



GTC Narrow Band $H\alpha$ Photometry of Super-Earth GJ1214b

RoPACS Network Meeting

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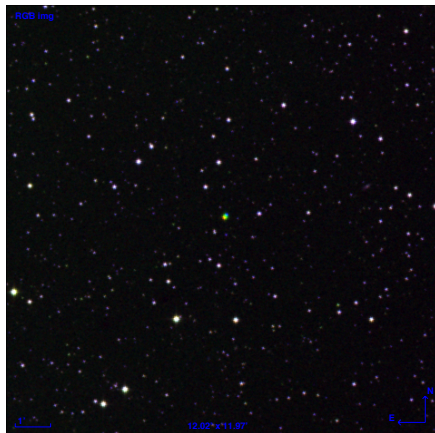
28th of November 2011

GJ1214b

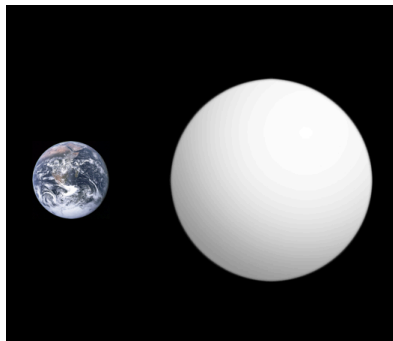
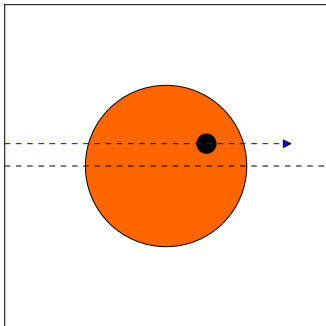
- Discovered in 2009^a
- GJ1214: M4.5 star
- $V = 14.67$, $d = 13$ pc
- $R = 0.210 R_{\odot}$, $M_{\odot} = 0.153 M_{\odot}$
- GJ1214b: $M = 6.5 M_{\oplus}$,
 $R = 2.74 R_{\oplus}$ ^b
- Period: 1.58 days

^aCharbonneau et al. 2009

^bKundurthy et al. 2011



Size:

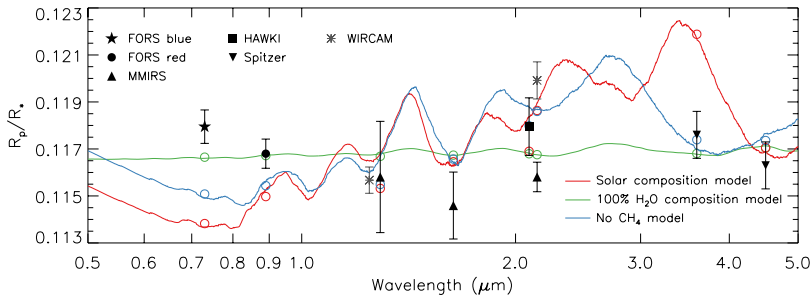


Roger and Seager (2010b):

- Mini-Neptune: rock, ice and primordial atmosphere
- Water world: water, ice and atmosphere dominated by water vapor
- Rocky planet: rocky material and secondary atmosphere

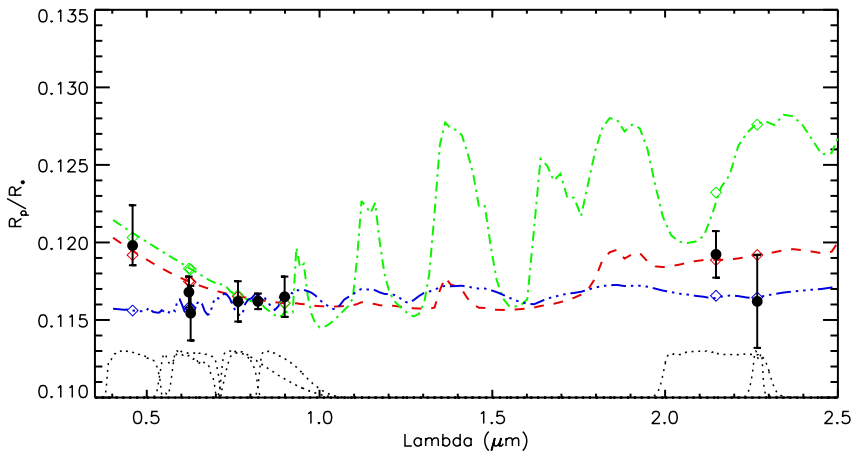
Atmospheric features \implies Transmission spectroscopy

