Transit Doppler Imaging of Extrasolar Planets

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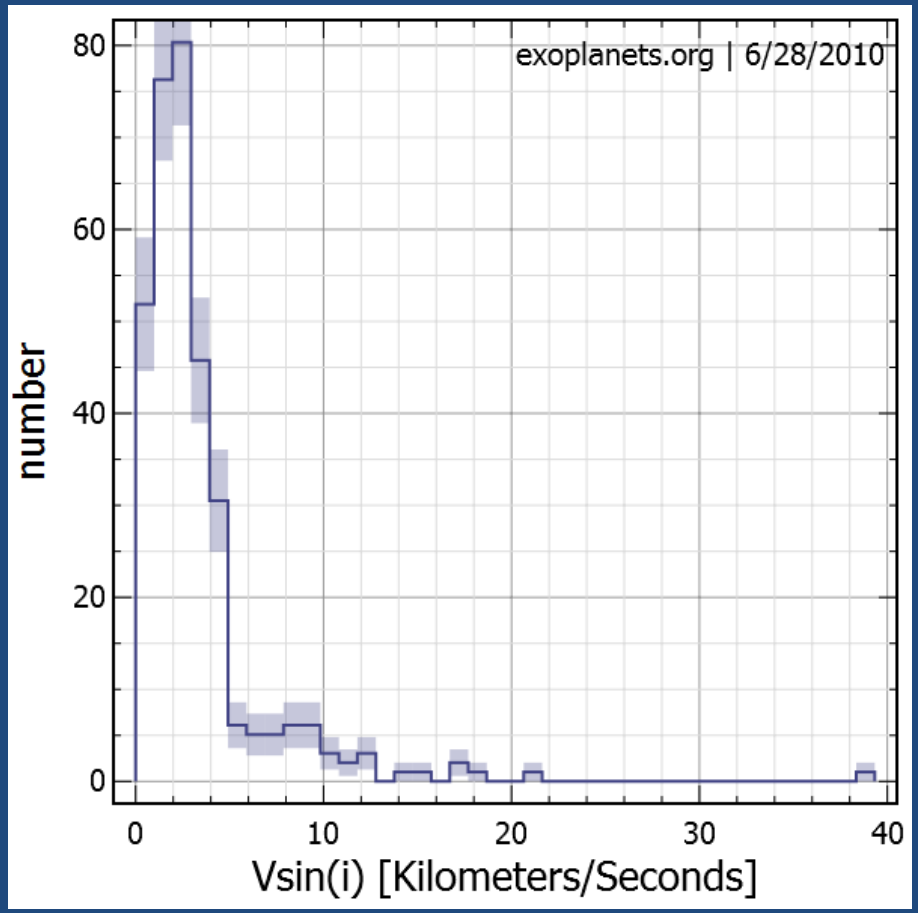
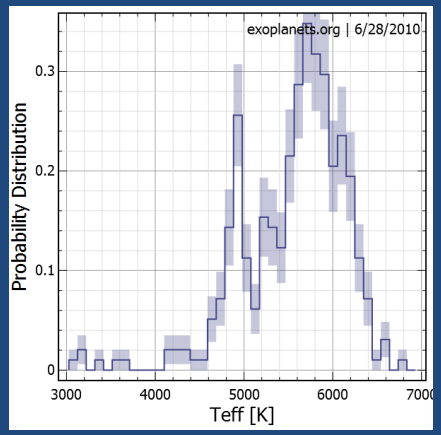
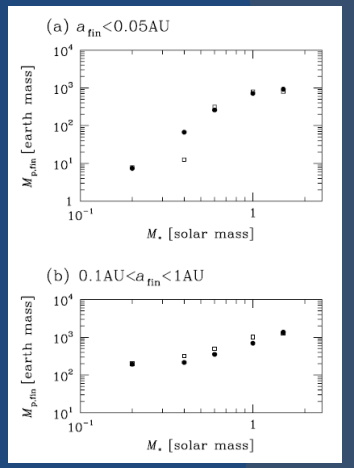
Motivation for Transit Doppler Imaging







