



Transmission Spectroscopy with the GTC 10.4 m

Paul Anthony Wilson
University of Exeter

Image:

GTC Atmospheric Survey

- Wide Survey of Hot-Jupiter Atmospheres
- Study: Na, K, TiO/VO, Haze, H₂ Rayleigh



Image:

Friday, 3 February 2012

GTC Atmospheric Survey

- Large ESO program (10 Hot Jupiters + GJ 1214b)

Collaborators:

David Sing & Frédéric Pont
(Exeter, UK)

Tom Louden

Exeter, UK

Jean-Michel Désert

CfA, USA

Gilda Ballester

UofA, USA

Jonathan Fortney

UCSC, USA

Alain Lecavelier des Etangs

IAP, France

Alfred Vidal-Madjar

IAP, France

David Ehrenreich

LAOG, France

Jordi Ceba

IAC, Spain



GTC Atmospheric

Tunable filter **Survey** Long slit spec.

GJ1214 b Flat spectrum

HAT-P1 Potassium

TrES-2 b Inconclusive

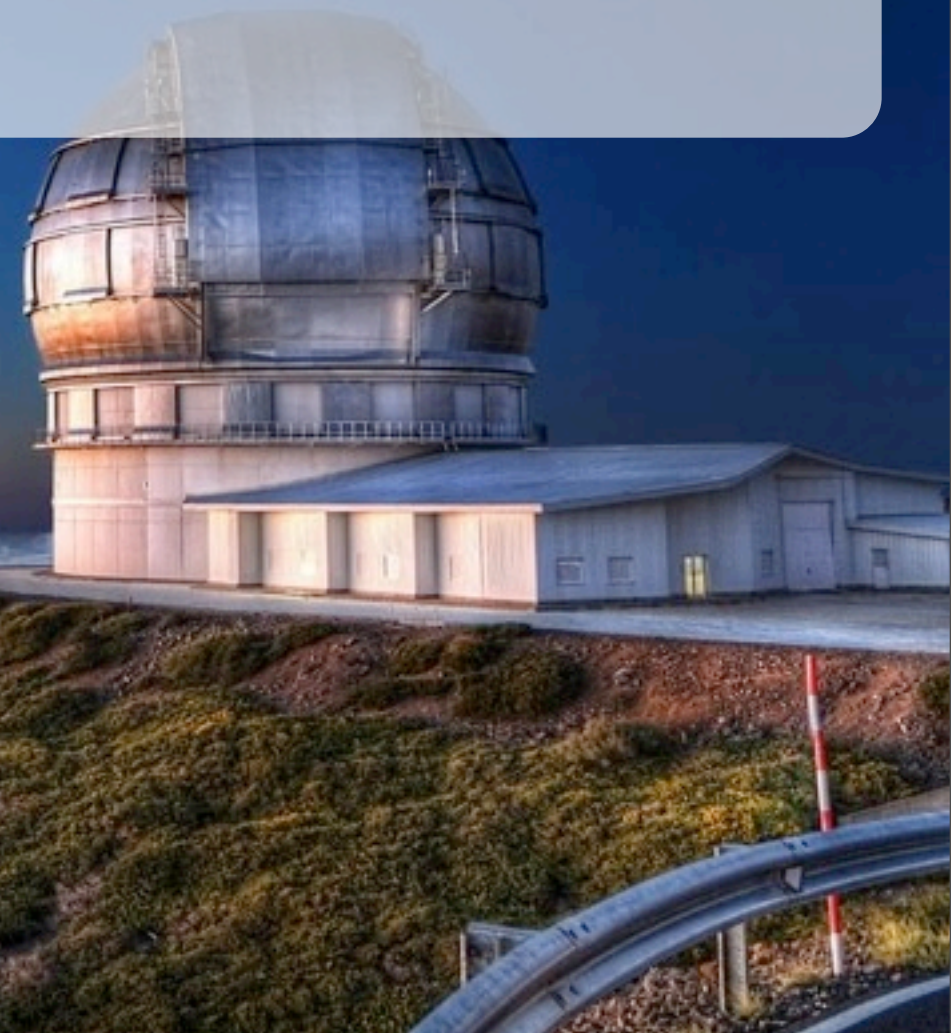
Na?, K

XO-2 b Potassium

Yet to be observed

GJ436, HAT-P4, HAT-P6, TrES-4

WASP-12, WASP-6, XO-1



GTC Atmospheric

Tunable filter **Survey** Long slit spec.

