EPRV with EXPRES at LDT

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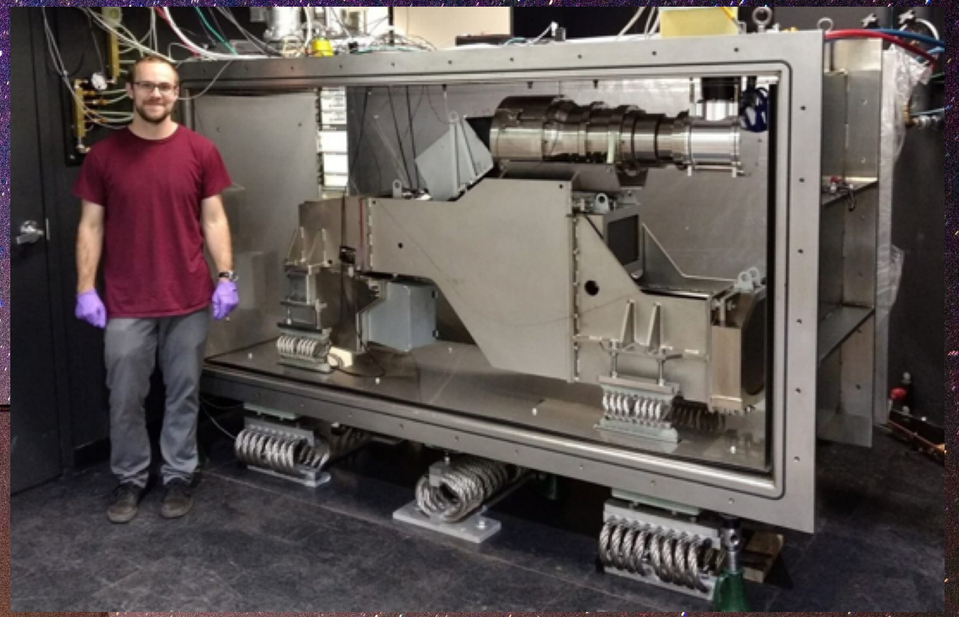
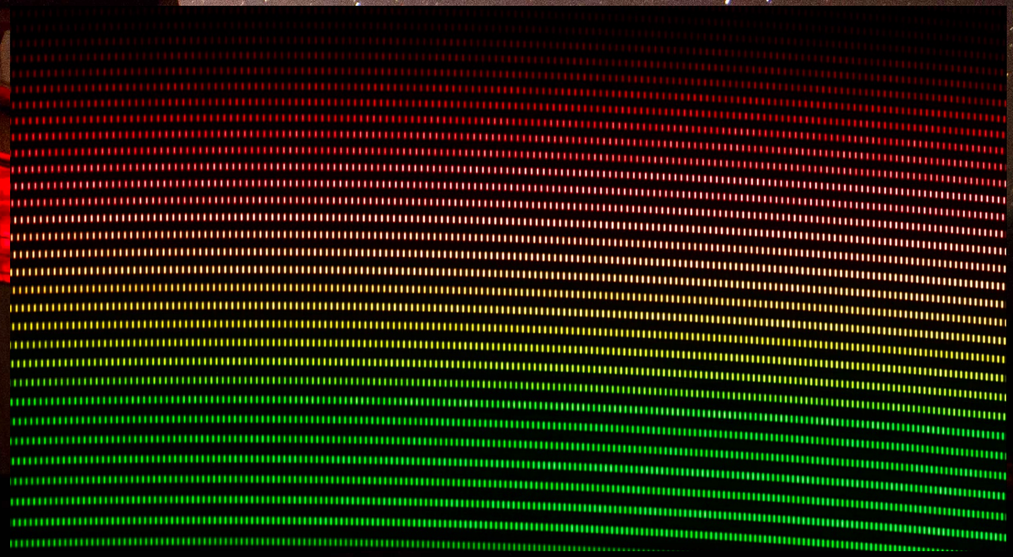
Lowell Discovery Telescope + EXtreme PREcision Spectrograph

