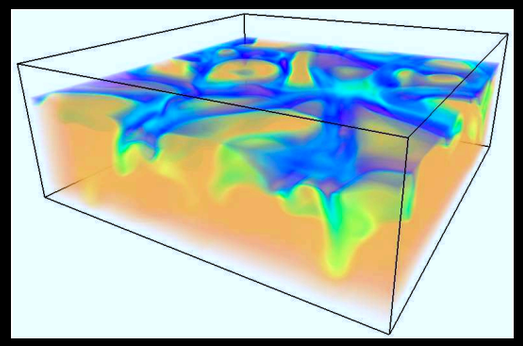
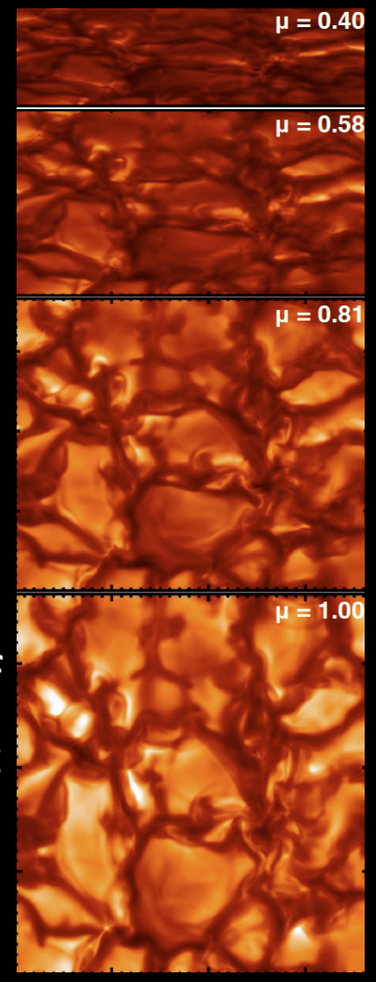
New view on exoplanet transits: describing the granulation pattern with three-dimensional hydrodynamical simulations of stellar convection

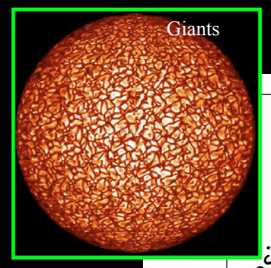
Andrea Chiavassa (Observatoire de la Cote d'Azur, Nice)

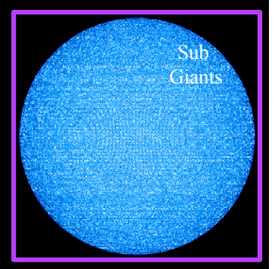


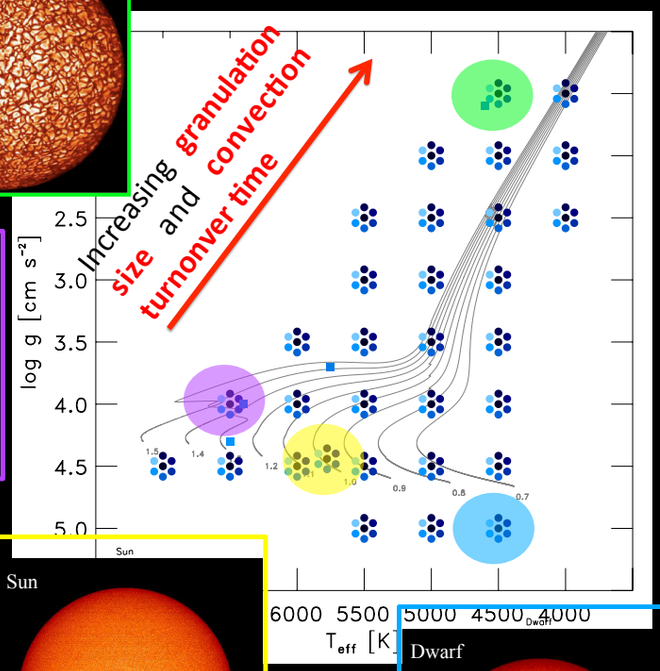
1 3D hydrodynamical simulations of stellar photosphere

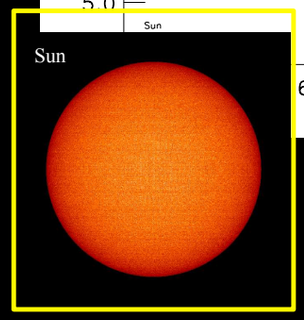
2 Center-to-limb computation of monochromatic emerging intensity

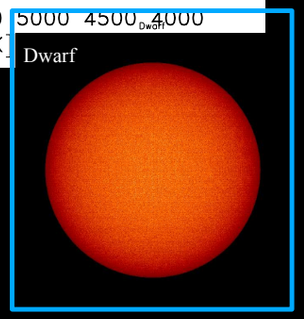












3 Synthetic stellar granulation images varying with time for all the HR diagram

New view on exoplanet transits: describing the granulation pattern with three-dimensional hydrodynamical simulations of stellar convection