GJ1214 b Flat spectrum

HAT-P1 Potassium

TrES-2 b Inconclusive

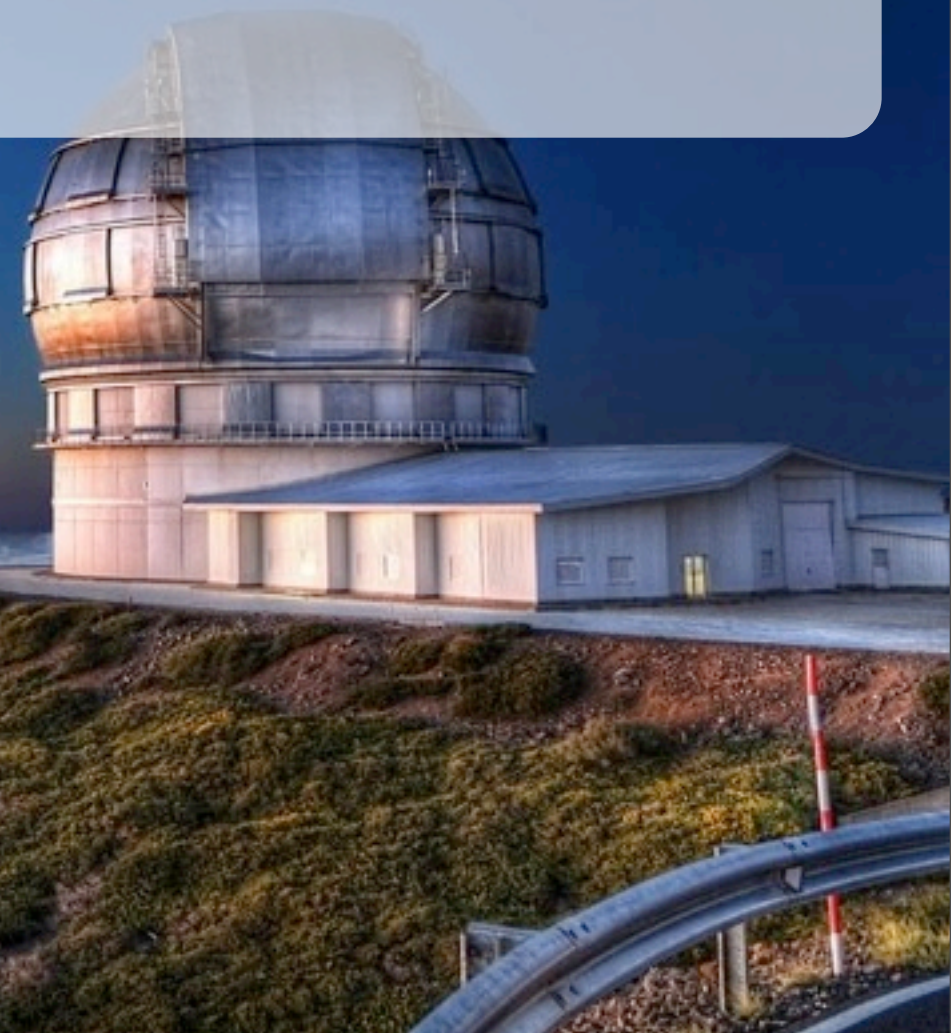
Na?, K

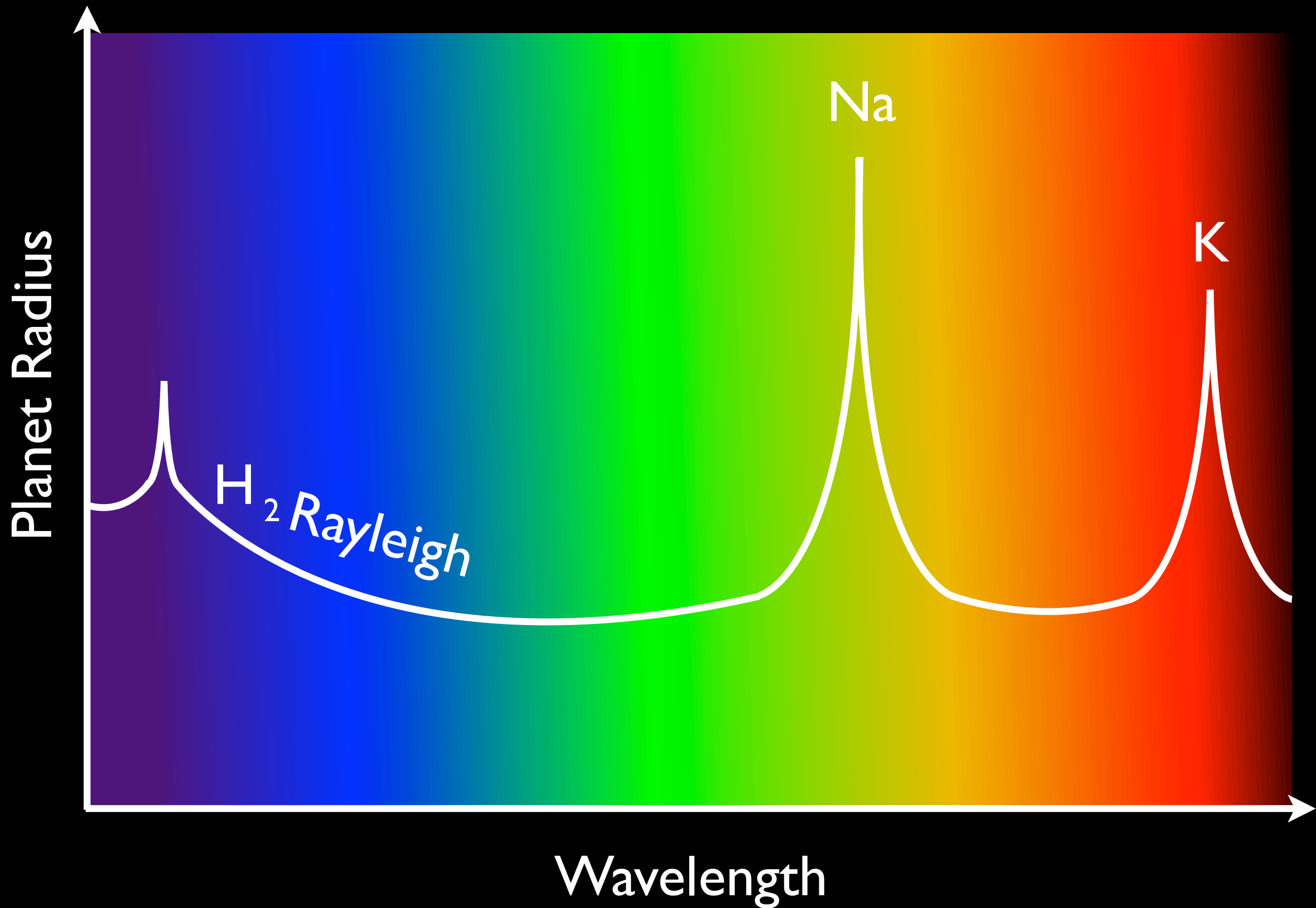
XO-2 b Potassium

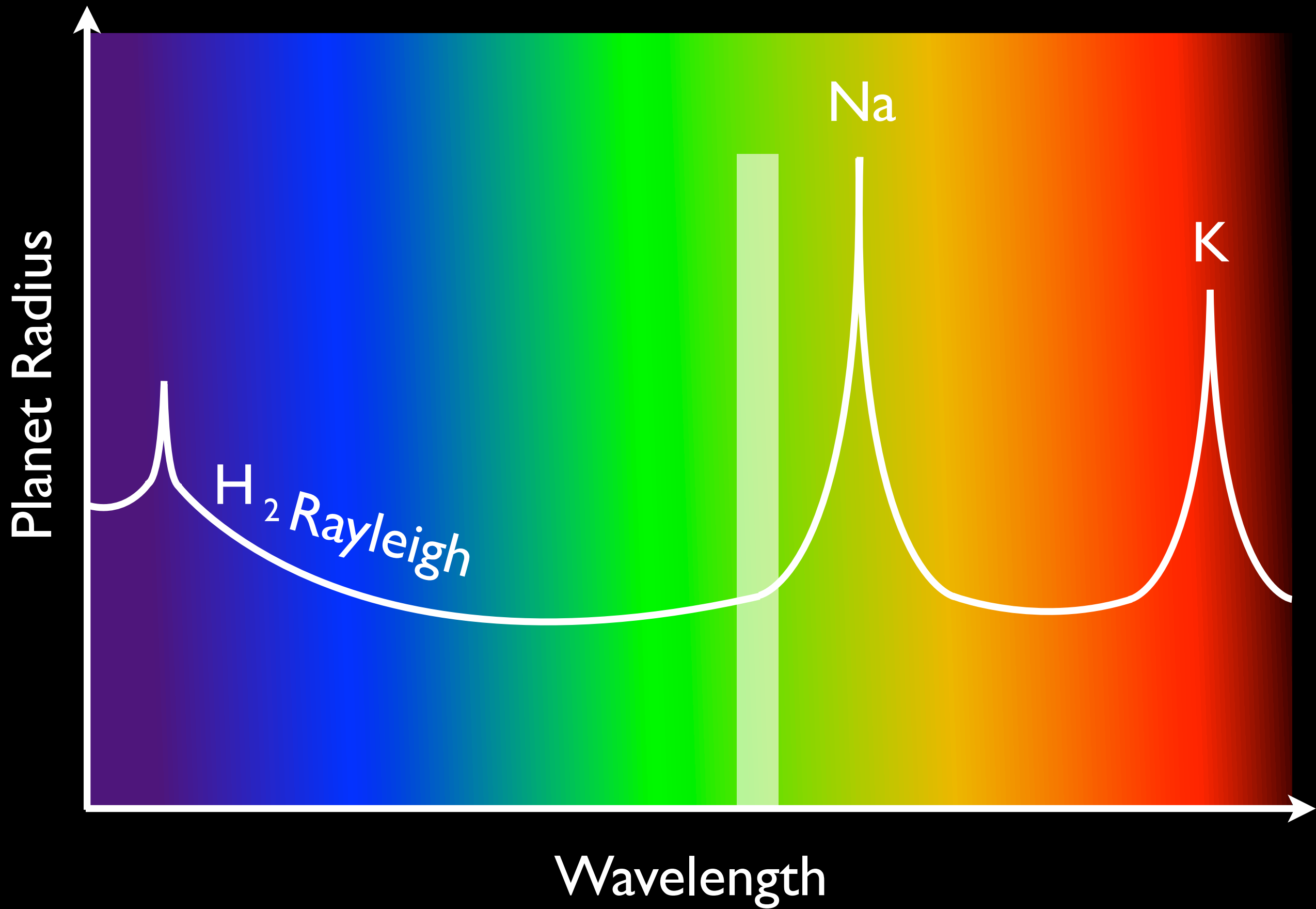
Yet to be observed

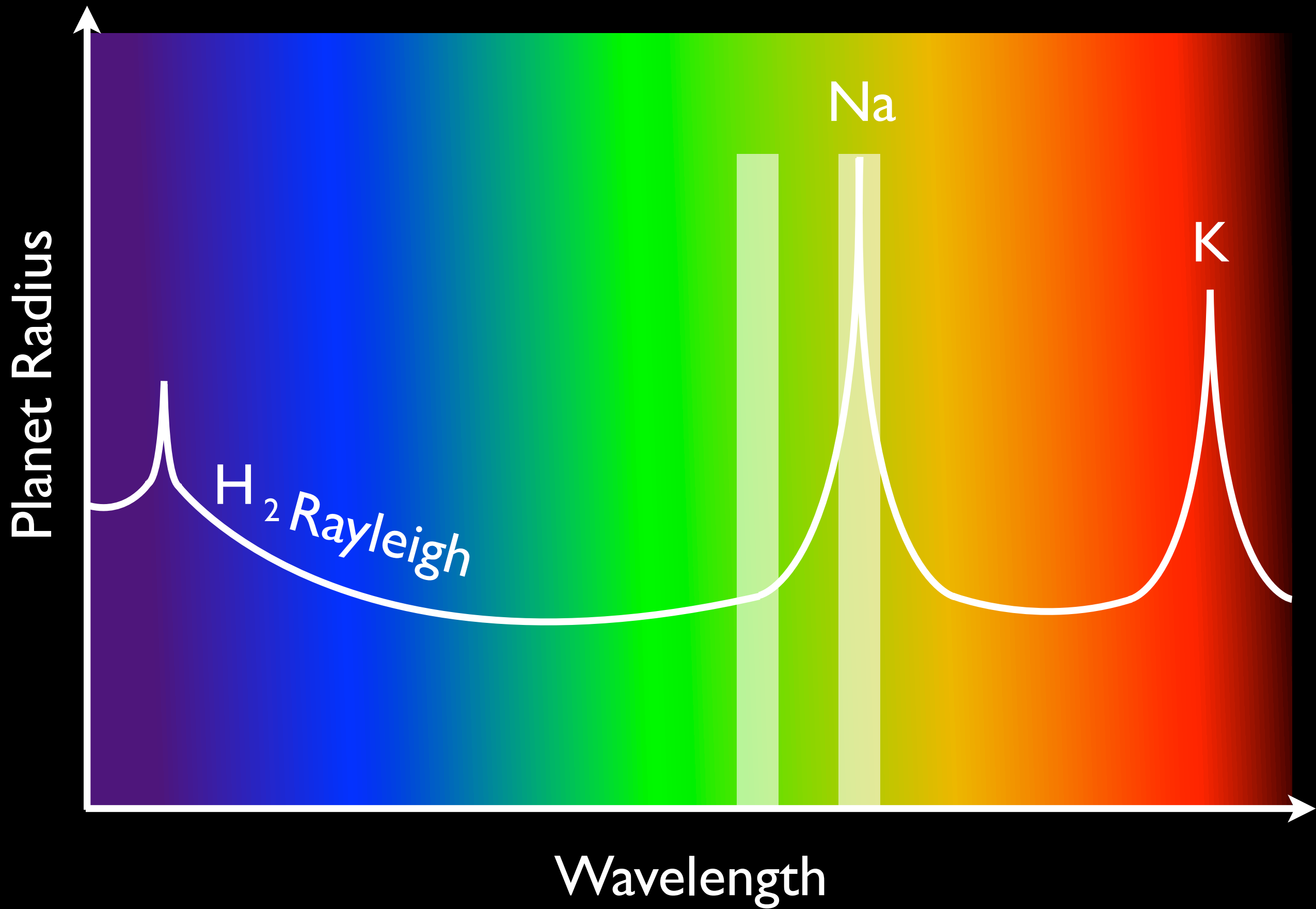
GJ436, HAT-P4, HAT-P6, TrES-4