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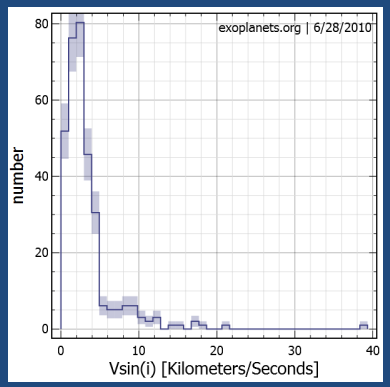

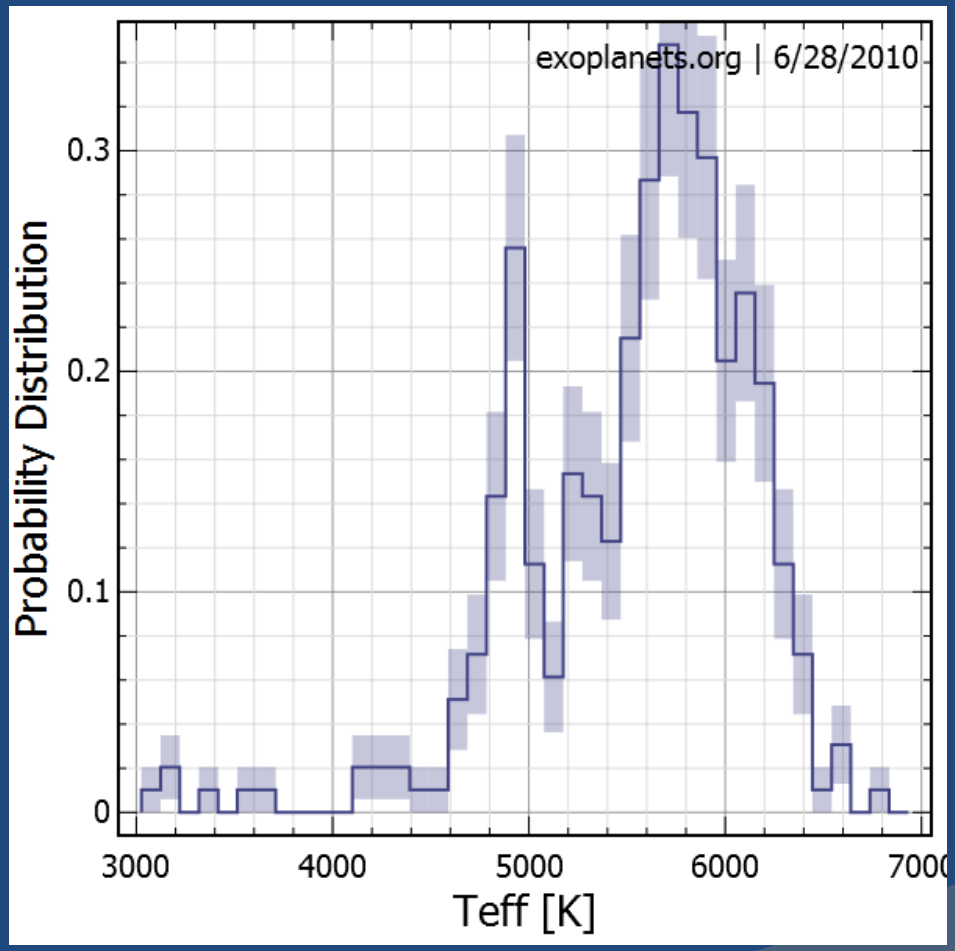

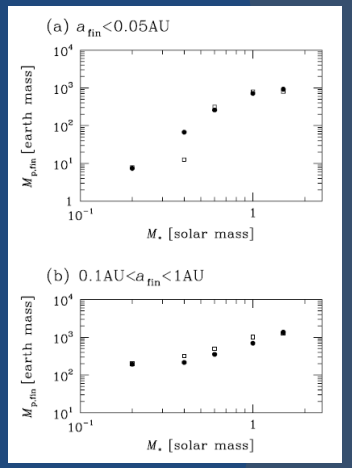

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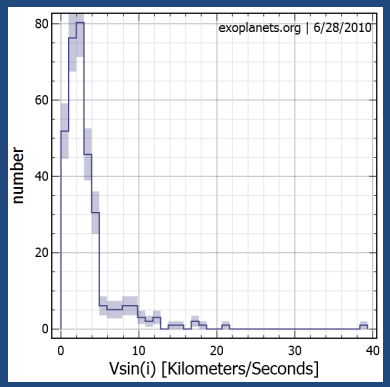