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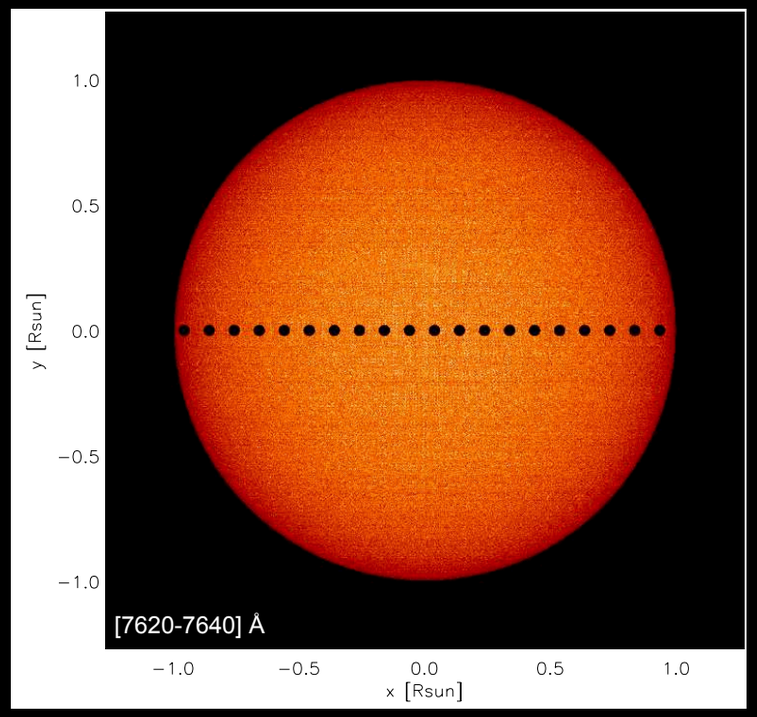
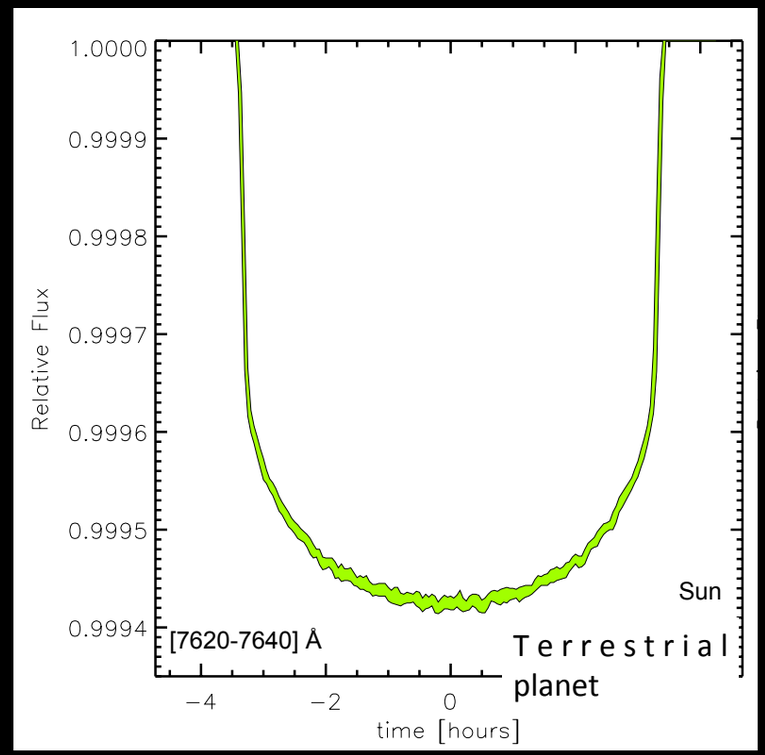
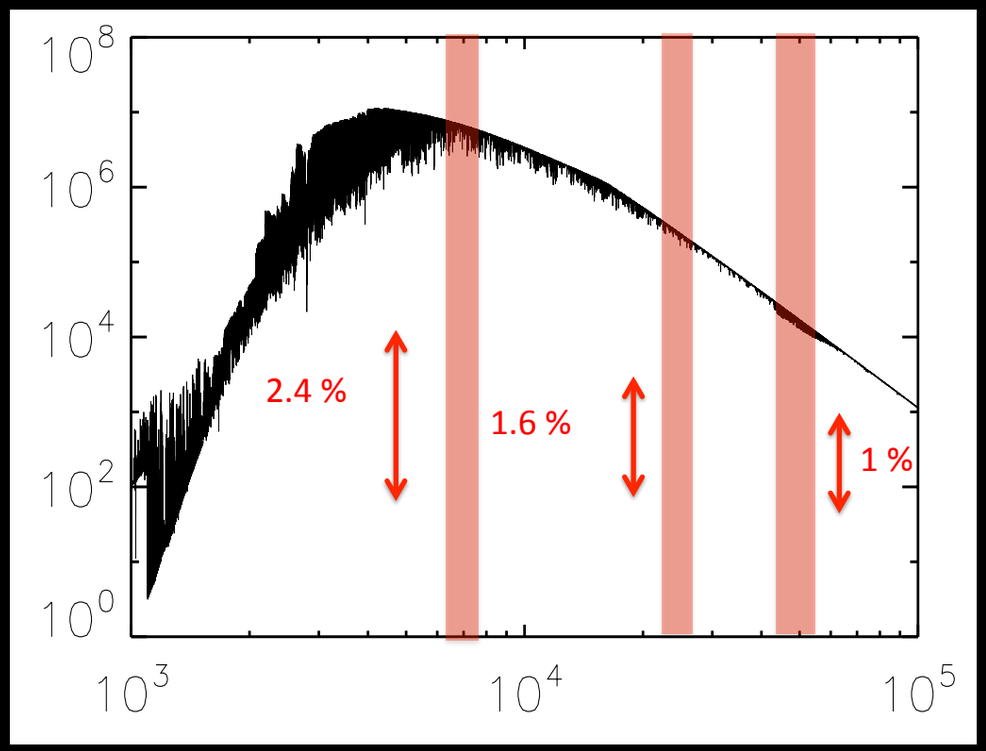


1

The granulation of solar/ dwarf type star affects the transit depth with an intrinsic noise