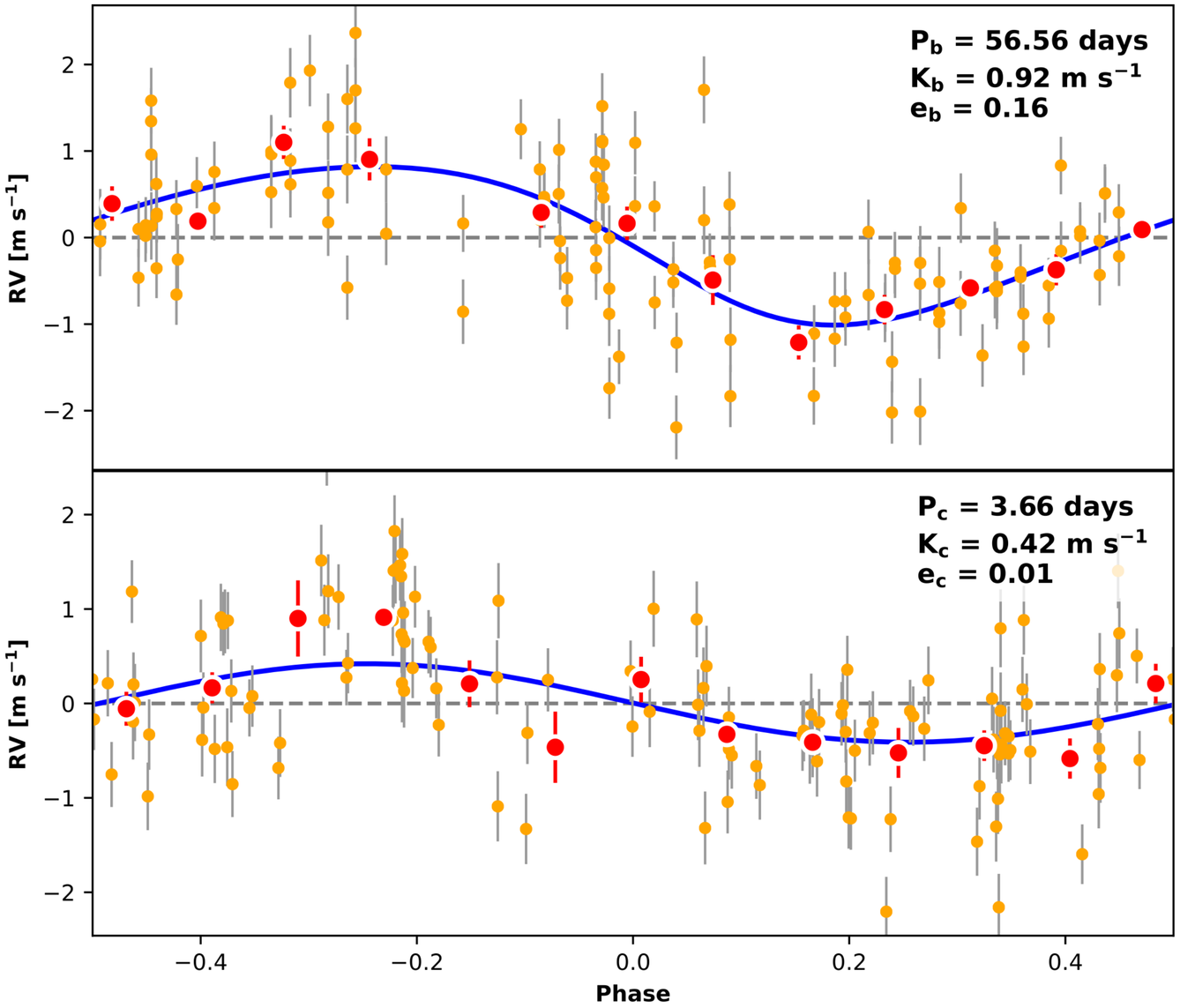
- Laser Frequency comb for wavelength calibration
- Resolution ~ 140,000
- Exposure meter for wavelength-weighted flux corrections for subtracting the velocity of the Earth
- Deployable tertiary mirror on the Lowell Discovery Telescope permits high cadence and flexible observing cadence.
- On sky since 2018 with science observations since 2019