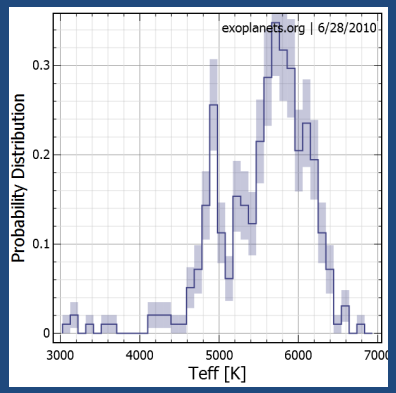

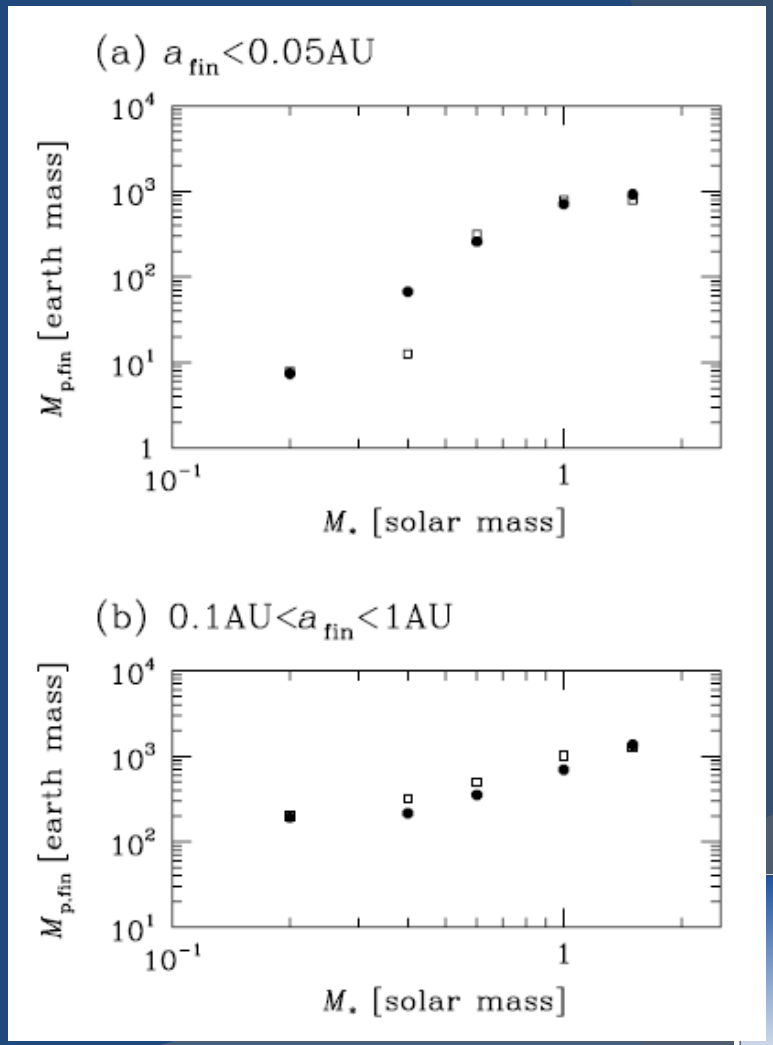

Ida & Lin, 2005

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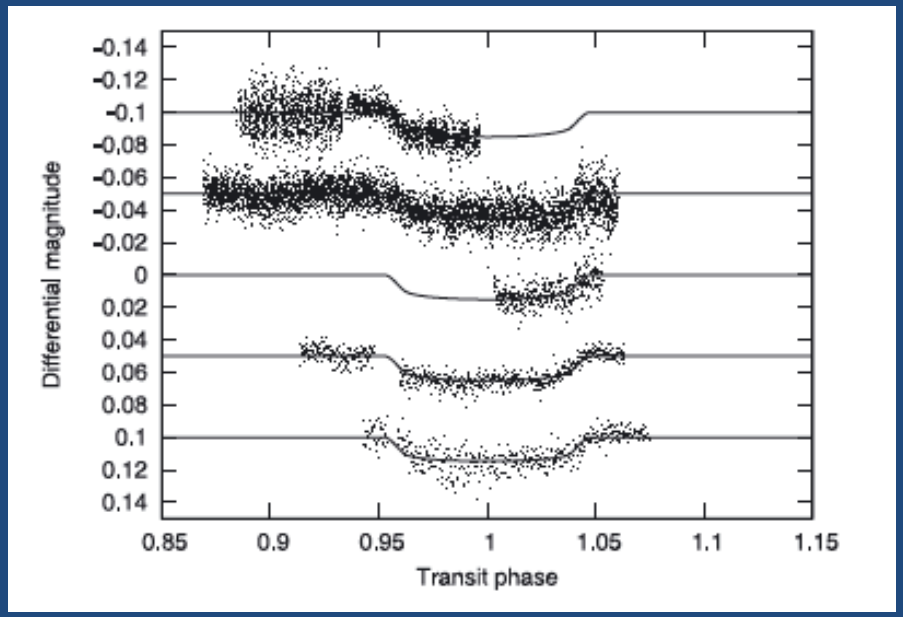