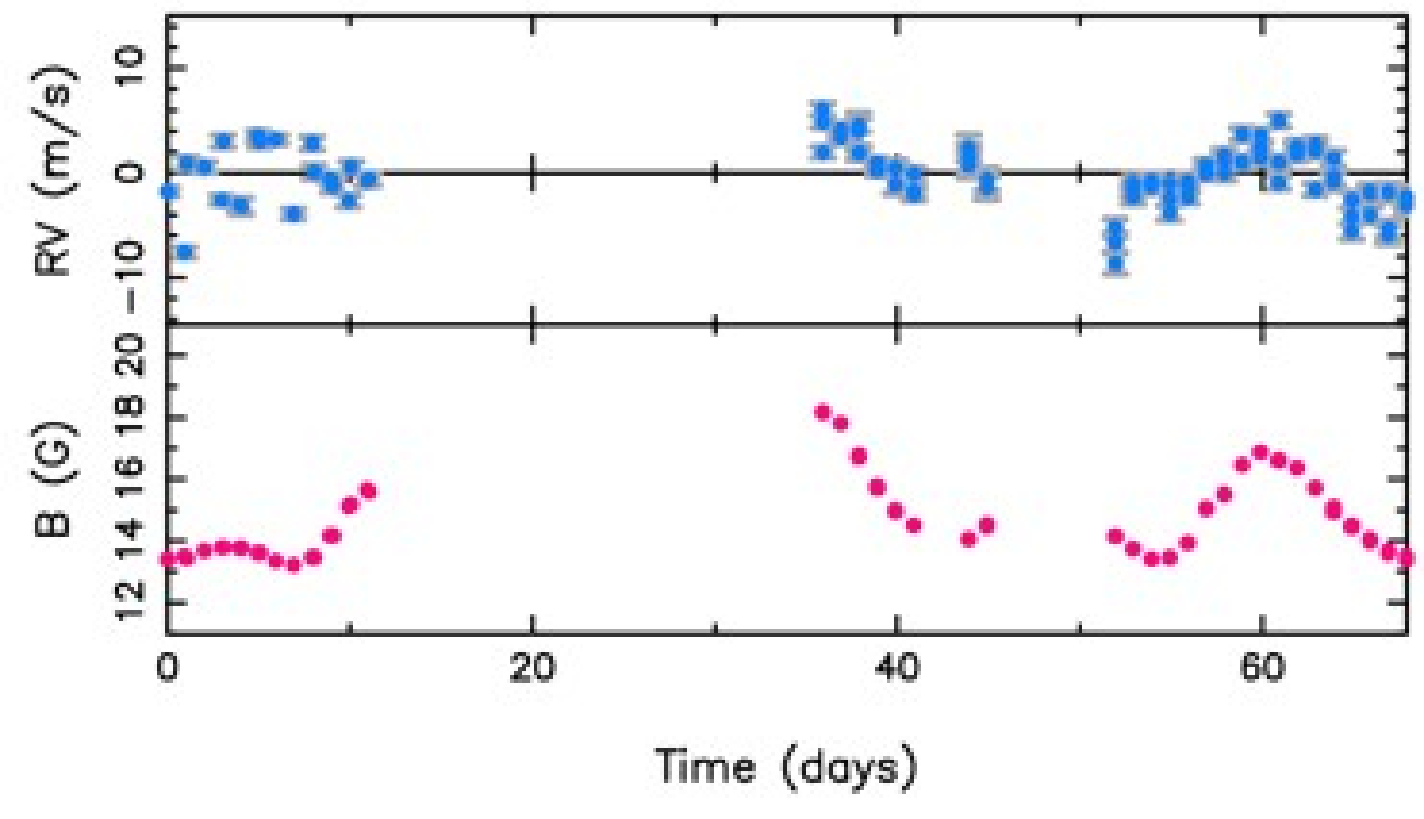




2

The resulting planetary radius incertitude is wavelength dependent and measurable with 3D hydrodynamical simulations of stellar convection

Precise activity measurements from high-resolution spectra



We use least-squares deconvolution and Gaussian processes to obtain the disc-averaged magnetic field strength as proxy for activity-driven radial velocity variations.

Annelies Mortier am352@st-andrews.ac.uk

Magnetic Fields and Circumstellar Environment around Planet-Hosting Stars

J.D. Alvarado-Gómez[1] • G. Hussain[1] • O. Cohen[2] • J. Drake[2] • J. Grunhut[1] • C. Garraffo[2]

[1]*European Southern Observatory, Garching, Germany*

[2]*Harvard-Smithsonian Center for Astrophysics, Cambridge MA, United States*

Planet-Hosting Systems

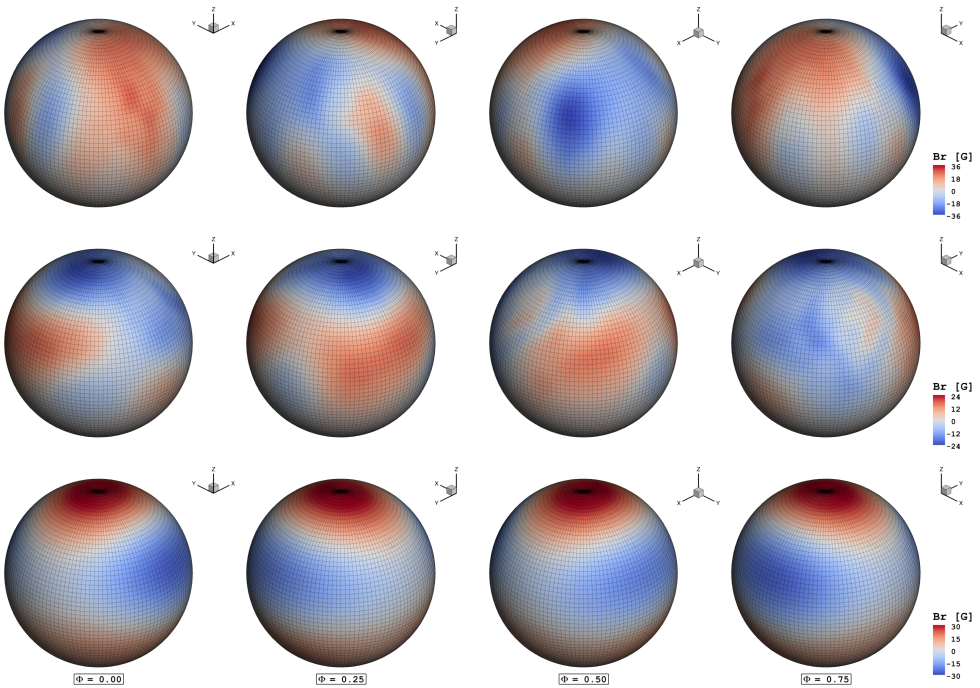
Name	Spectral Type	T_{EFF} [K]	$R_\star$ [$R_\odot$]	$M_\star$ [$M_\odot$]	P_{ROT} [d]	Activity $\log(R'_{HK})$	Activity $\log(L_X)$	$M_p \sin(i)$ [M_{JUP}]	a [AU]
HD 1237	G8V	5572	0.86	1.00	7.00	– 4.38	29.02	3.37	0.49
HD 22049	K2V	5146	0.74	0.86	11.68	– 4.47	28.22	1.55	3.39
HD 147513	G5V	5930	0.98	1.07	10.00	– 4.64	28.92	1.21	1.32

