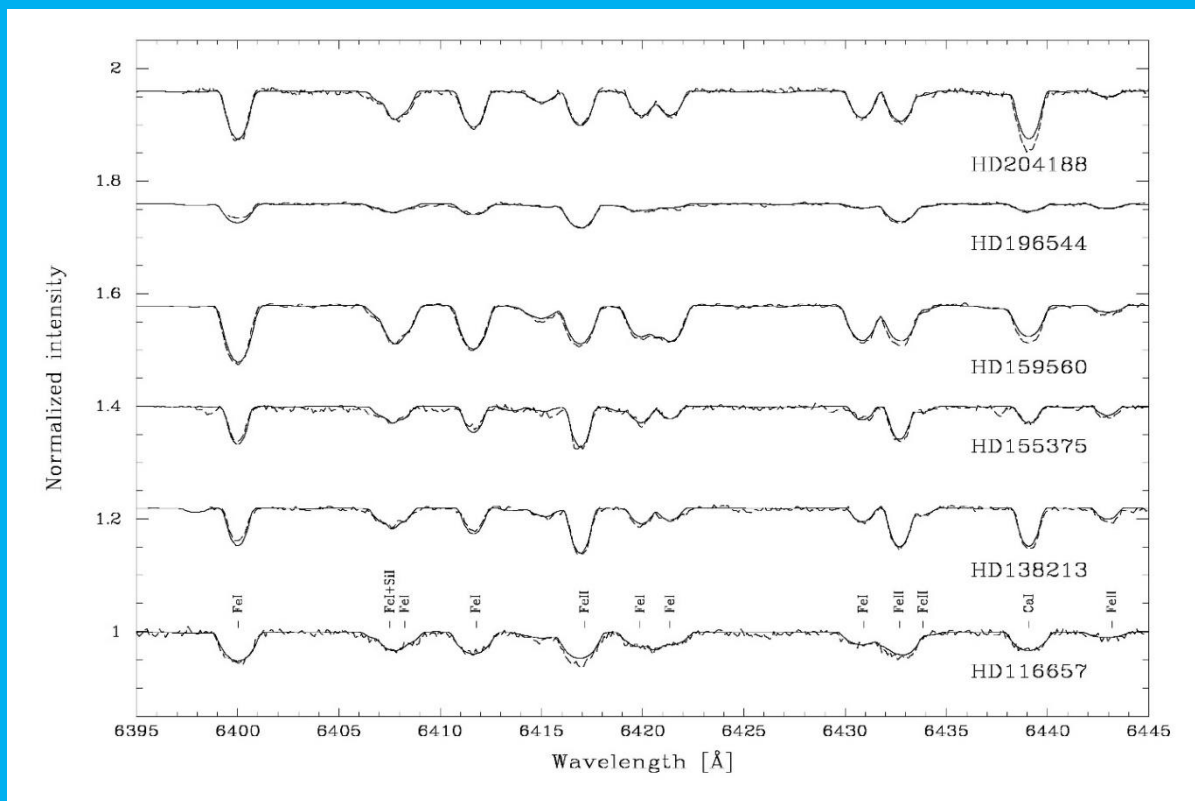
ESpeRo characteristics

- Depends on weather conditions (seeing)

- for exposure time of 600sec
  you can reach for the region of H_α
    - SNR $\sim$ 600 for Vmag = 3.0

- for exposure time of 3600sec
    - SNR $\sim$ 200 for Vmag = 6.0
    - SNR $\sim$ 100 for Vmag = 9.0
    - SNR $\sim$ 20 for Vmag = 12.0

ε Aur

Relative intensity

ESPERO, 19 Dec 2015

ELODIE, 01 Nov 2003

Wavelength[Å]

Δ RV [km/s]

JD-2457024.0(days)

HR 718

Normalized relative flux to 5500Å

ESPERO, 11 Aug 2016

Wavelength[Å]

