

Observing techniques, instrumentation and science for metre-class telescopes II
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A Highly Eccentric Spectroscopic Binary Star: HD 5624

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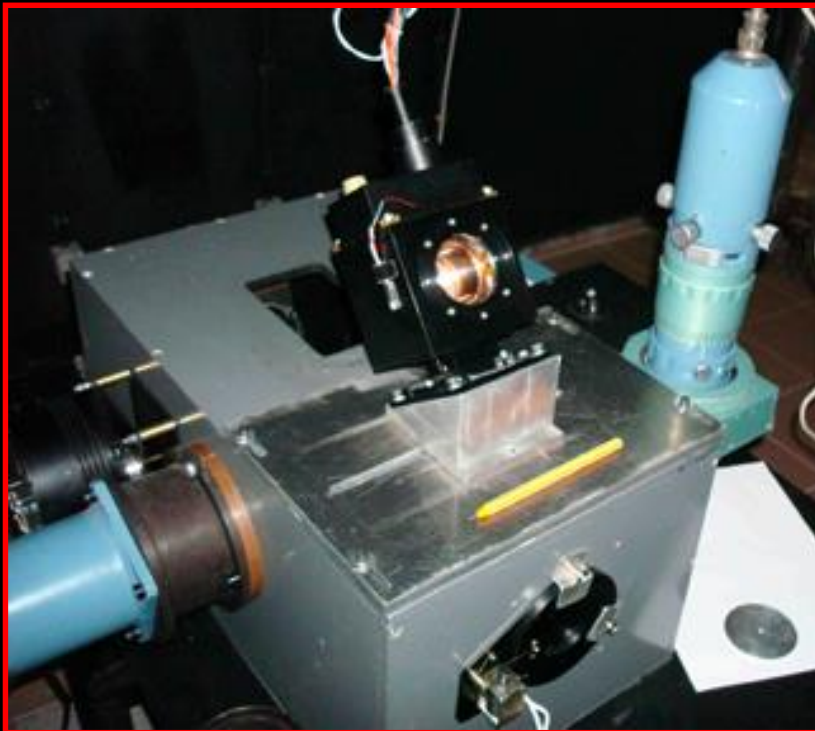
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To start exoplanet searches at Turkish National Observatory (TUG)
we established an international collaboration
between Turkish-Russian-Japanese colleagues