Large-Scale Magnetic Field (ZDI maps)

HD1237

HD 220149

HD 147513



Contact

Julián David Alvarado Gómez

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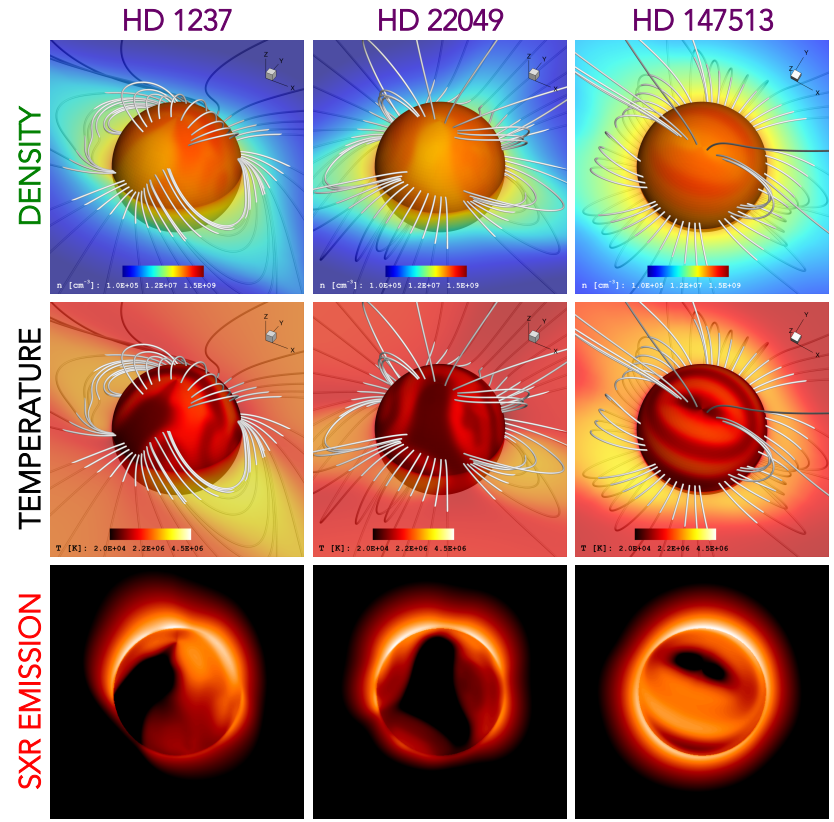
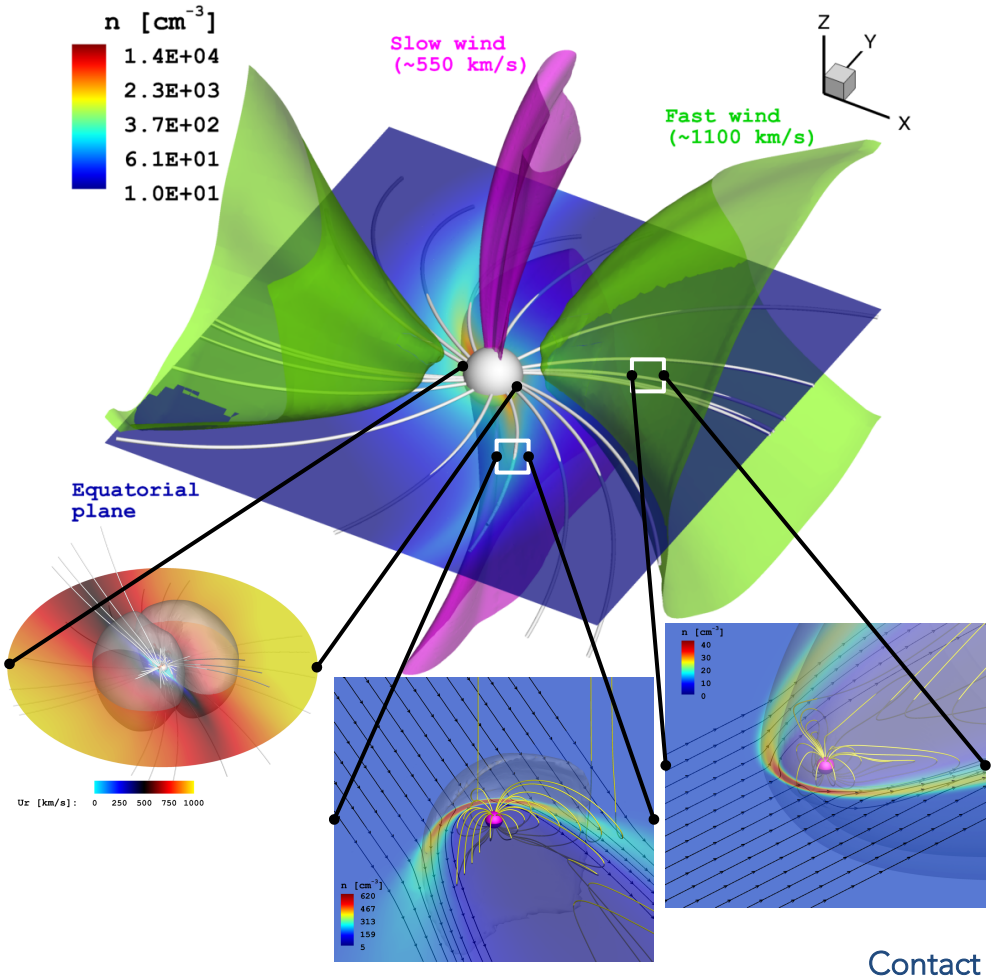
3D MHD Numerical Simulations