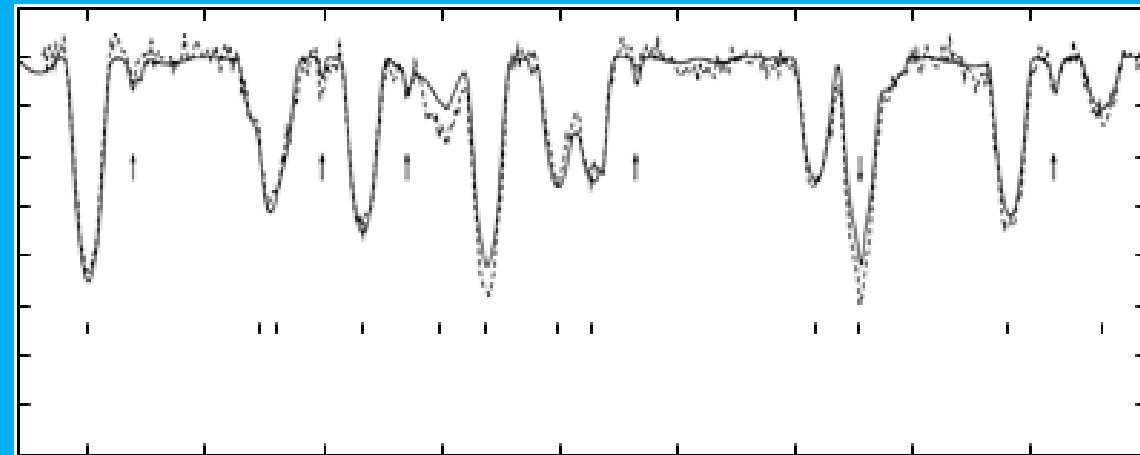## Radial velocities

The RV accuracy is a few hundred meters per second

Abundance analysis of A stars

Abundance analysis of Am star HD861.