Bean et al. 2011

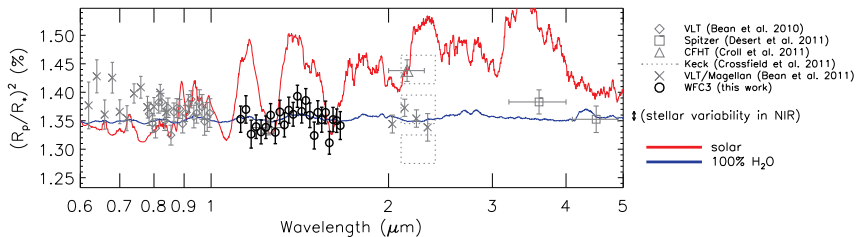


De Mooij et al. 2011

Green: Hydrogen rich with solar metallicity **Red:** Hydrogen rich with sub-solar metallicity **Blue:** Atmosphere dominated by water



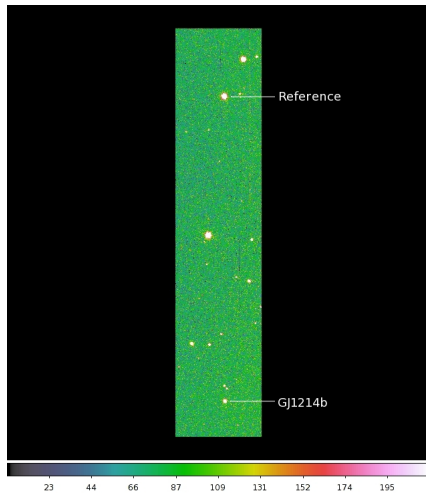
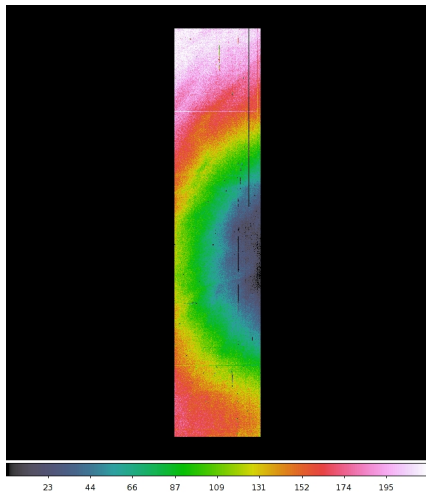
Berta et al 2011 (Today!)



- GTC: Gran Telescopio de Canarias, 10.4m
- OSIRIS: Optical System for Imaging and low Resolution Integrated Spectroscopy
- Tunable Filter (TF) imaging mode
- Custom bandpasses 651.0-934.5 nm

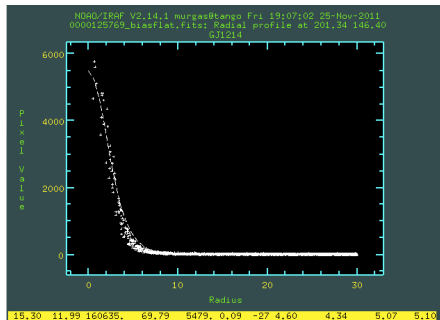


- 17th of August 2011
- Filters: 653.5nm, 656.3nm ($H\alpha$) and 662.0nm
- Filter width: 0.2 nm
- Exposure time: 9 seconds
- Begin: 22:50 UT, Airmass: 1.27
- End: 01:00 UT, Airmass: 2.37
- Total images: 333, 111 for each filter