Circumstellar Environment



Contact

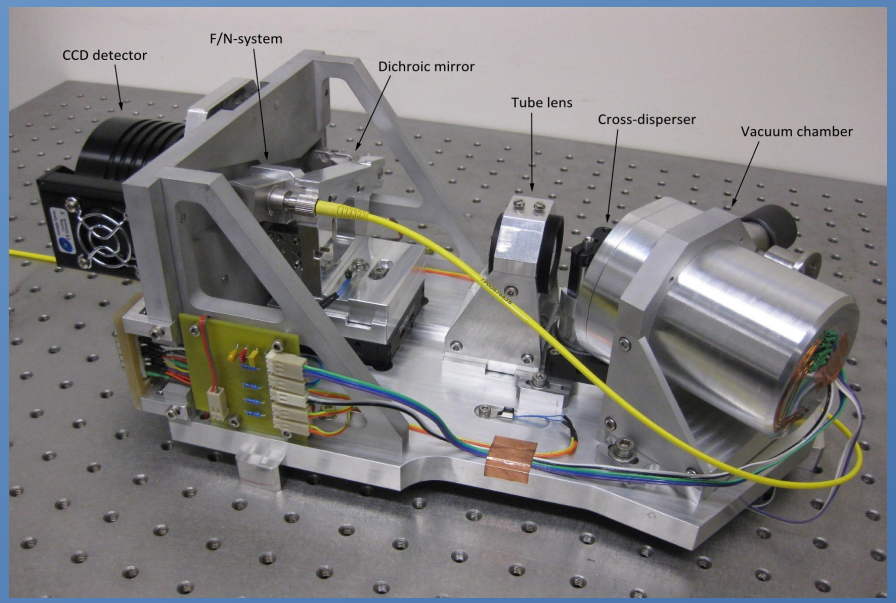
Julián David Alvarado Gómez

E-mail: jalvarad@eso.org

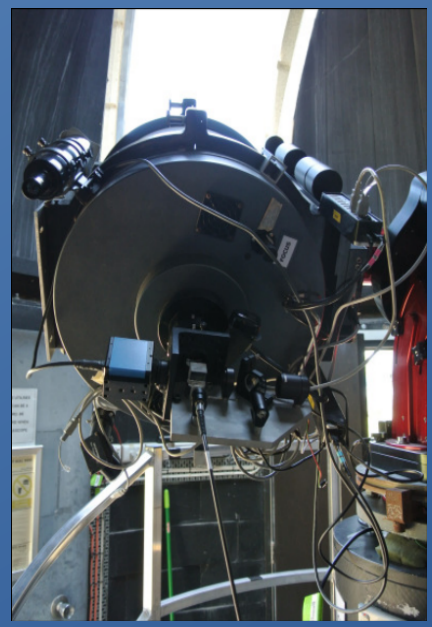
The Replicable High-resolution Exoplanet and Asteroseismology (RHEA) spectrograph

#65336

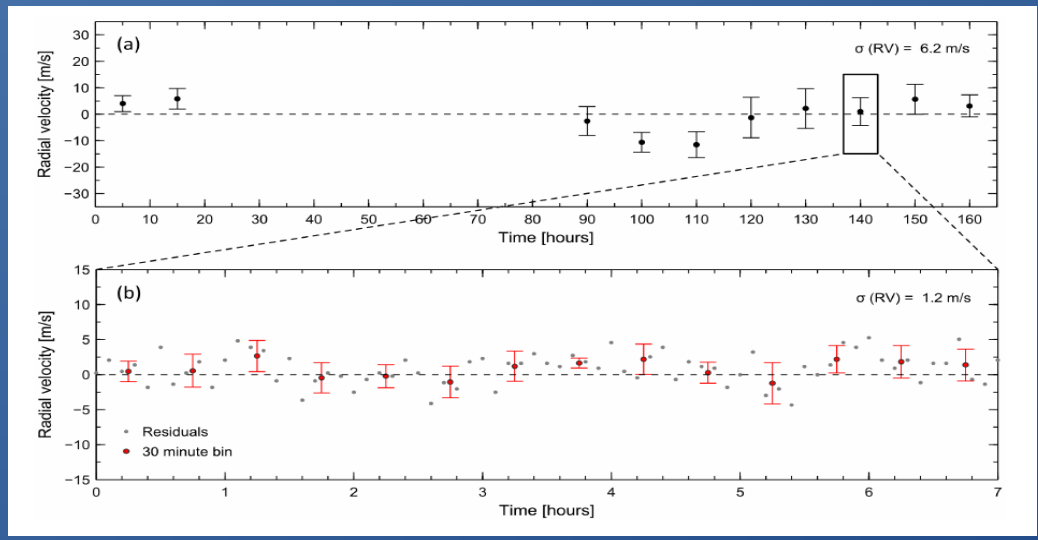
J. **Bento,** T. **Feger,** M. **Ireland,** A. **Arriola,** D. W. **Coutts,** C. **Schwab,** A. **Rains**



- Long-baseline radial velocity monitoring of bright stars with small telescopes
- Currently targeting giant stars looking for Jupiter sized planets
- Asteroseismology = better mass estimates



- Optical Single-mode fibre-fed spectrograph
- Double-pass echelle design
- R~75,000 at 550nm
- Stable to **~1 m/s** RV precision measurements
- **~US$20,000** per unit



Imperfect (= Low-contrast) Pre-Coronagraph (LPC) for additional contrast

J. Nishikawa (NAOJ), M. Oya
N. Murakami , M. Tamura
T. Kurokawa, Y. Tanaka

◆Low-contrast Pre-Coronagraph (LPC) method submitted

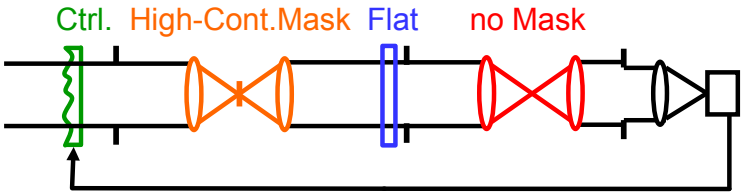
➢ LPC is used in four-stage configuration .