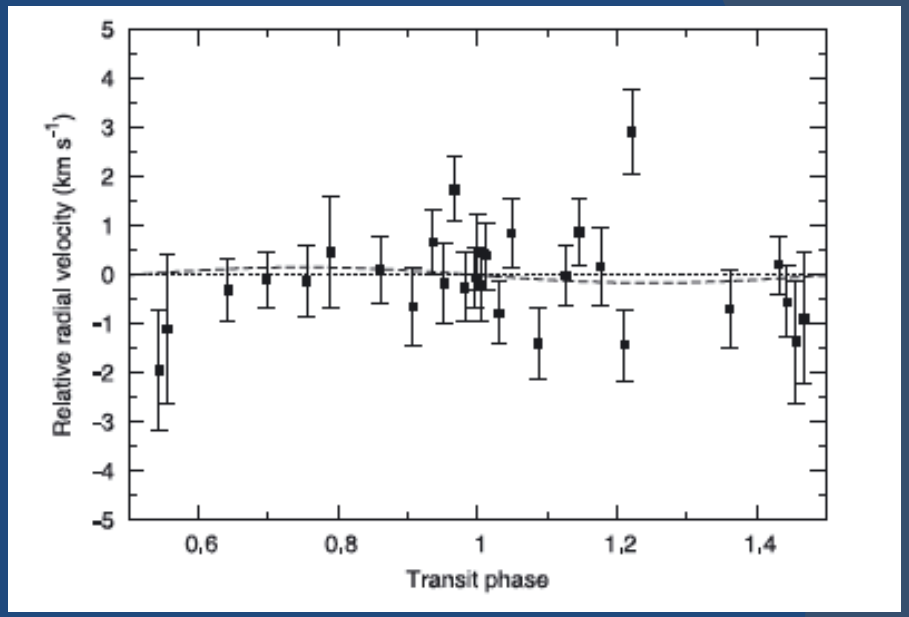

WASP-33, vsini ~ 90 km/s
Collier Cameron et al. 2010, MNRAS, 882C
„Line-profile tomography of exoplanet transits – II.“