New long-period Planets incoming

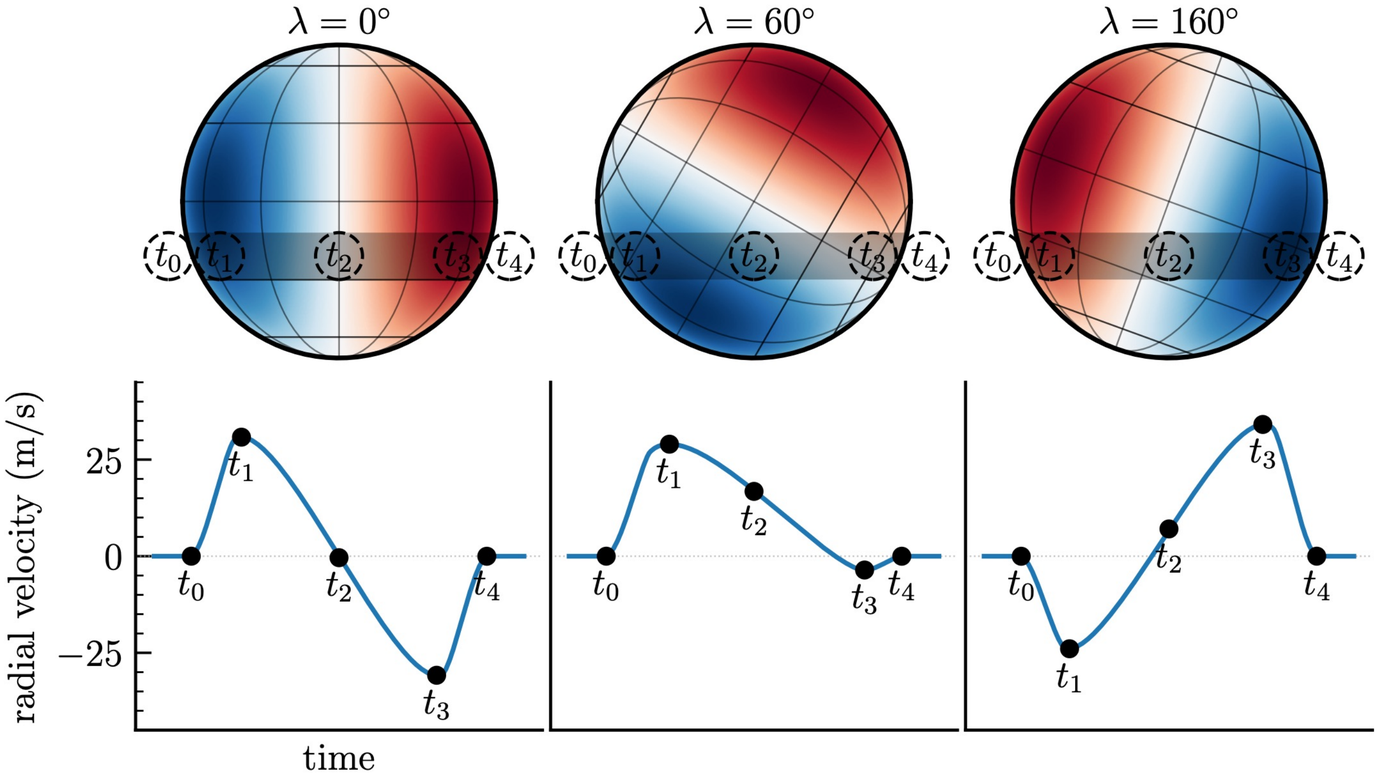
- In systems where we have > 40 nights of data, we are beginning to see keplerian signals growing.
- This system is a quiet G1V, no filtering for activity in this data.
- Both signals are growing in significance as we add more data.
- Tentative third, longer-period signal that is not quite significant yet (but is growing).

