OHP2015: Conference Highlights
François Bouchy
Improvements to Sophie
Ongoing survey projects
Javiera Rey
Long period planets from OHP
(14 with periods > 8 years)
Monitoring long-term drifts
(stellar activity, instrumental)
Rodrigo Diaz
Long-period giant planets:
Bayesian approach
Daniel Bayliss

174 hot Jupiters, P<10d, V<15.5, 0.4%
Properties match general population
Jason Wright
20 years of PRV at Lick & Keck
Long-period orbits & activity
Combining data with other
(15 years of PRV at McDonald)
Xavier Dumusque
Sources of stellar jitter
Solar telescope on HARPS-N
(discover Venus)
Sam Quinn
Planets in clusters
Constraints on migration
Luca Malavolta
Planets in clusters: improve orbits (especially eccentricity)
Outer planet in Praesepe 211 system

- Activity: Boisse+2011 approach (sinusoids at $P_{rot}$, $P_{rot}/2$, $P_{rot}/3$,...)
- Activity + Keplersians simultaneous MCMC fit with emcee

OHP 2015: Twenty years of giant exoplanets
Masashi Omiya
Okayama planet search
300 high-mass host stars
30 massive planets
Don Pollacco

History of Photometric surveys
Science enabled by transiting planets:
diversity & system architectures,
atmospheric studies, RM & obliquity
energy transport and weather
Aldo Bonomo

211 transiting planets studied
45 with HARPS-N
Improve orbits, eccentricities
KELT 6 outer planet
Alex Santerne

127 KOIs, $10 < P < 100$ d
120 nights on Sophie
55% false positive rate
Roy Alonso
Legacy of CoRoT
570 planet candidates
320 solved, 35 planets
Susana Barros
K2-19b & c (8 & 12 days)
TTV Masses: 44 & 16 M_E
Dan Fabrycky
TTVs of Temperate Giants
System architectures
Migration mechanisms
Doppler orbits vs TTVs
Thomas Beatty
9 transiting brown dwarfs
Links to hot Jupiters
Teruyuki Hirano
70 RM obliquities
30% misaligned
Are hot Jupiters really lonely? Five have known companions. K2 revelation for WASP-47: inner & outer small planets
Marshall Perrin
Gemini Planet Imager
Exoplaneet survey
10-100 Myr
51 Eri: 20 Myr, 750K
First in sample of 150
Masayuki Kuzuhara
SEEDS on Subaru
400 targets observed
GJ 504b at 44 AU
Alessandro Sozzetti
Status of Gaia: great news
First data release: mid 2016
Paolo Giacobbe
Giant planets around M dwarfs
Gaia will find ~1000
Hybrid DEMCMC orbit solver
Ignas Snellen
Atmospheric characterization
Dream is biomarkers
Flux balance, T vs p, chemistry, clouds, rotation, weather
Spatial vs temporal vs spectral
Role of high resolution
Aurélien Wyttenbach
Na D spectroscopy in transit
Doppler shift
Temperature profile
Jayne Birkby
CRIRES/VLT of 51 Peg
Velocity of planet gives
Mass and inclination:
0.46 M\textsubscript{J} and 80 degrees
Jorge Martins
Reflected light of 51 Peg b
similar mass and inclination
Broad features from RM Spectra at high resolution
Need VLT + ESPRESSO
Henriette Schwarz
Spin of GQ Lup b
Spatial + spectral
Broadening = 6 km/s
Shift = 2 km/s
Ian Crossfield
Future prospects for:
Young and hot
Old and hot
Old and cold
Nikolay Nikolov
126 orbits HST + Spitzer
WASP-17b, -31b, -6b
Cloud free?
Ashlee Wilkins
WASP-18b with HST Transmission/emission
Tom Louden
Na D for HD 189733
RM time resolved
The bottom line

- Evidence for chromospheric enhancement on planet orbital period is at best intermittent.
- Beware of selection effects in flux-limited X-ray surveys.
- Magnetic and kinetic power of wind may power observable electron-cyclotron maser emission – but only 1/1000 of what’s needed to power Ca II, X-rays
- Mass-separation diagram sculpted by tides.
- Spin-up of host stars suggests $Q'_s \sim 10^8$.
- TTV for WASP-18b should become detectable.
- Warm, inflated low-mass gas giants inhabit the tidal boundary. Why?

Andrew Cameron
Star-planet interactions
Some planets are doomed
David Ehrenreich
Evaporation of GJ 436 b
Michael Salz
Photoevaporation
Rosemary Mardling
Multi planets with TTVs
Analytical insights save time
Jean-Baptiste Delisle
Role of dissipation in resonant systems
Tristan Guillot
When do brown dwarfs get eaten
Nadine Nettelmann
Giant planet internal structure
Alexandre Correia
Close-in planet structure
and the Love number
Mathieu Guenel
Role of tidal dissipation
Love number & tidal Q
Pierre Auclaire-Desrotour
Tidal dissipation scaling laws
Bekki Dawson
Formation and Migration
Toward a blueprint
Yann Alibert
Formation & composition
Integrated models
Melvyn Davies
Birth environment
Role of encounters
Daniel Carrera
Grains to planetesimals
Transiting Super-Neptunes: HATS-7b and HATS-8b


*The HATSouth network is operated by a collaboration consisting of Princeton University, the Max Planck Institute for Astronomy, the Australian National University and Pontificia Universidad Catolica de Chile.