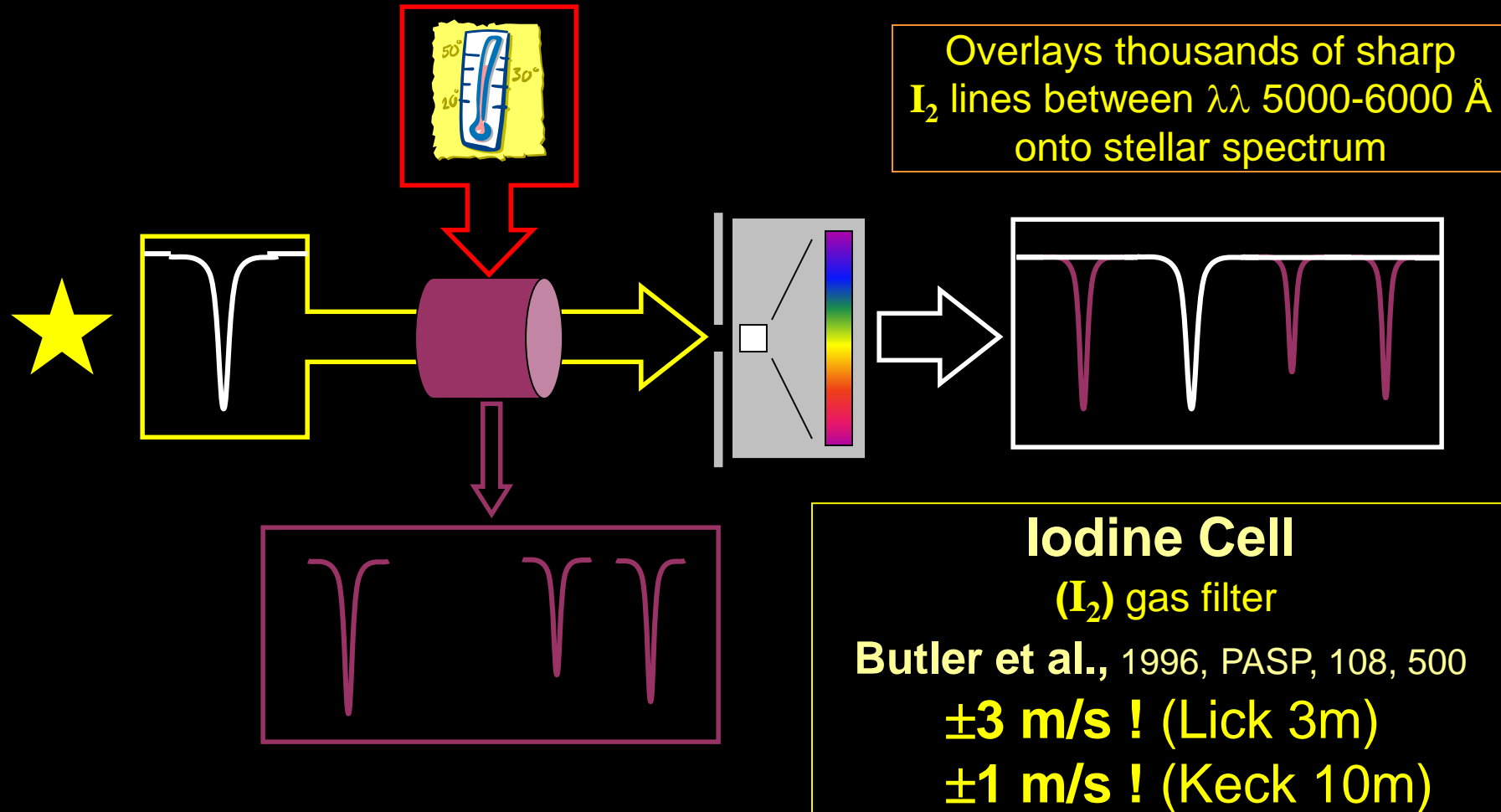
An I₂-Cell and its temperature controller was produced by our Japanese
colleagues at Okayama Astrophysical Observatory (OAO) and successfully
integrated to RTT150-CES on **OCTOBER 2007**

(for technical details, see: Kambe et al., 2002, PASJ, 54, 865)



DOPPLER TECHNIQUE

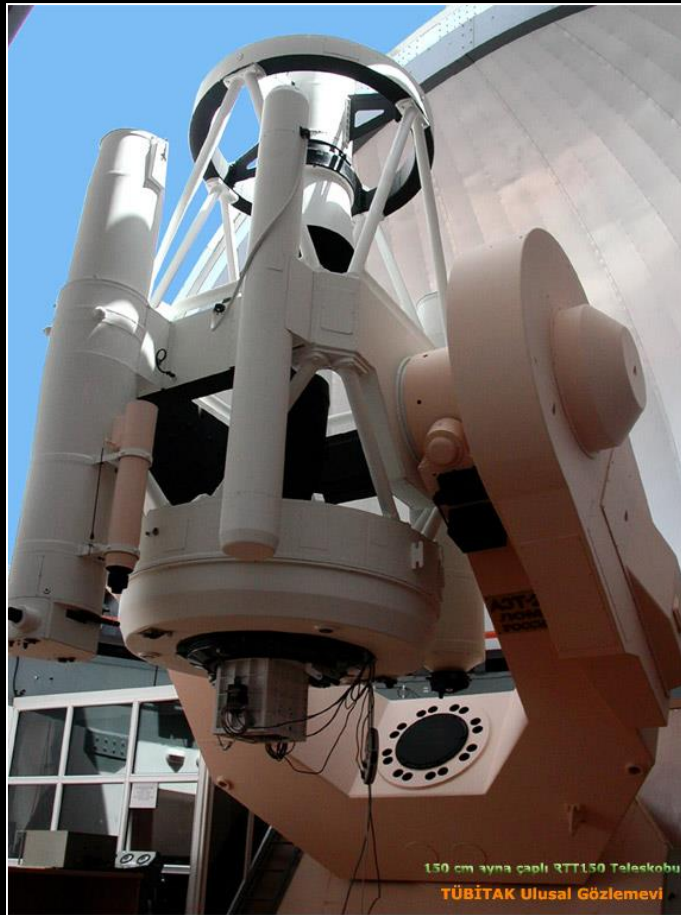
A Thermally Stabilized Gas Absorption Cell
in the front of the entrance slit of a spectrograph