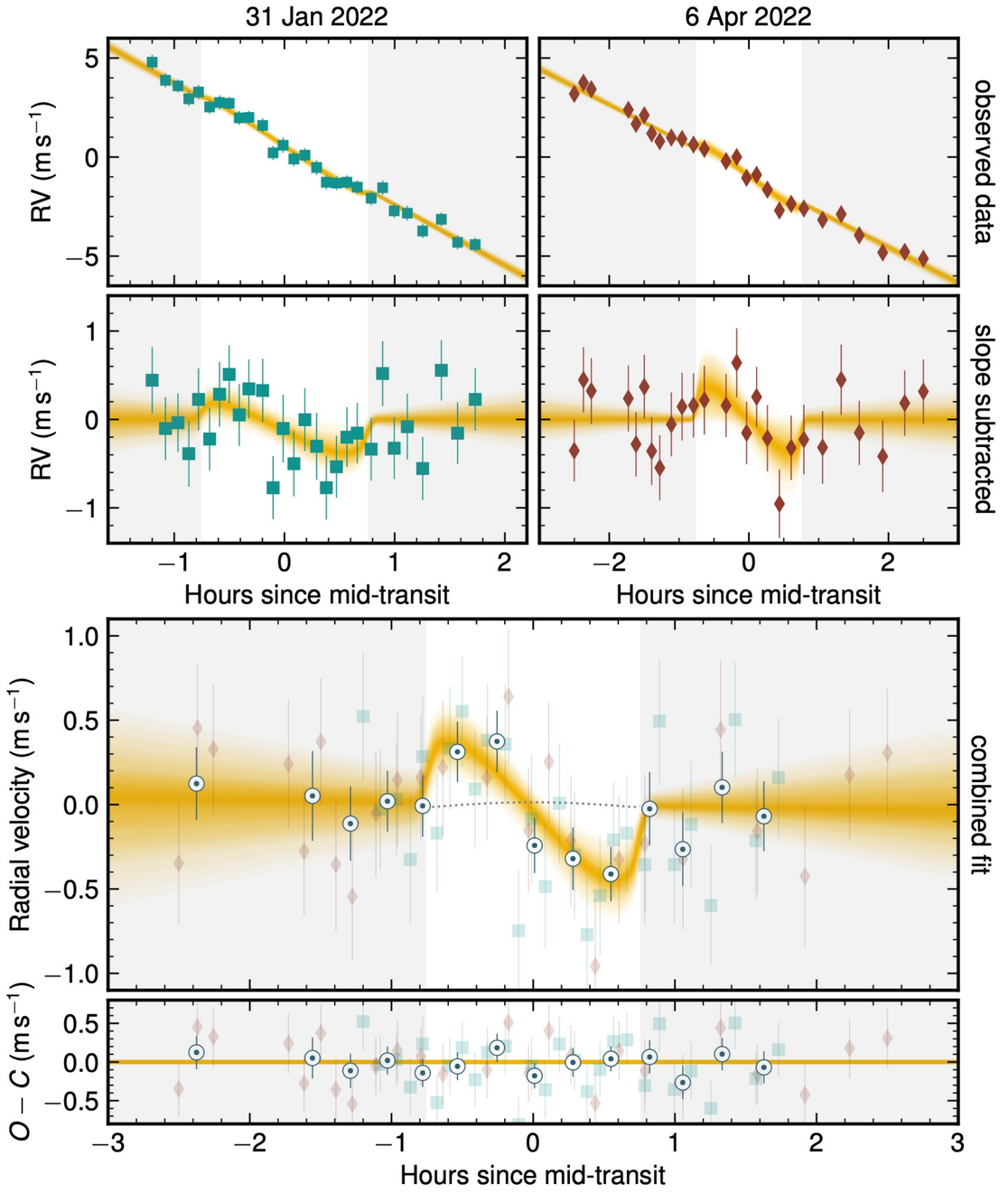


Brewer et al. (in prep)