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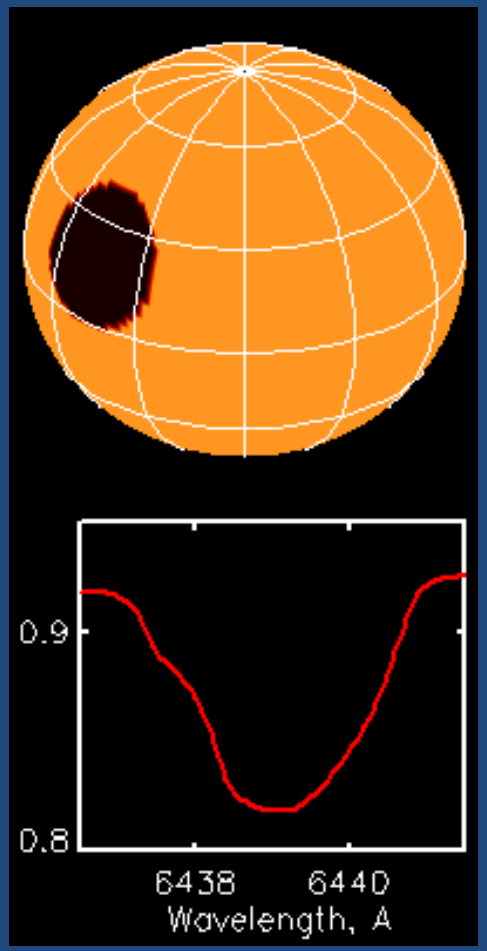
Doppler Imaging

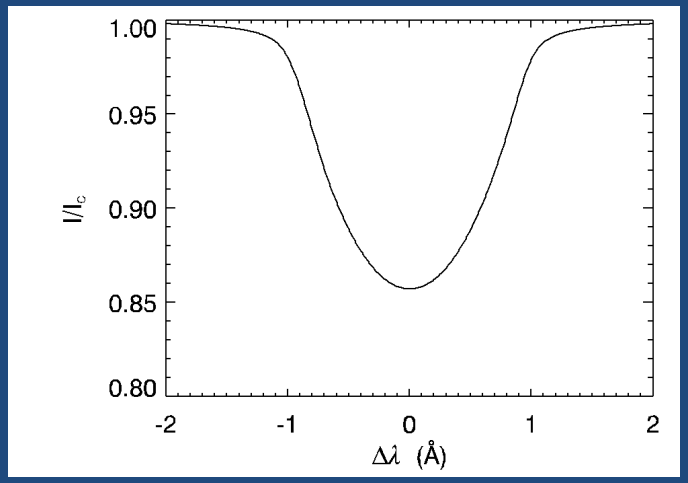


first used by Vogt & Penrod in 1983

stellar rotation needs to be the dominating effect broadening the spectral lines!