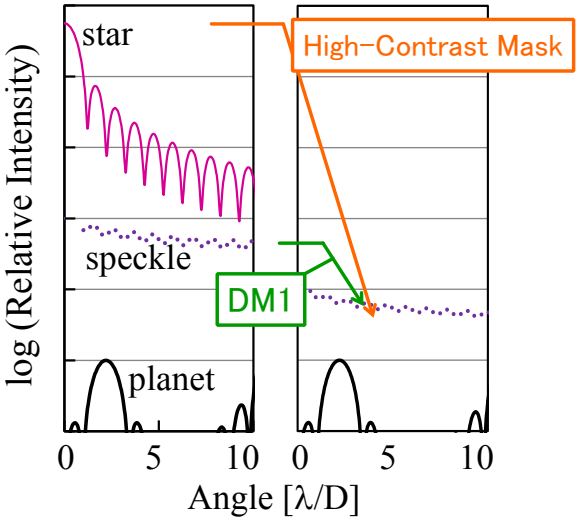
DM1 (phase/amp)	Low-contrast Pre-Coronagraph	DM2 (phase)	Main Coronagraph

➢ LPC provides Synergy Extinction of Dark Hole
✓ when the contrast of the main coronagraph is limited by some reason.

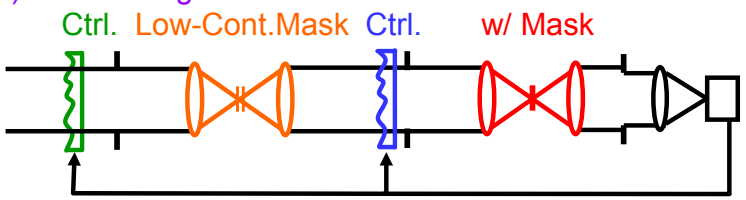
➢ Needs two operation procedures.

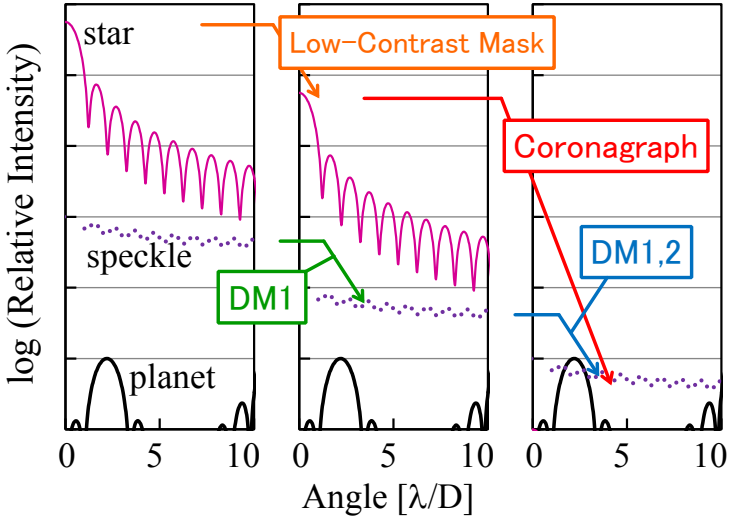
(1) pre-nulling





(2) main nulling





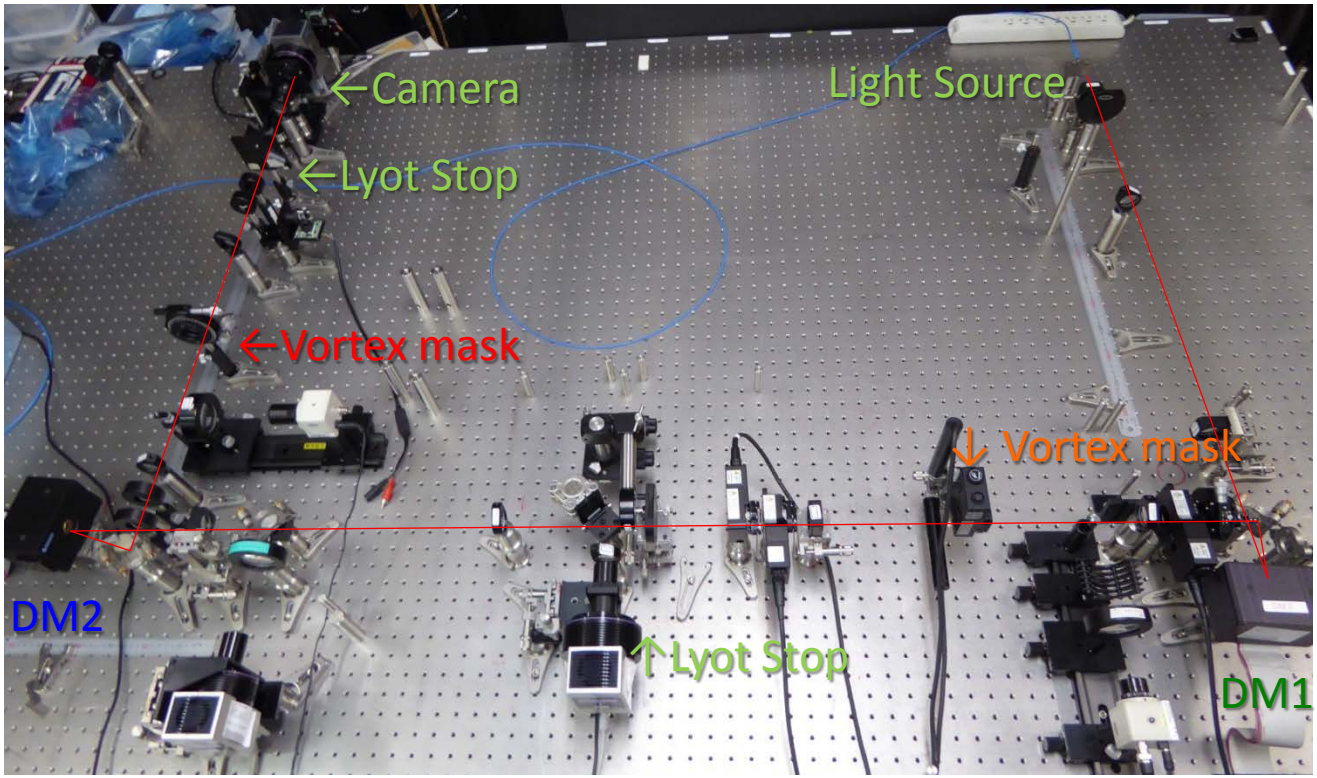
Imperfect (= Low-contrast) Pre-Coronagraph (LPC) for additional contrast