55 Cnc e: Rossiter-McLaughlin

Spin-orbit alignment of a tiny, close-in exoplanet



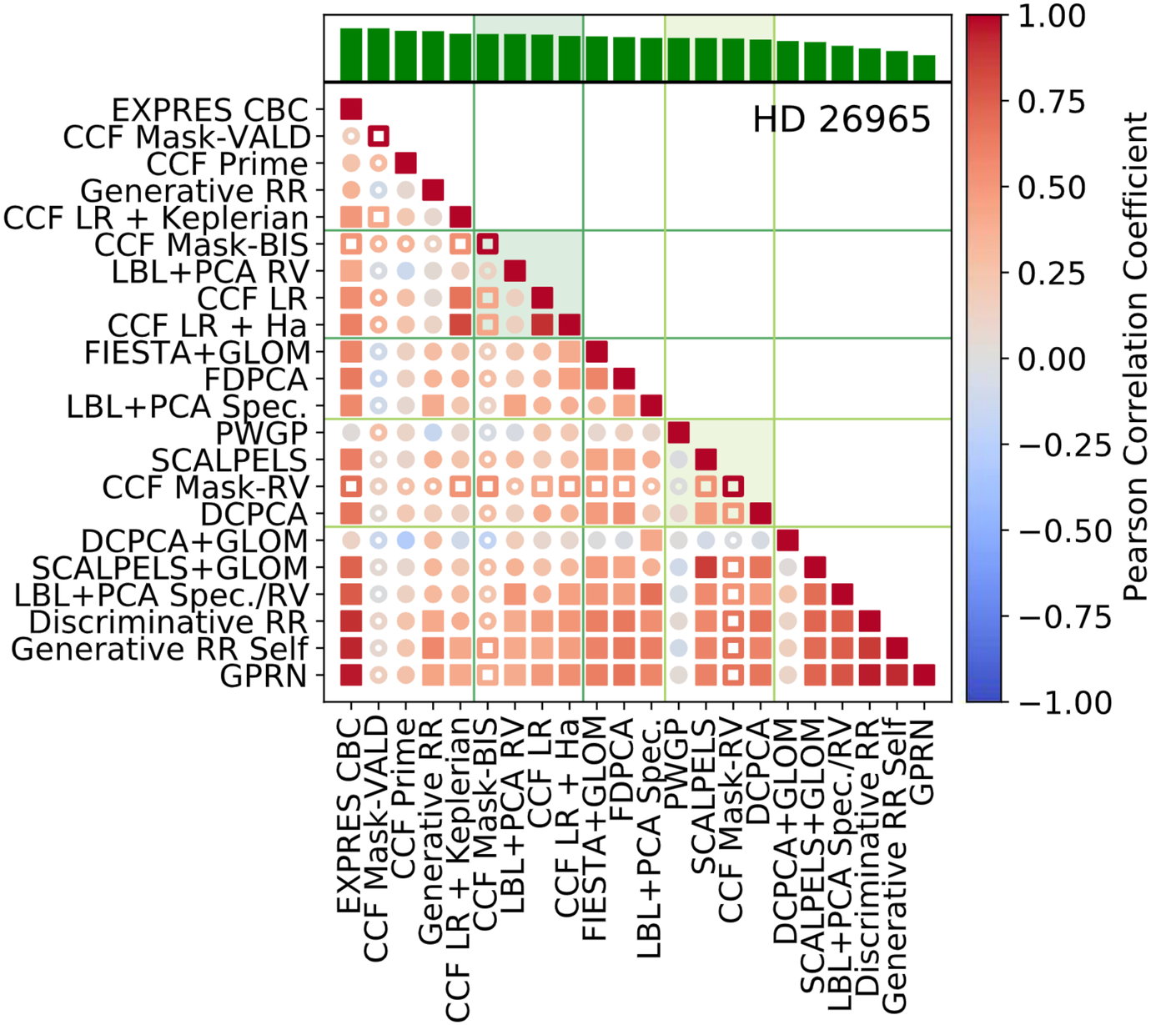


Zhao, Kunovac, et al. Nature Astronomy (2022)

EXPRES Stellar Signals Project

11 teams, 22 approaches…..many answers

- We released EXPRES spectra, RVs, and photometry on ~5 stars for the community.
- 11 teams participated and were able to reduce the RMS scatter in the RVs.
- The reductions weren't always correlated with activity indicators…or each other…