inclination angle *i* should preferably be 20°-70°

Transit Doppler Imaging



independend method to derive the

- star/surface ratio

→ planetary radius

- trajectory of the planet

→ orbital inclination
impact parameter
spin-orbit misalignment

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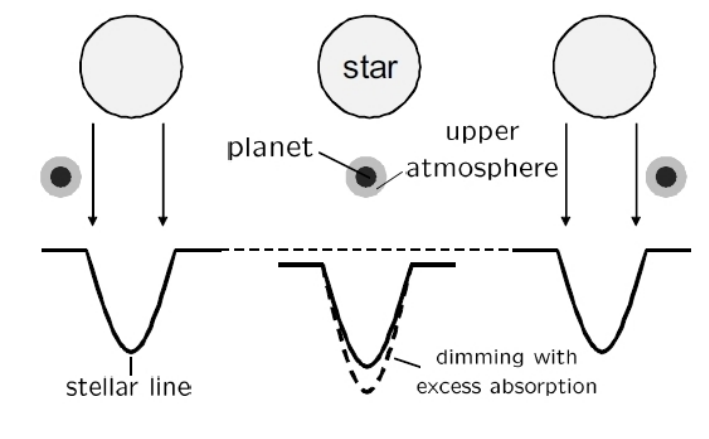
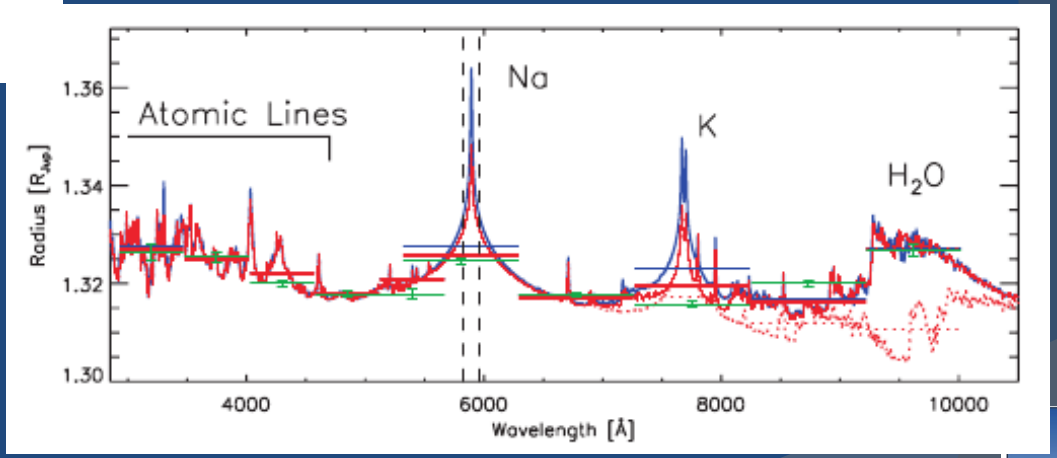
Transmission spectroscopy



planetary spectral information due to a wavelength dependent radius

long-term goal: characterization of planetary atmospheres with PEPSI@LBT



Barman 2007

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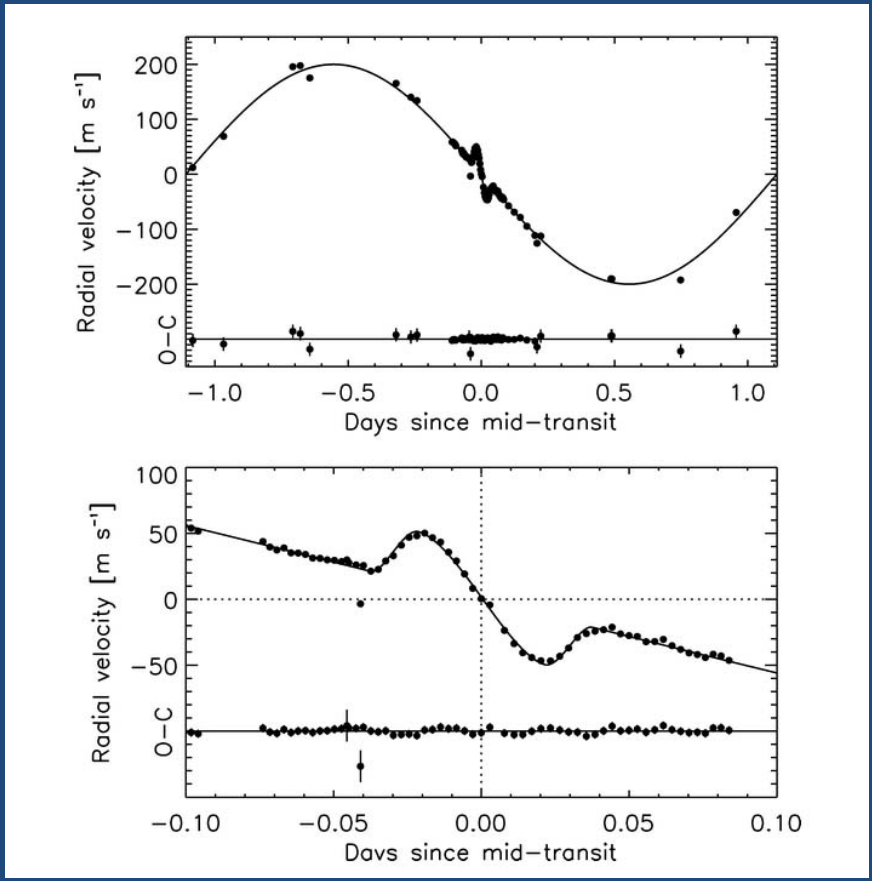
The Rossiter-McLaughlin effect