Turkish National Observatory (TUG)

RTT150 Telescope - CES

Taurus Mountains-Bakirlitepe / Antalya, h=2500 m, 36° 49' 27" N, 30° 20' 08" E
<http://www.tug.tubitak.gov.tr>



RTT150 Telescope

$\varnothing = 1.5$ meters

Coude f/48

Cassegrain f/7.7

Coude Echelle Spectrograph (CES)

$R = \Delta\lambda/\lambda = 55\,000$

slit width = 1.5 arcsec (500 μm)

$\lambda\lambda$ 3800 – 10000 Å (85 orders)

2Kx2K 13 μm pix CCD

Registered wavelength interval on CCD

$\lambda\lambda$ 3900 – 8700 Å (68 orders)

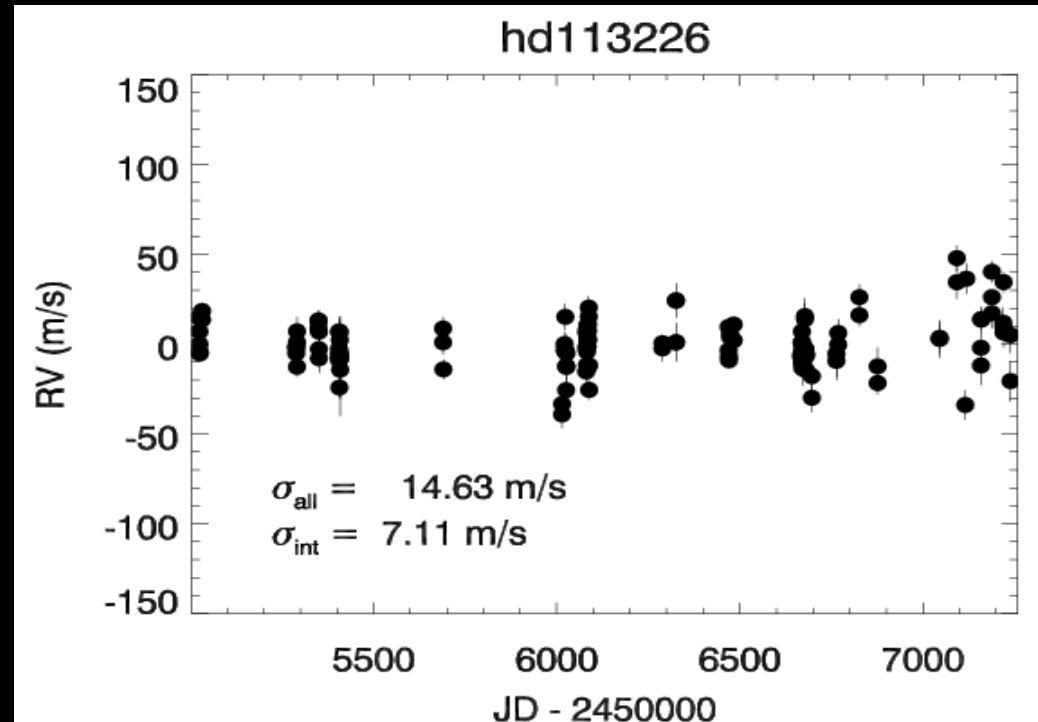
ACHIEVED RV PRECISION

For V=3 mag stars under ~15 min. exposure time (S/N=200)

~10 m/s

For V=6.5 mag stars under ~30 min. exposure time (S/N=100)

~15 m/s



TARGET LISTS

- 50 G- and K-type giants from HIPPARCOS catalogue
- Visual magnitude (V) of ~ 6.5
- Absolute magnitude (M_V) of $0.15 \leq M_V \leq 2.5$
- Colour index of $0.6 \leq B-V \leq 1.0$
- declination of $\delta > 20^\circ$
- RMS > 25 m/s RV variation in the previous RV surveys

Motivation

- G-K giants are intermediate-mass ($1.5 \sim 5M_{\text{sun}}$) stars in evolved stages
- How common are planetary systems?
 - Many young B, A stars have proto-planetary disks (HAEBE stars)
 - few planet searches targeting massive stars (O-A type stars, $>1.5M_{\text{sun}}$)
- Dependence of properties of planets on host stars' mass
 - More massive stars have more planets and more massive planets?
 - Suppressed by strong radiation from early-type host stars?
- Constrain timescale of planet formation
 - Lifetime of proto-planetary disk around massive stars are shorter than those around lower mass stars
- Evolution of planetary systems
 - How do planetary systems react to the red giant phase?