Zhao et al. (2022)

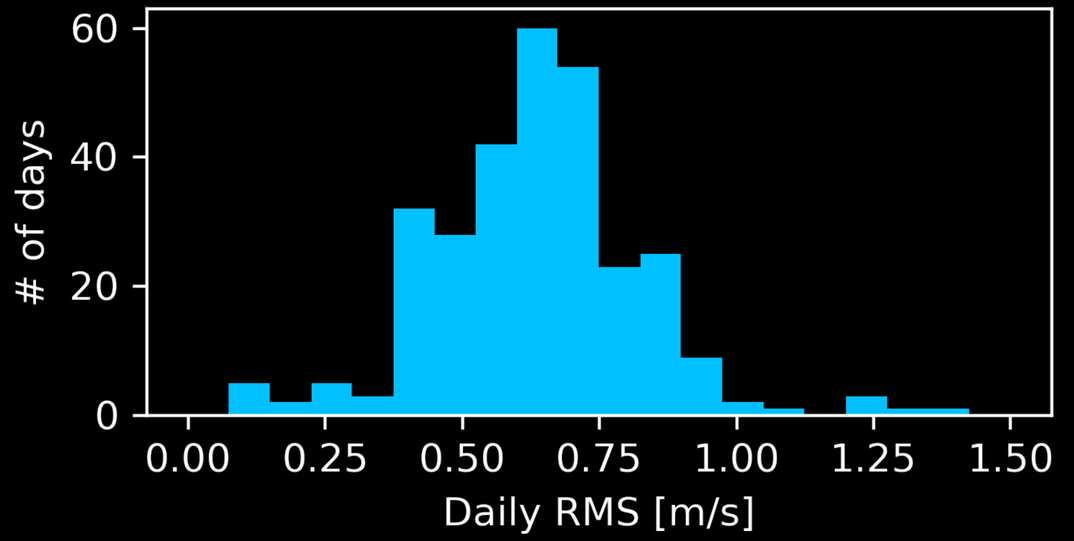
The Lowell Observatory Solar Telescope (LOST)