Winn et al. 2006

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The Rossiter-McLaughlin effect

The RM-effect	Transit Doppler Imaging
spin-orbit misalignment transmission spectroscopy (planetary radius)	spin-orbit misalignment transmission spectroscopy planetary radius simultaneous measurement of star spots & stellar pulsation

complement

appropriate for slowly rotating stars	appropriate for fast rotating stars

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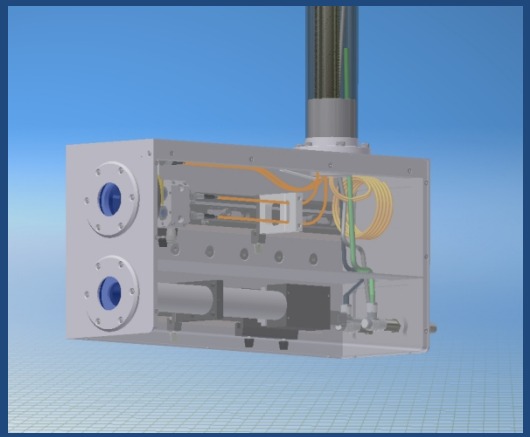
Our work schedule:

- run simulations

- proof the method by own HARPS data (3 transits of WASP 18) and archived data

- Venus transit in June 2012



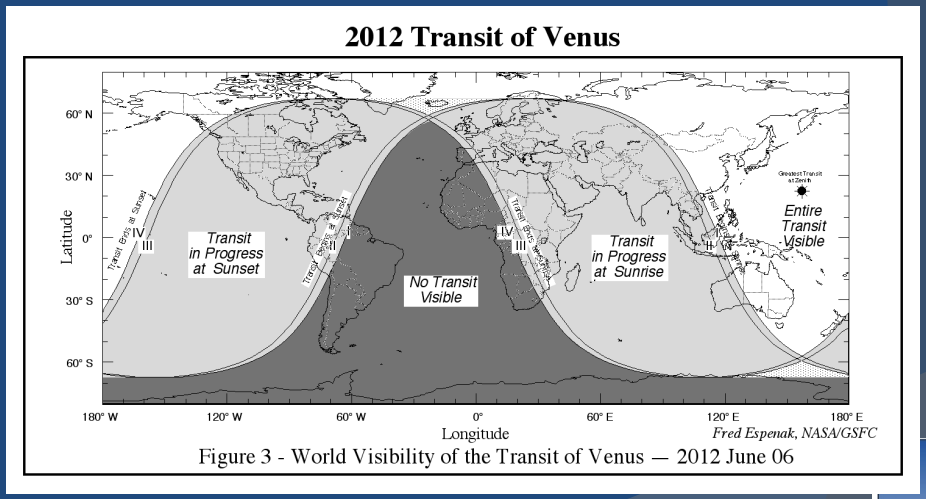


Figure 3 - World Visibility of the Transit of Venus — 2012 June 06

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Thank you !