High resolution spectra reveal the presence of a second comparion thus determined the star as SB2. Synthetic spectra of A and G star are calculated in order to fit the observed spectra (Iliev et al., 2006, MNRAS 370)
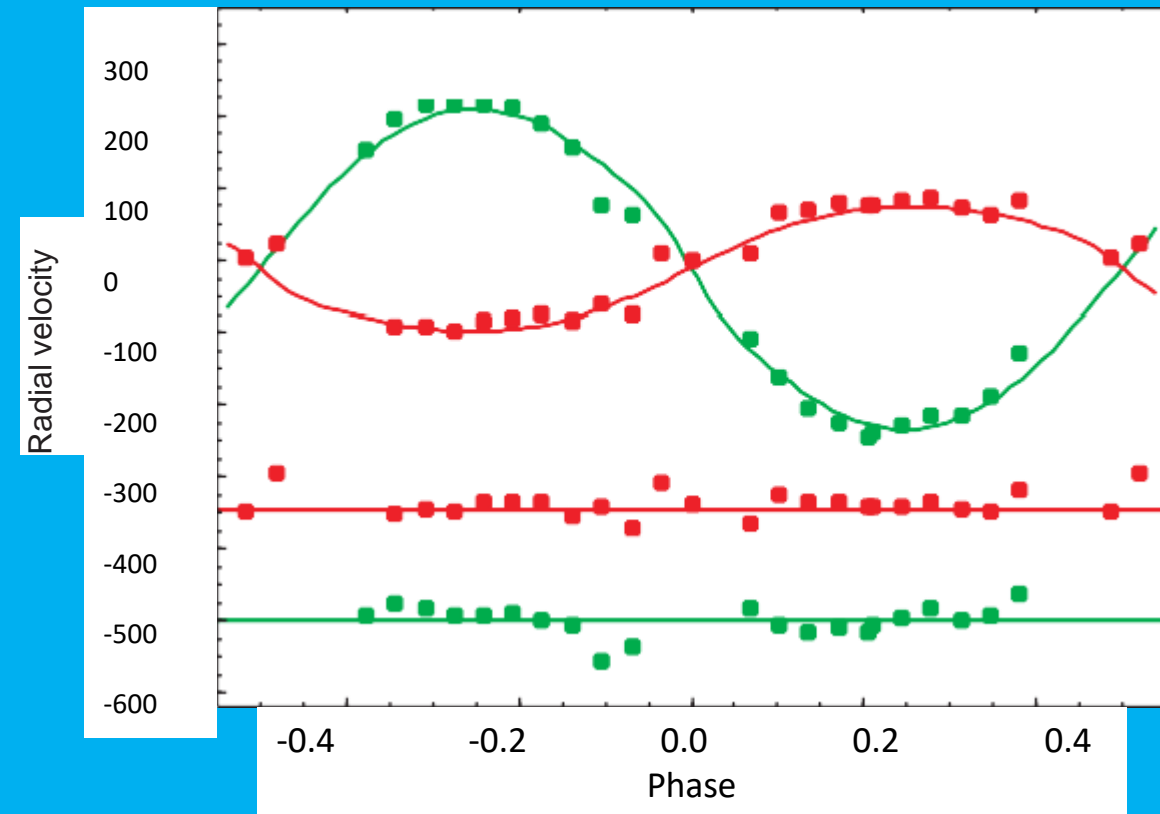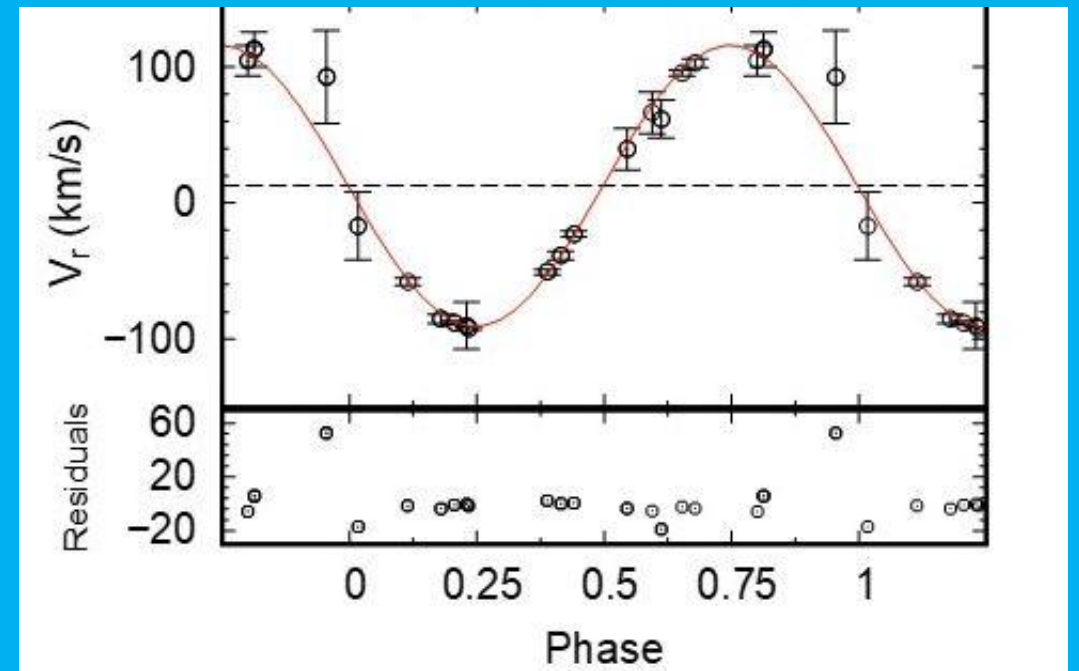
Abundance analysis of Am stars. Comparison between observed and synthetic spectra (Stateva et al., 2012, MNRAS 420)

Radial velocity measurements

Study of W UMa stars with photometric and spectroscopic observations.

The radial velocity curve, the fit and residuals (Kjurkchieva et al., 2020, AN 341)

Study of EB stars with photometric and spectroscopic observations.

The radial velocity curve, the fit and residuals (Ulas et al., 2020, AcA 70)

Some useful links:

- web-site of IANAO:
  www.astro.bas.bg

- web-site of NAO-Rozhen:
  www.nao-rozhen.org

- web-site of Time Allocation Committee:
  http://docs.astro.bas.bg/~observations/index_EN.html

- echelle spectrograph paper:
  2017, BgAJ 26, 67, Bonev T., Markov H., Tomov T. et al., 'ESpeRo: Echelle spectrograph Rozhen'