J. Nishikawa (NAOJ), M. Oya
N. Murakami , M. Tamura
T. Kurokawa, Y. Tanaka

- Experimental setup is under construction.
  - DM1: 12x12 BMC
  - Pre-Coronagraph: Achromatic Vector Vortex Coronagraph *, **
  - DM2: 12x12 BMC
  - Main Coronagraph: Achromatic Vector Vortex Coronagraph *

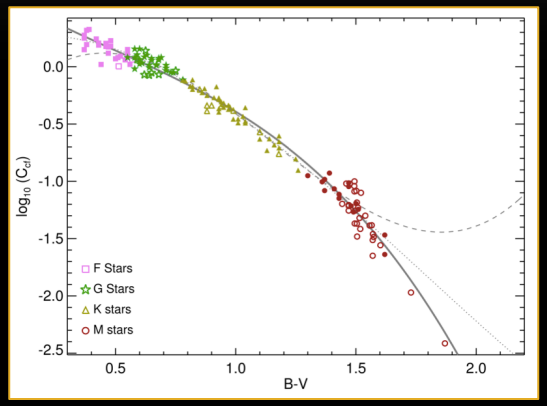
* AVVC = Polarizer + QWP + Concentric HWP + QWP + Analyzer (Murakami 2013)

** Low-contrast condition is obtained by rotating the Polarizer



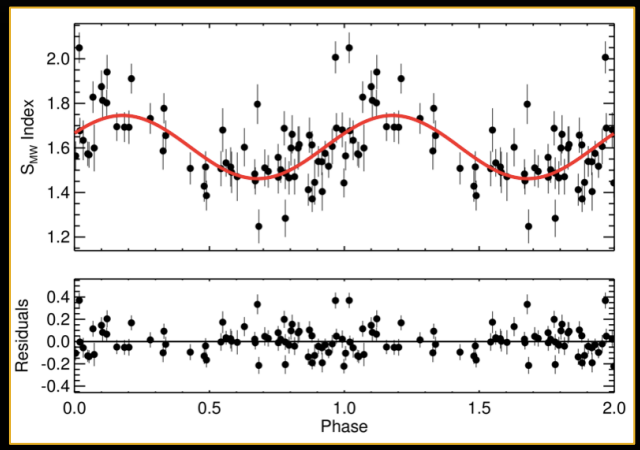
Rotation Periods, Activity-Induced RV Signals, and Detection of Habitable Planets

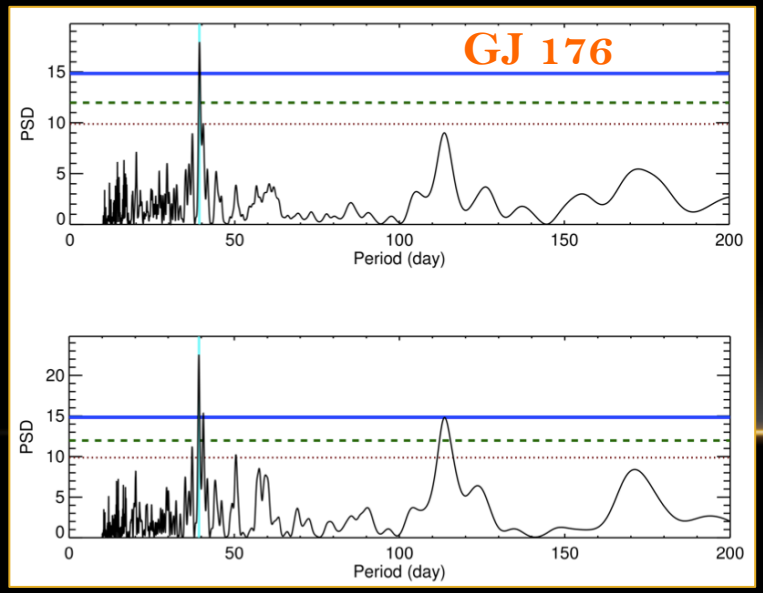
Jonay I. González-Hernández, Alejandro Suárez-Mascareño, Rafael Rebolo & Massimiliano Esposito



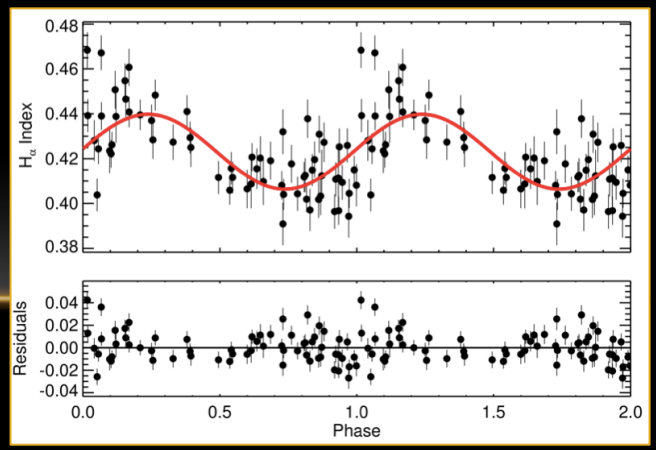
Suárez-Mascareño et al. (2015, MNRAS, in press)

S index





Hα index



Rotation Periods, Activity-Induced RV Signals, and Detection of Habitable Planets