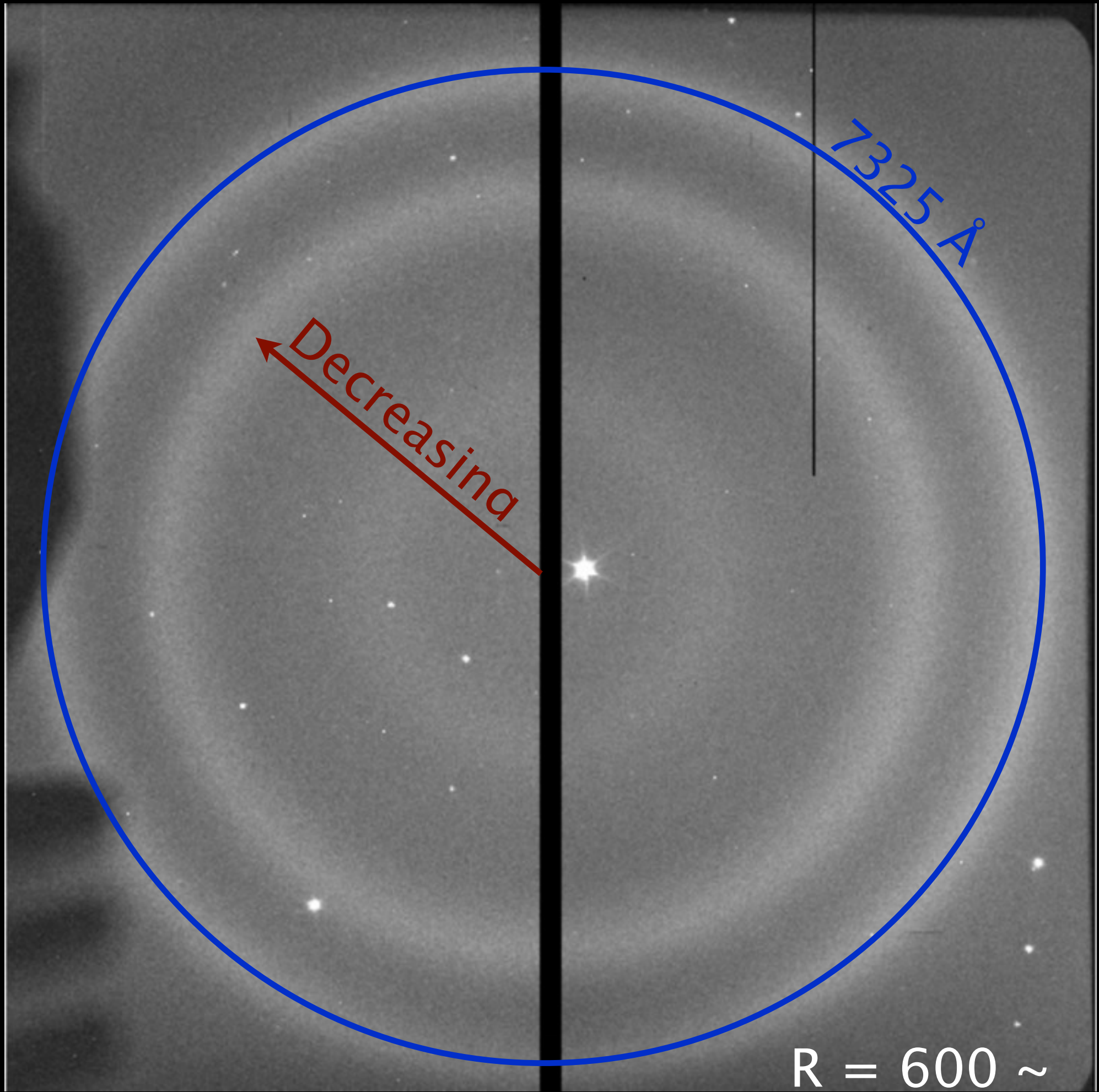
WASP-12, WASP-6, XO-1











- Tune between sky lines
 - Good Spectral
-

- Limited λ coverage
- Limited simultaneous λ coverage

Ideal for the detection of Na, K

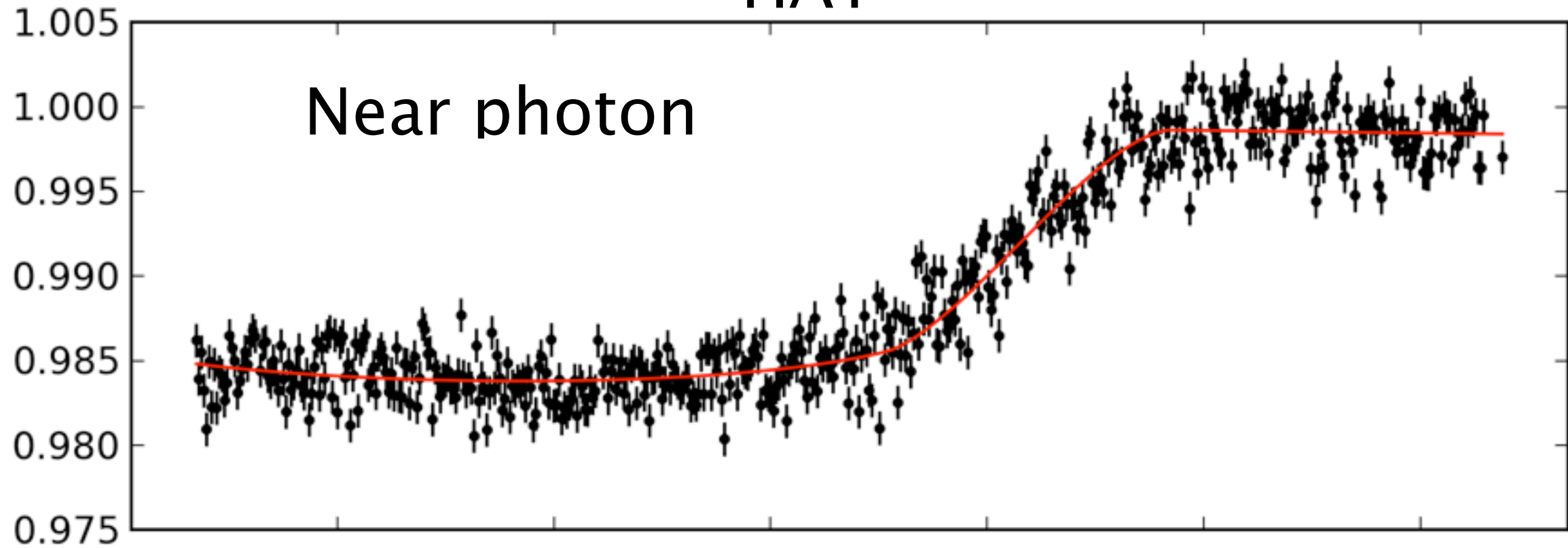
- Tune between sky lines
- Good Spectral