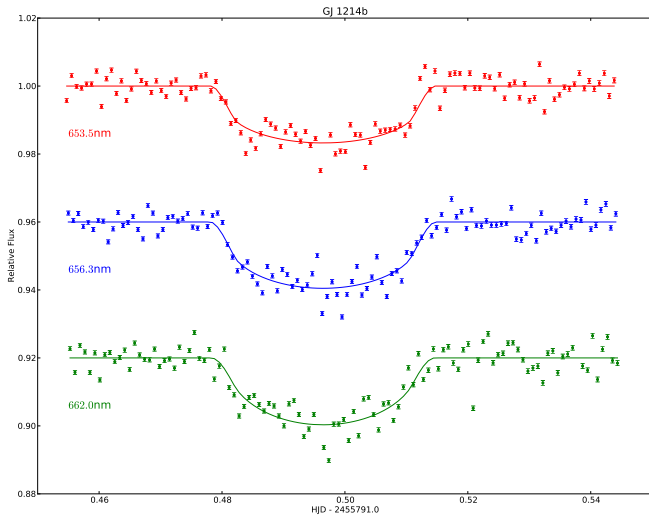


- Aperture photometry
- 1 reference star
- Fix aperture: 9 pixels
- Sky: 20-30 pixels
- TFRed^a: not better results

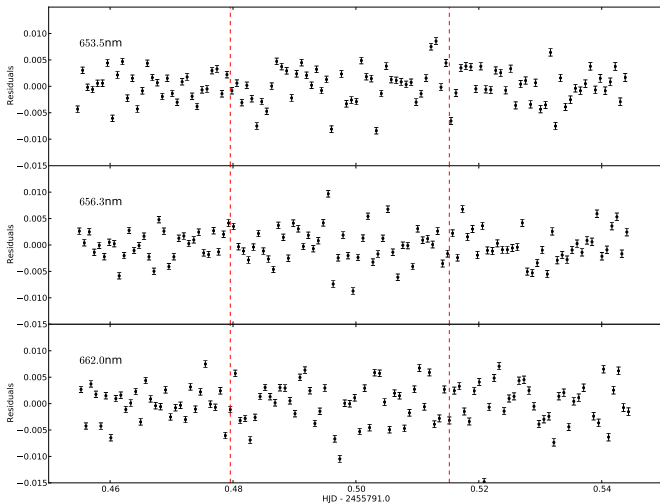
^aD.H. Jones et al. 2002



Results



Results

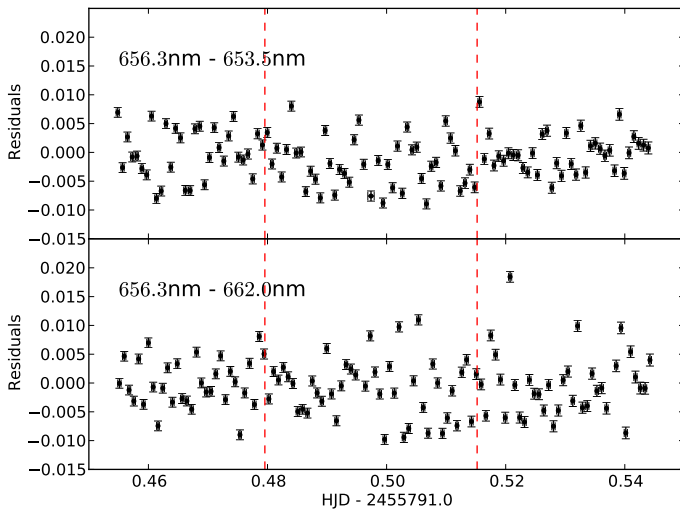


Light curve fitting (Gimenez 2006):

- 653.5 nm \longrightarrow $R_p/R_s = 0.114$
- 656.3 nm \longrightarrow $R_p/R_s = 0.121$
- 662.0 nm \longrightarrow $R_p/R_s = 0.117$

I owe you an error bar :(

Results



Summary

- GJ1214b Narrow band observations
- Traditional data reduction and TFRed
- Performed aperture photometry
- Light curve fitting

Future Work

- Errors in R_p/R_s estimation
- Compare results

Thank you