Overview

- "Super-Neptunes" are defined as exoplanets with masses greater than Neptune but less than half of Saturn. Formally, this equates to 0.054 M_J < M_P ≤ 0.18 M_J or 17.15 M_E < M_P ≤ 57.2 M_E

- Super-Neptunes lie in a regime where exoplanets transition from rock/ice dominated bodies to H/He dominated bodies. In this sense they are the lowest mass "giant" planets.

- Unlike transiting Jupiter and Saturn mass exoplanets, the compositions of super-Neptunes have not been well characterised. Prior to HATS-7b and HATS-8b, only six super-Neptunes were known with densities better than 20%: Kepler-9c (Torres et al. 2011), Kepler-101b (Bonomo et al. 2014), Kepler-35b (Welsh et al. 2012), HAT-P-11b (Bakos et al., 2010), Kepler-18c (Cochran et al., 2011) and Kepler-30d (Fabrycky et al., 2012).

HATS-8b

- The light curve of HATS-8 shows a 8.6mmag transit at a period of 3.58 days. The transit was later confirmed by high-precision photometric follow-up with 1m class telescopes.

- High precision radial velocity measurements from HIRES on Keck show in-phase radial velocity variations of K=17.7 m/s.

- HATS-8 has an equal magnitude neighbour at 19.4 arc-seconds separation. This will make an ideal reference star for long-slit, high-resolution transit spectroscopy of HATS-8b. Additionally, the scale height of the low density atmosphere is almost 1000km, adding to the prospects of transit spectroscopy.

All exoplanets with densities determine to 40% or better. HATS-8b is plotted in red. It lies in the transition region between rocky/icy planets and gas-giants.

Discovered light curve (left) and radial velocities (right) for HATS-8b. From a global fit, we find HATS-8b to be a transiting exoplanet with M=0.138±0.019 M_J, R=0.873±0.10 R_J, & density=0.259±0.091 g/cm^3.
Magnetic Fields and Circumstellar Environment around Planet-Hosting Stars

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Abstract

Recent developments in instrumentation and observational techniques have opened a new window for stellar magnetic field studies. In particular, Zeeman Doppler Imaging (ZDI) is now routinely used to recover the magnetic field topologies of stars different from the Sun, including several planet-hosting stars. These stellar magnetic fields intimately affect the environment around late-type stars by driving the coronal heating and mass ejection, transient events (e.g. flares and coronal mass ejections), and the development of stellar winds and atmospheres. These elements can have a strong impact on the evolution of planetary systems orbiting stars. In this context, the initial results from ZDI data-driven, detailed 3D MHD modeling of the coronal conditions and circumstellar environment around planet-hosting stars are presented. For one of the considered systems (HD 1237), we investigate the interactions of the magnetized stellar wind with the exoplanet, assuming a Jupiter-like magnetosphere around it.

Target-Hosting Systems

G- (HD 1237 and HD 147513), and one K-dwarf (HD 22049), are targets considered in this study. Each of these systems hosts a close-in planet ($M_p \sin i > M_{\oplus}$), with orbital separations comparable to the solar system planets (Hatzes et al. 2000; Naef et al. 2001; Mayor et al. 2004; Benedict et al. 2006). Table 1 contains a list of the relevant astrophysical parameters for each system.

Table 1. Target systems astrophysical properties.

<table>
<thead>
<tr>
<th>System</th>
<th>Spectral Type</th>
<th>Teff [K]</th>
<th>R* [R_\odot]</th>
<th>M* [M_\odot]</th>
<th>P [d]</th>
<th>Activity</th>
<th>M_p sin(i) [M_\oplus]</th>
<th>log(R_p [R_\odot])</th>
<th>log(M_p [M_\odot])</th>
<th>[AU]</th>
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<tbody>
<tr>
<td>1237</td>
<td>G8V</td>
<td>5572.0</td>
<td>0.86</td>
<td>1.00</td>
<td>7.00</td>
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<td>3.37</td>
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<tr>
<td>22049</td>
<td>K2V</td>
<td>5146.0</td>
<td>0.74</td>
<td>0.86</td>
<td>11.68</td>
<td>4.47</td>
<td>28.22</td>
<td>1.55</td>
<td>3.39</td>
<td></td>
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<tr>
<td>147513</td>
<td>G5V</td>
<td>5930.0</td>
<td>0.98</td>
<td>1.07</td>
<td>10.00</td>
<td>4.64</td>
<td>28.92</td>
<td>1.21</td>
<td>1.32</td>
<td></td>
</tr>
</tbody>
</table>

Global-Scale Magnetic Field: ZDI maps

Previous studies have recovered the large-scale magnetic field on the surface of these stars, by applying ZDI over time-series of spectropolarimetric spectra (Figure 1, Jeffers et al. 2014; Alvarado-Gómez et al. 2015; Hussain et al. 2015).

Figure 1. Target stars ZDI radial magnetic field maps.

3D MHD Numerical Simulations

The numerical simulations presented here are performed using the 3D MHD code BATS-R-US (Powell et al. 1999), which is part of the Space Weather Modeling Framework (SWMF, Tóth et al. 2012). This numerical approach includes all the relevant physics for calculating a coronal/wind model, having the ZDI radial field maps as driver of a steady-state solution for a given star (e.g. Cohen et al. 2014).

Figure 2. Coronal structure derived from the steady-state solutions.

Figure 2 shows the coronal structure obtained for each system. The figure highlights the different coronal geometries and the impact of the magnetic field on the coronal and wind structures.

Figure 3 contains the detailed circumstellar environment around HD 1237. Dense streamers develop along the coronal structure (shown over the equatorial plane). The bi-modal wind structure resembles a ~90° tilted solar wind structure, showing strong radial wind speeds.

Figure 3. Circumstellar environment around HD 1237.