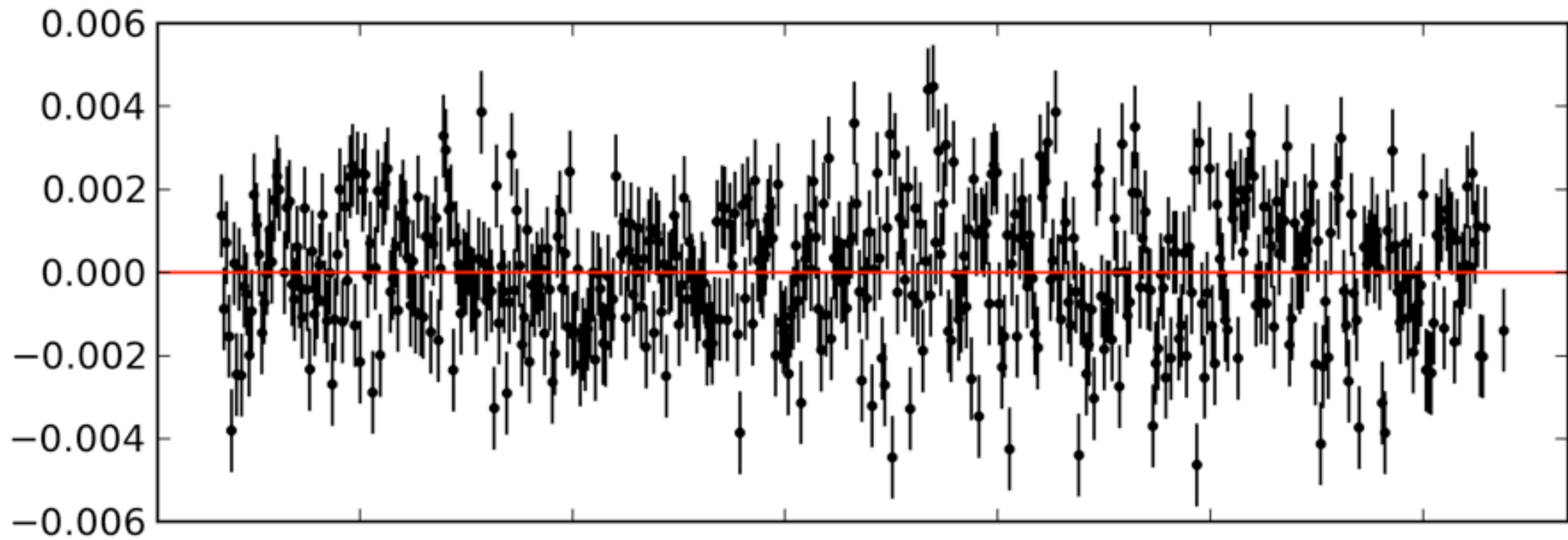
- Limited λ coverage
- Limited simultaneous λ coverage