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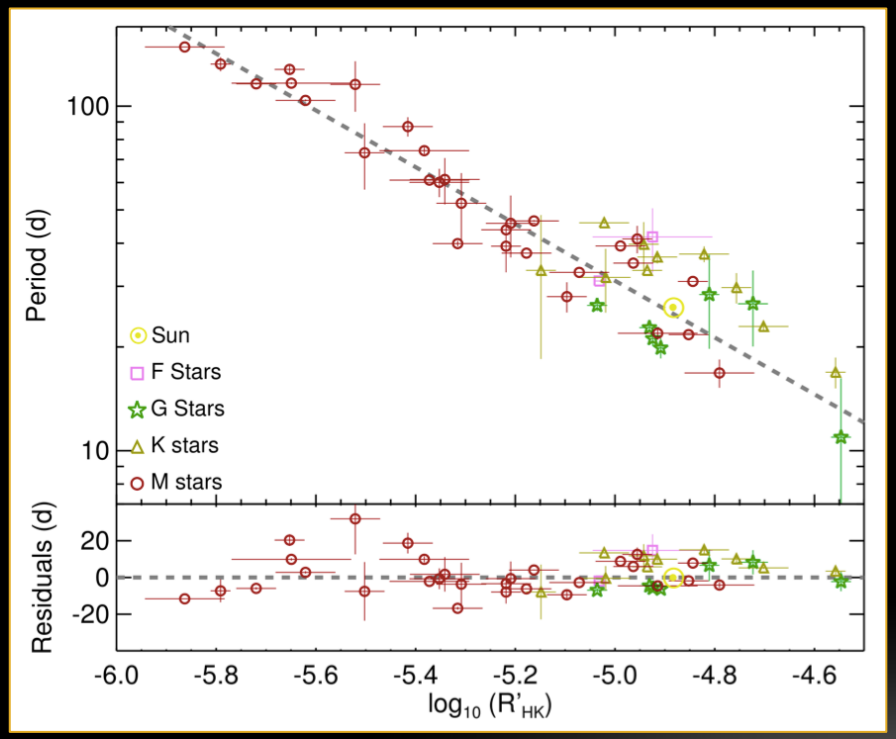
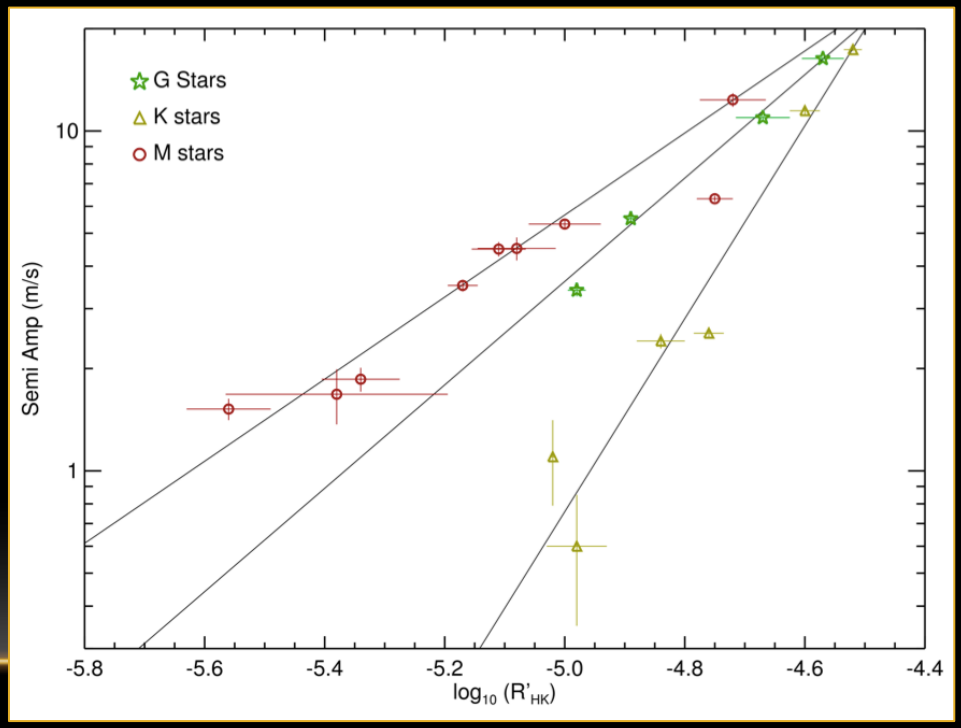
P_{ROT} vs log R'_{HK}



Suárez-Mascareño et al. (2015, MNRAS, in press)

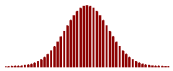
A_{RV} vs log R'_{HK}



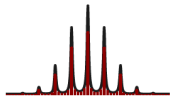
Suárez-Mascareño et al. (2015, in preparation)

AstroComb

IR fiber comb

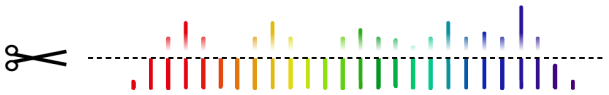


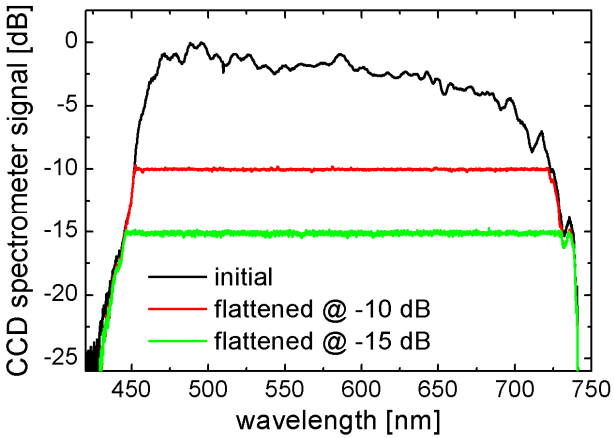
Mode filtering

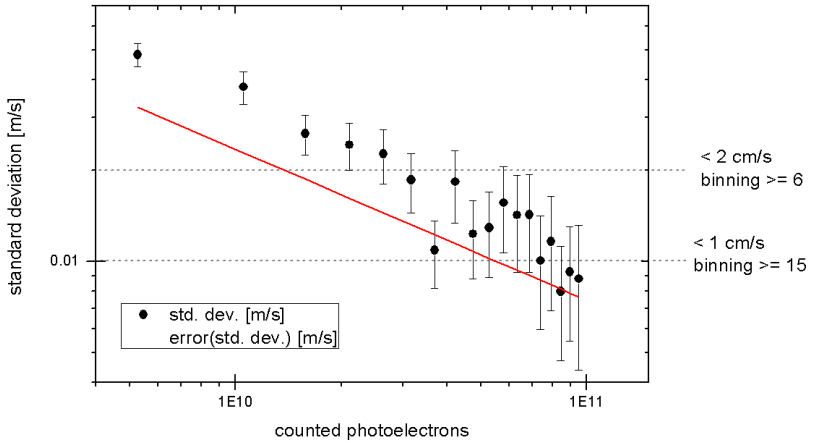


Spectral broadening

Spectral flattening







MenloSystems GmbH

Photo of participants in La Silla