Orbital Solution of HD 5624

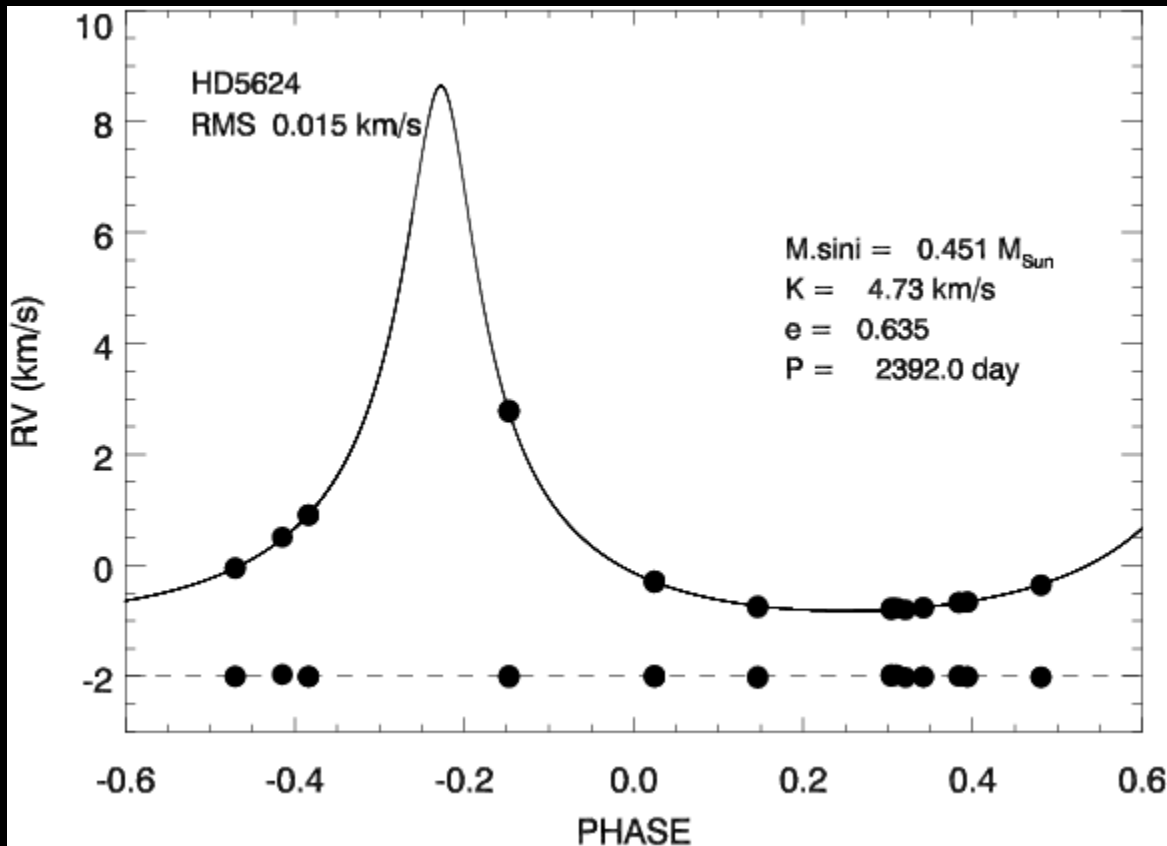


Table 1. Orbital parameters for HD 5624

Parameter	value	error
P (days)	2391.98	4.47
$K1$ (km/s)	4.73	1.19
e	0.63	0.06
ω (deg)	2.45	0.76
Tp (JD-2440000)	8383.565	4.318
$m2.\text{sini}$ (M_{\odot})	0.45	0.08
a (AU)	4.62	0.07
rms (m/s)	15	