Ideal for the detection of Na, K

HAT-



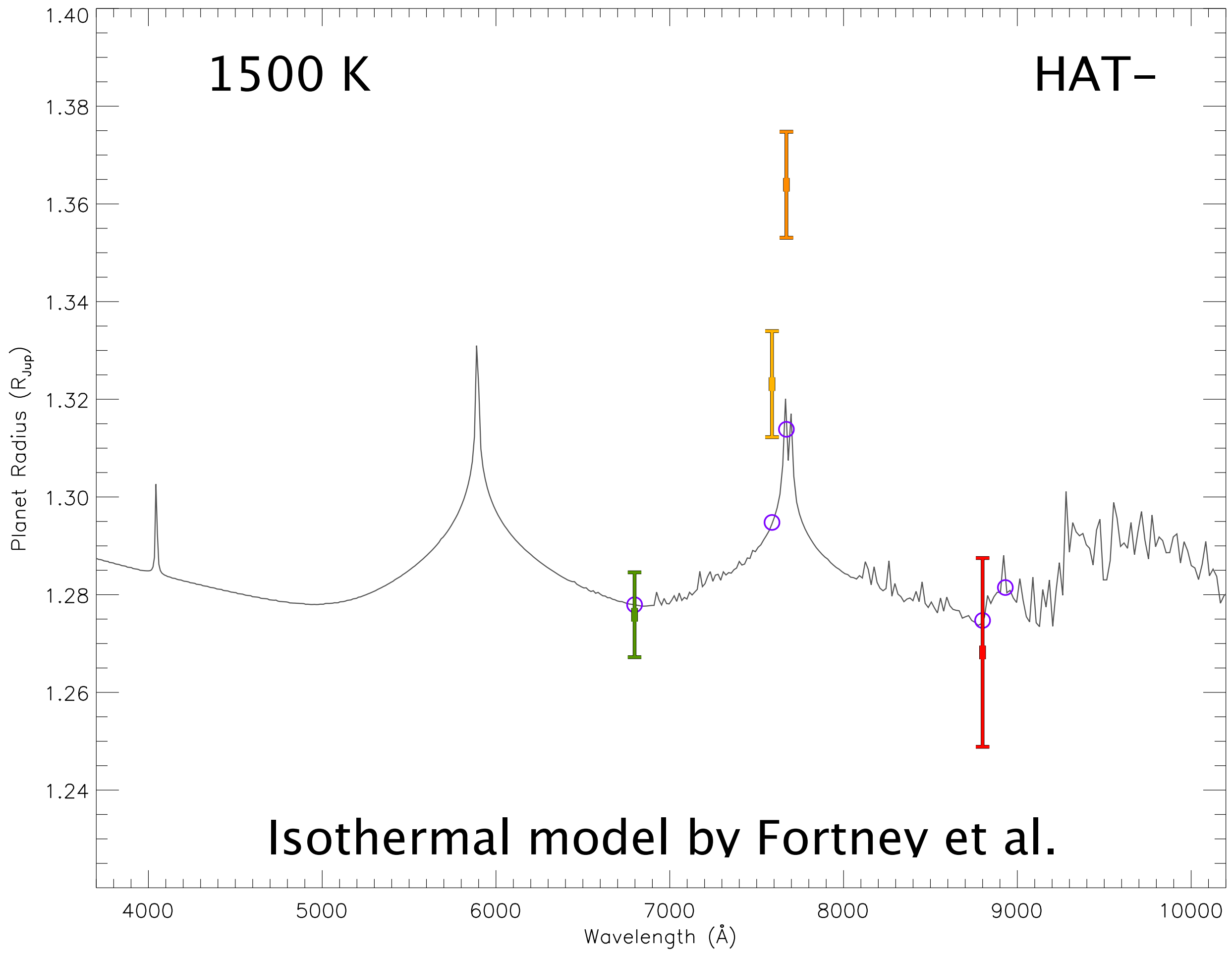
Time



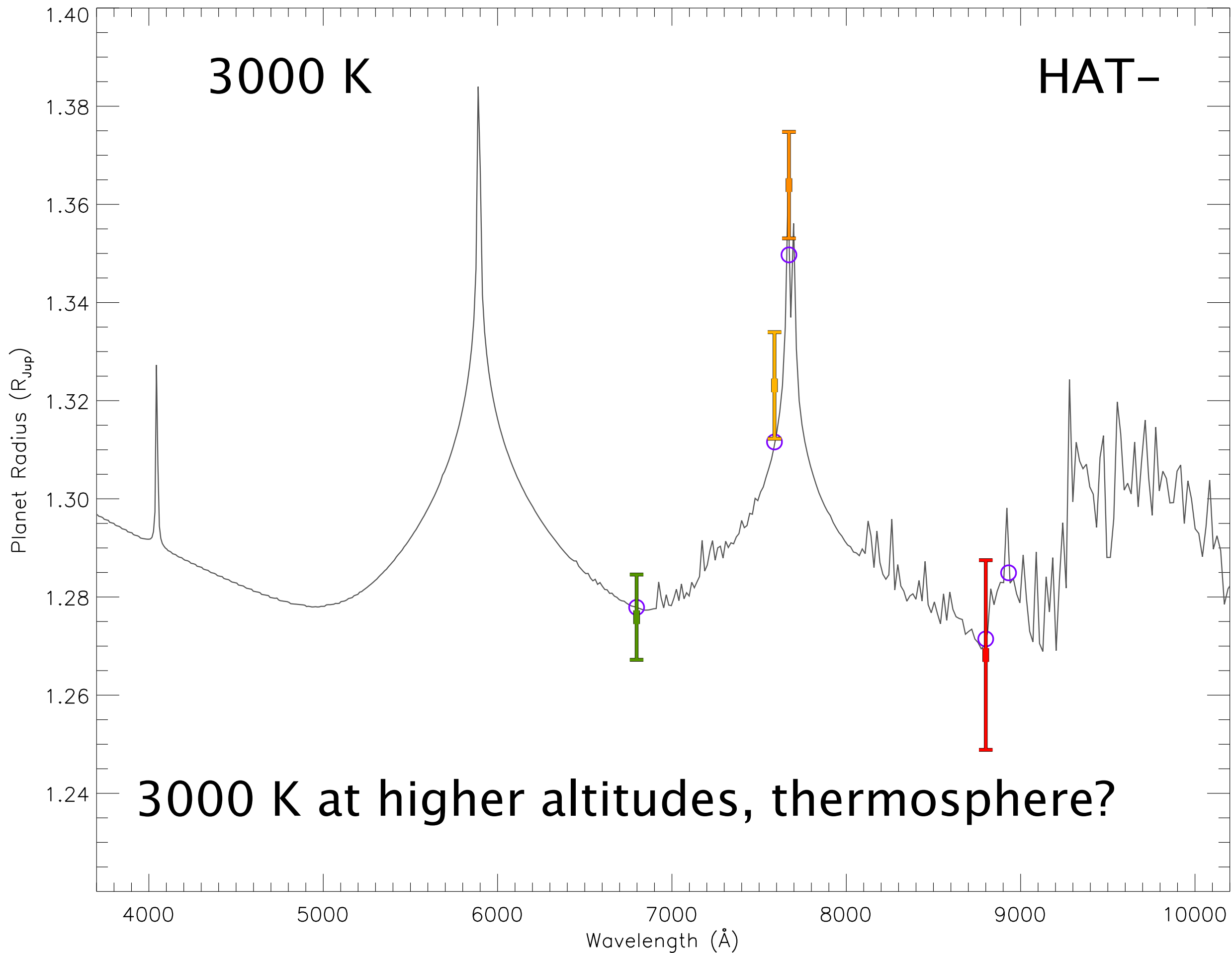
Time

1500 K

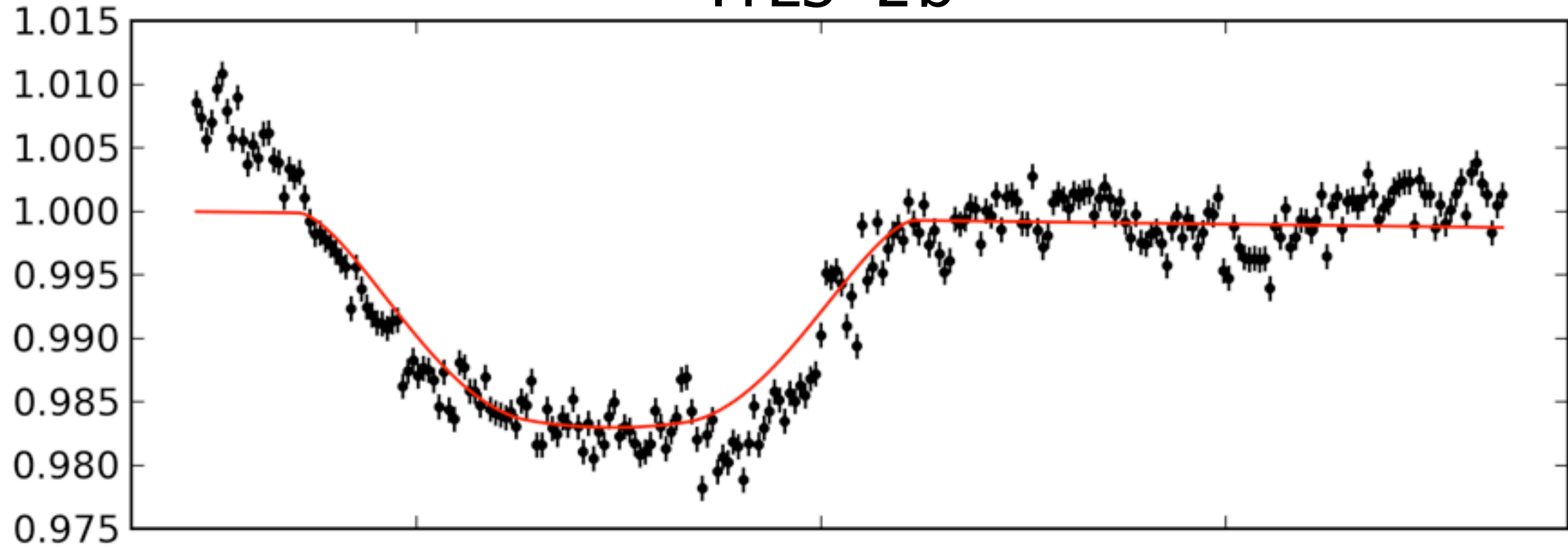
HAT-



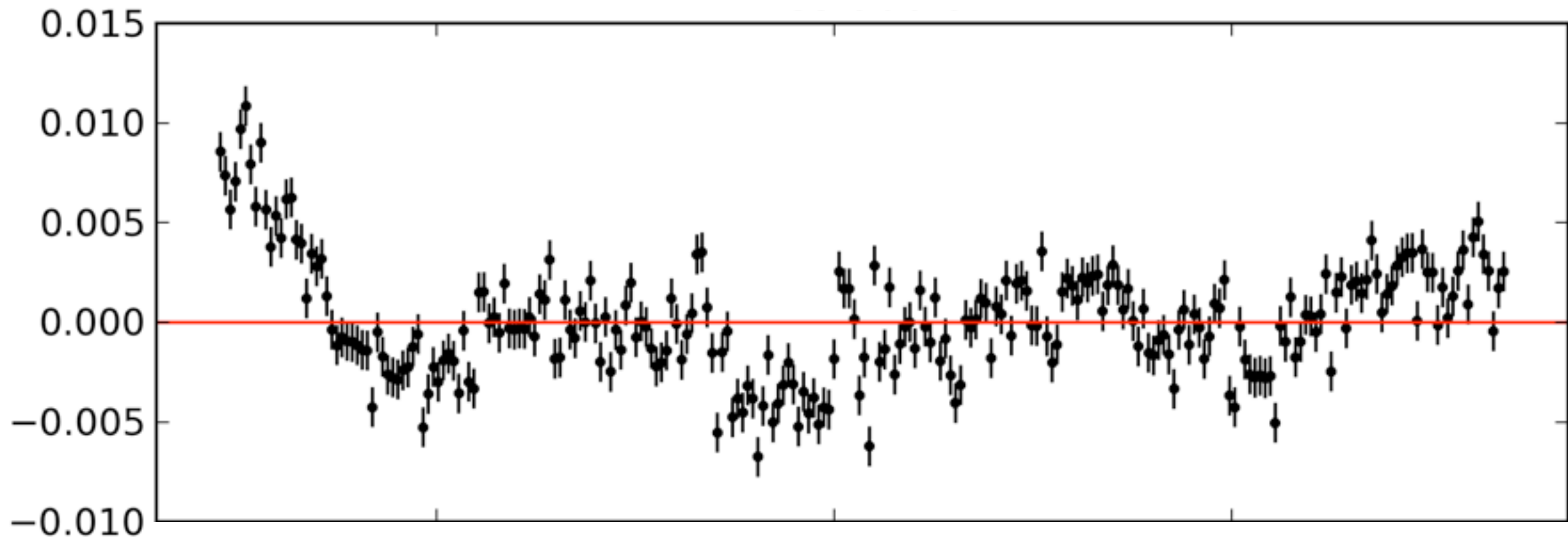
Isothermal model by Fortney et al.



TrES-2b

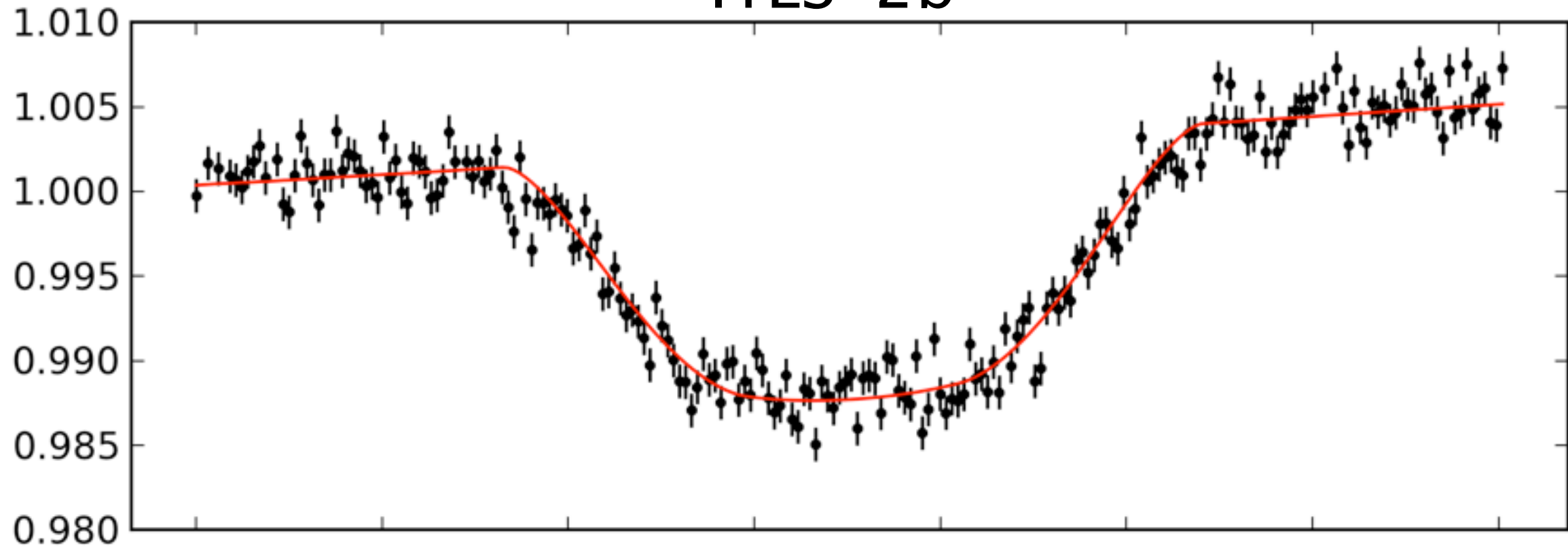


Time

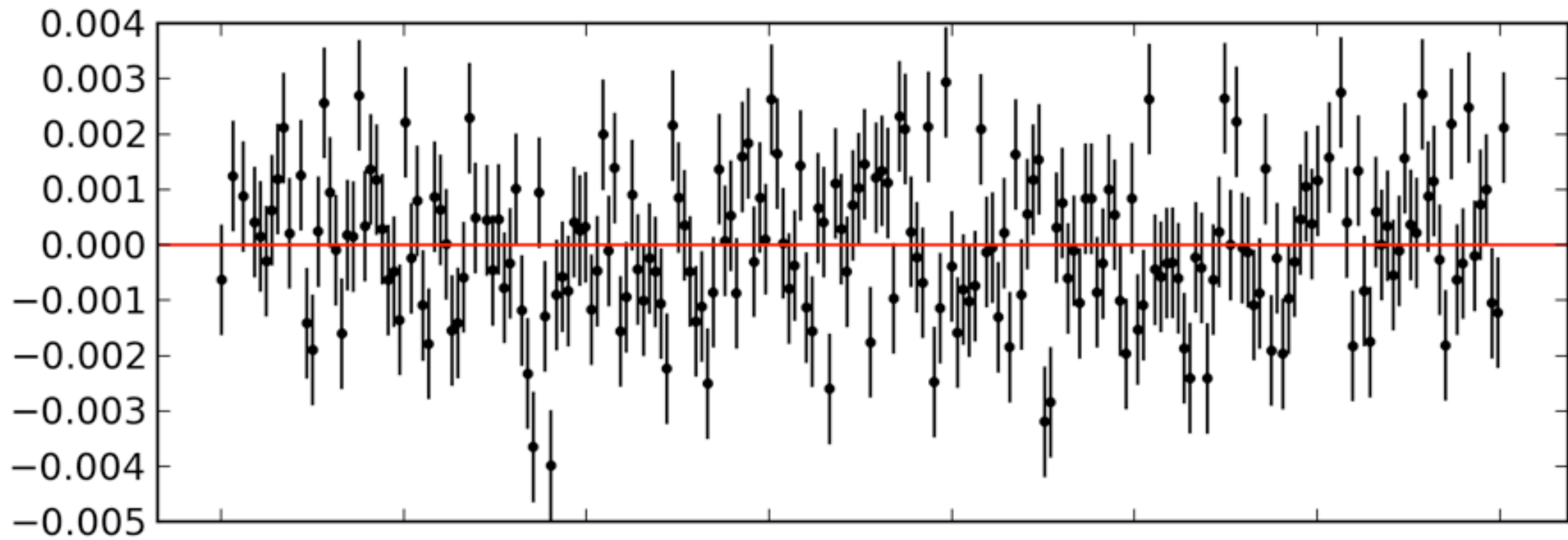


Time

TrES-2b



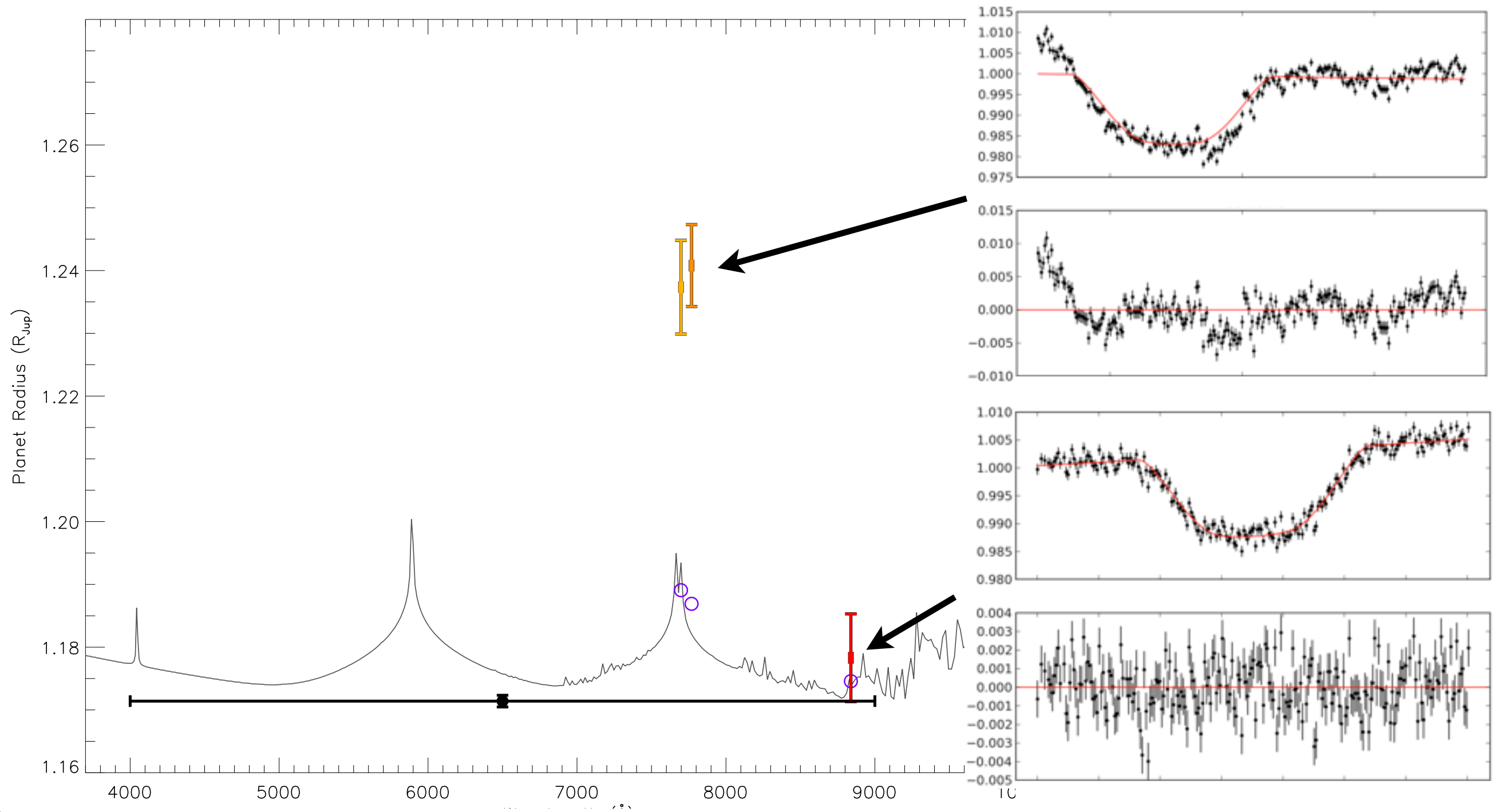
Time



Time

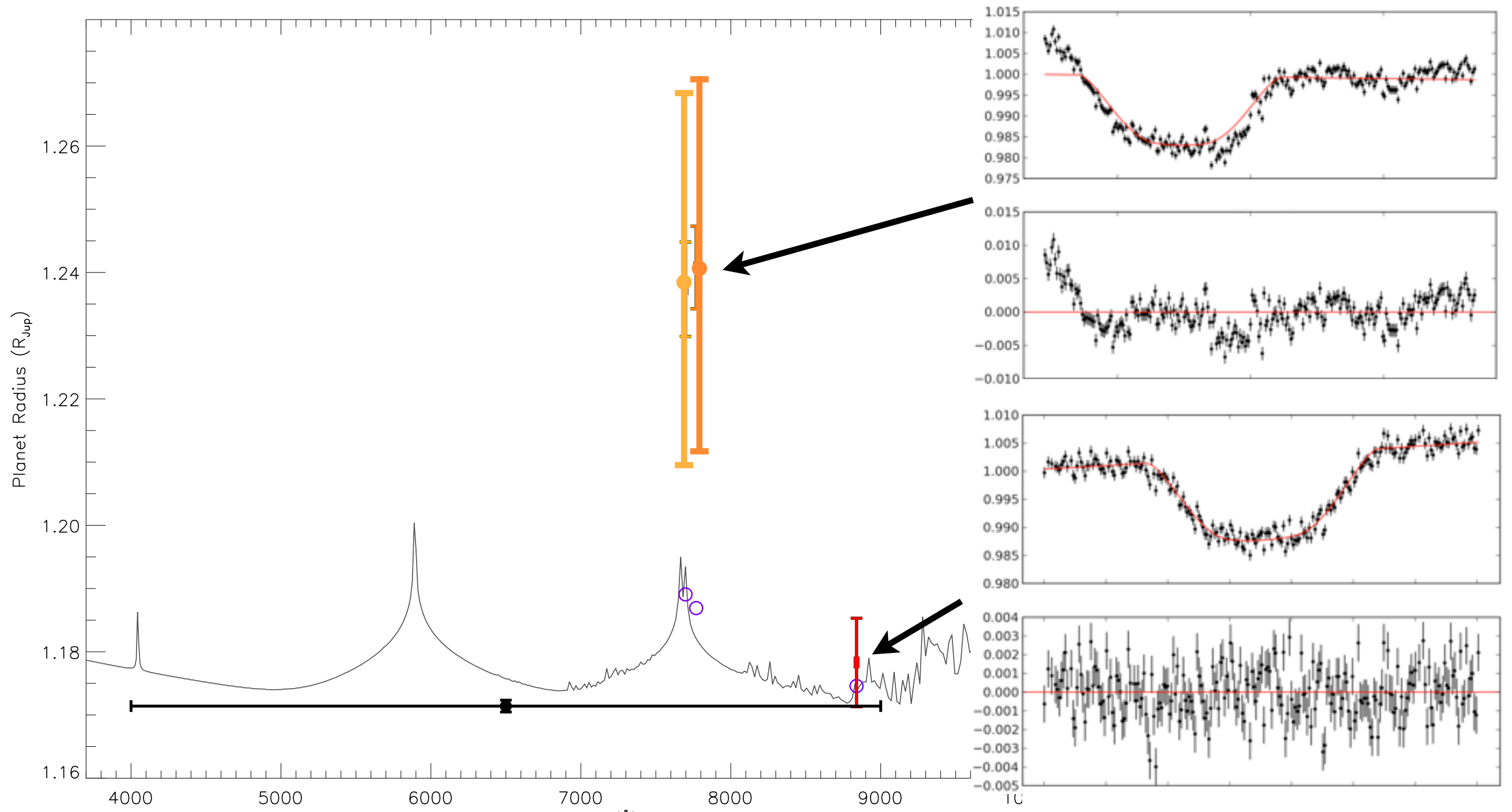
Possible FWHM

Dominated by



Possible FWHM

Dominated by



GTC Atmospheric

Tunable filter **Survey** Long slit spec.

GJ1214 b Flat spectrum

HAT-P1 Potassium

TrES-2 b Inconclusive

Na?, K

XO-2 b Potassium

Yet to be observed

GJ436, HAT-P4, HAT-P6, TrES-4

WASP-12, WASP-6, XO-1



GTC Atmospheric

Tunable filter **Survey** Long slit spec.

GJ1214 b Flat spectrum

HAT-P1 Potassium

TrES-2 b Inconclusive

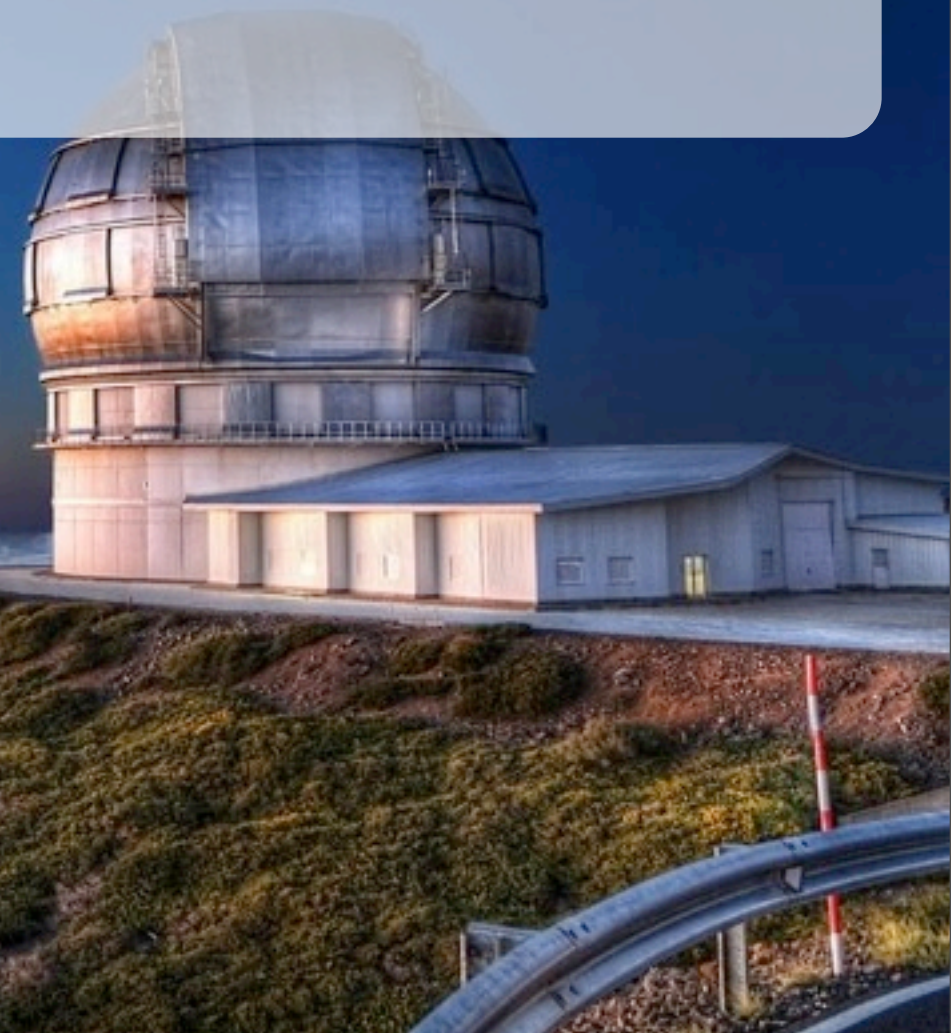
Na?, K

XO-2 b Potassium

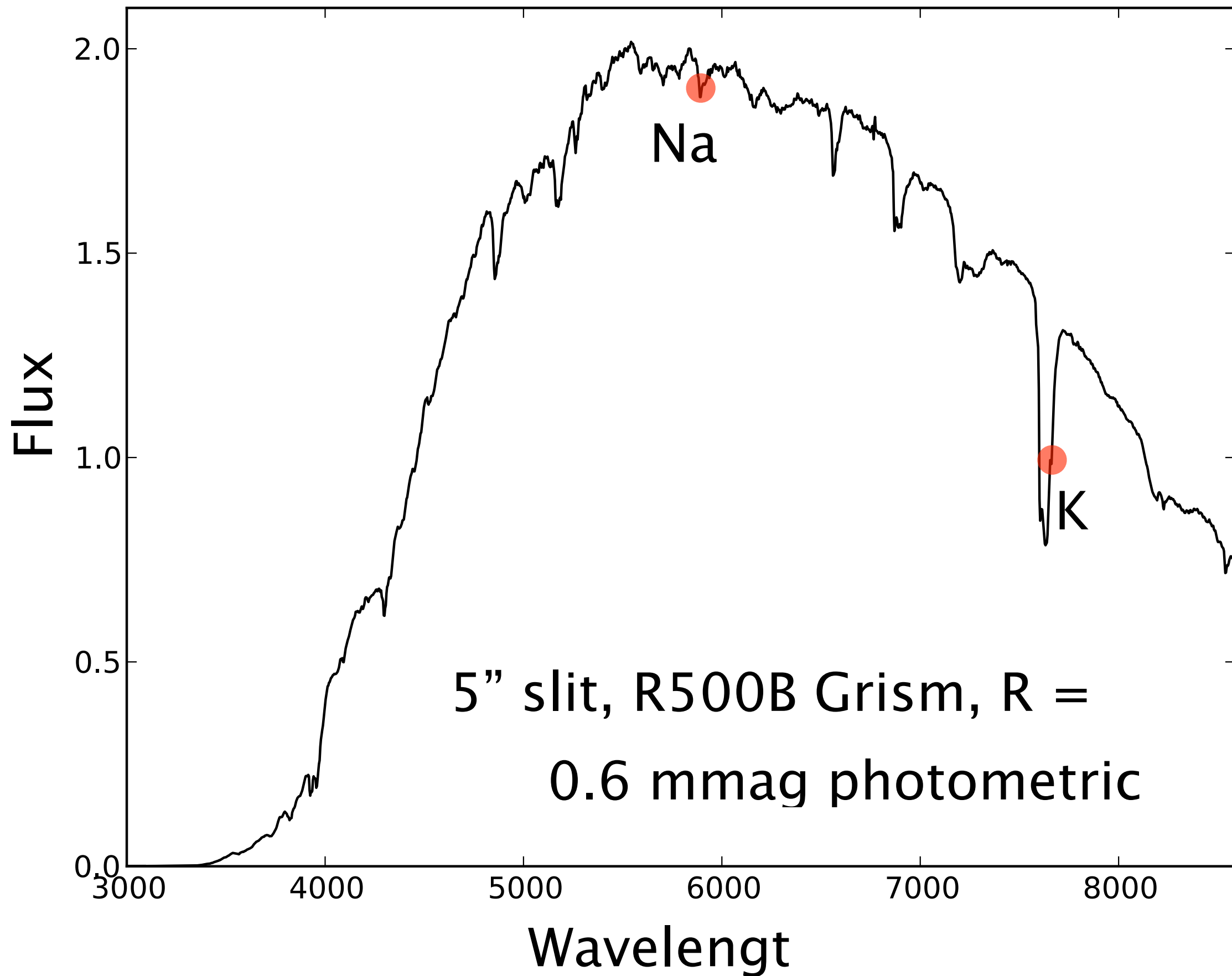
Yet to be observed

GJ436, HAT-P4, HAT-P6, TrES-4

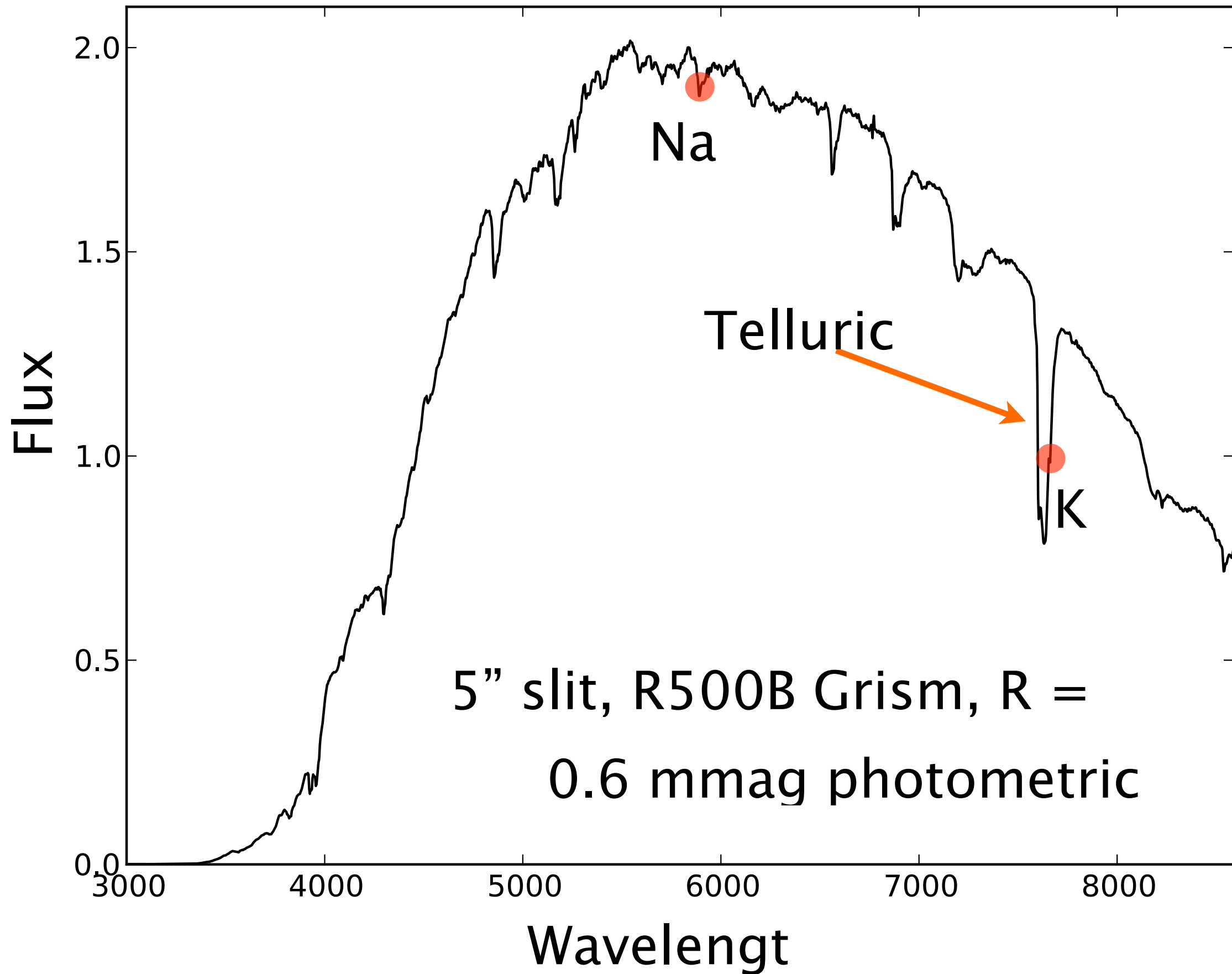
WASP-12, WASP-6, XO-1



Differential Long Slit



Differential Long Slit



5" slit, R500B Grism, R =
0.6 mmag photometric

Summary

- Potassium present in HAT-P-1 b.
- Large K feature indicates thermosphere (3000 K) in HAT-P1-b.
- Long slit spectroscopy has potential to observe Na and K simultaneously (sky lines).

Future

- Analyse the other exoplanets in the survey
- With this perform comparative exoplanetology