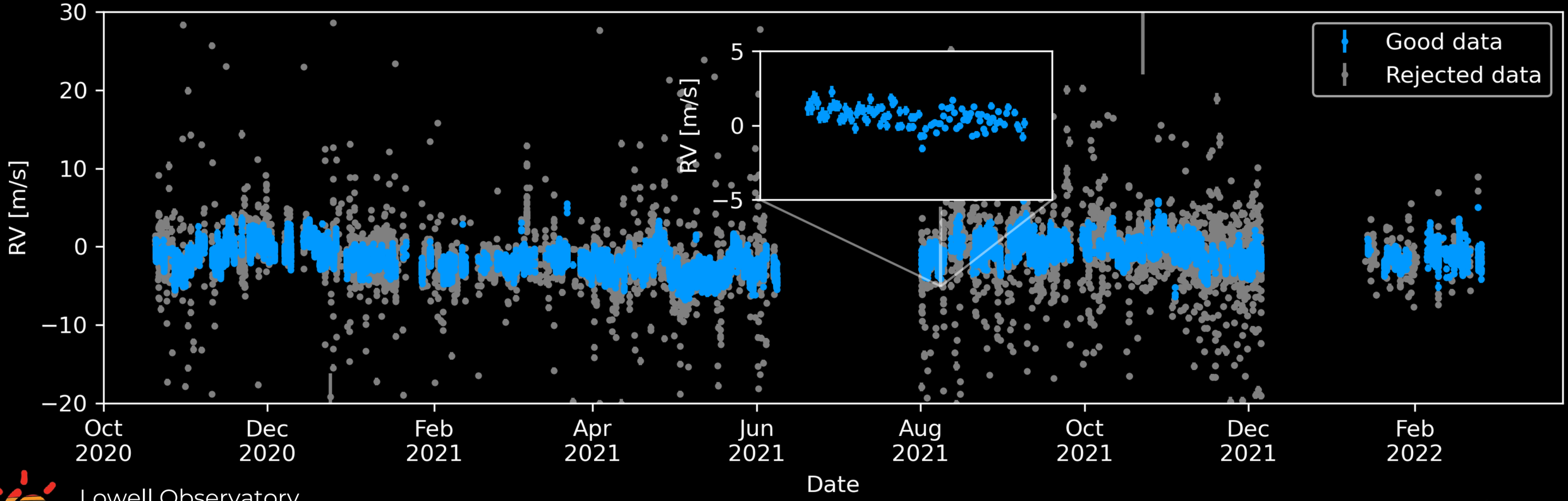
Lowell Observatory
Solar Telescope

- Observe every clear day when Sun > 15º,
- Daily calibrations in the morning: Darks + Flats,
- Observations terminate at 600-s or SNR~500,
- In clear conditions, cadence is ~90-s
- LFC+Thar every 30 minutes,
- Minimal modifications to the EXPRES pipeline
- Most important: System is fully automated.

First data release

> 35,000 observations so far!





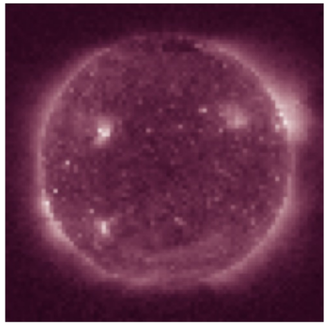
Lowell Observatory
Solar Telescope

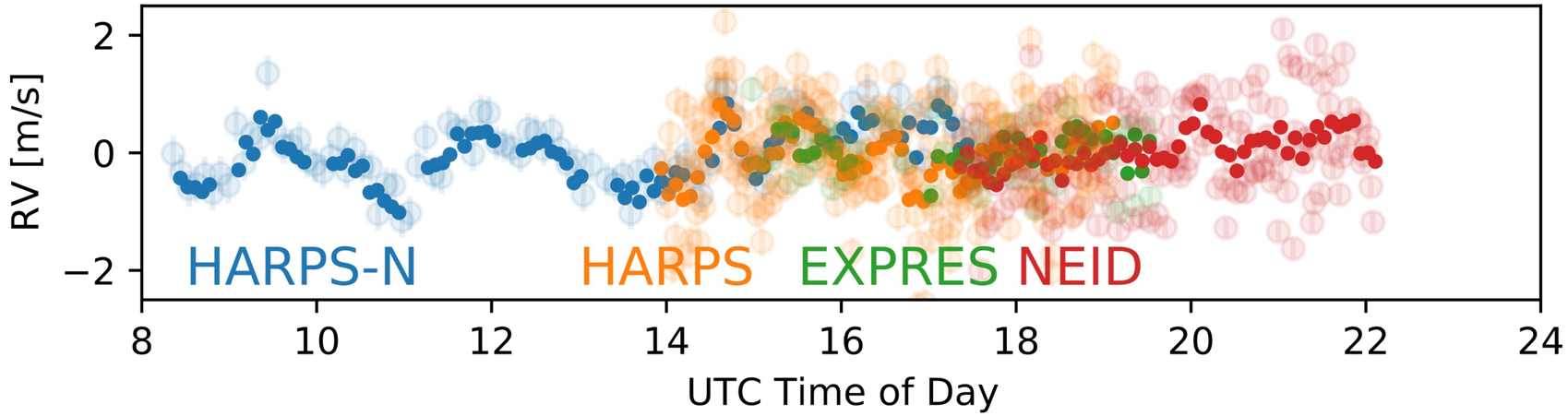
Llama et al. (in prep)

EPRV observations of the Sun

Data, binned to 5 minute time stamps, show generally great agreement

05-31





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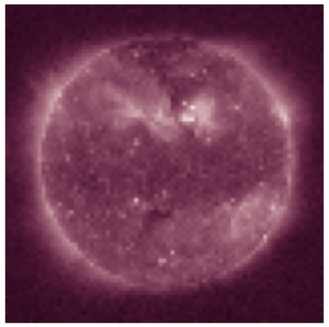

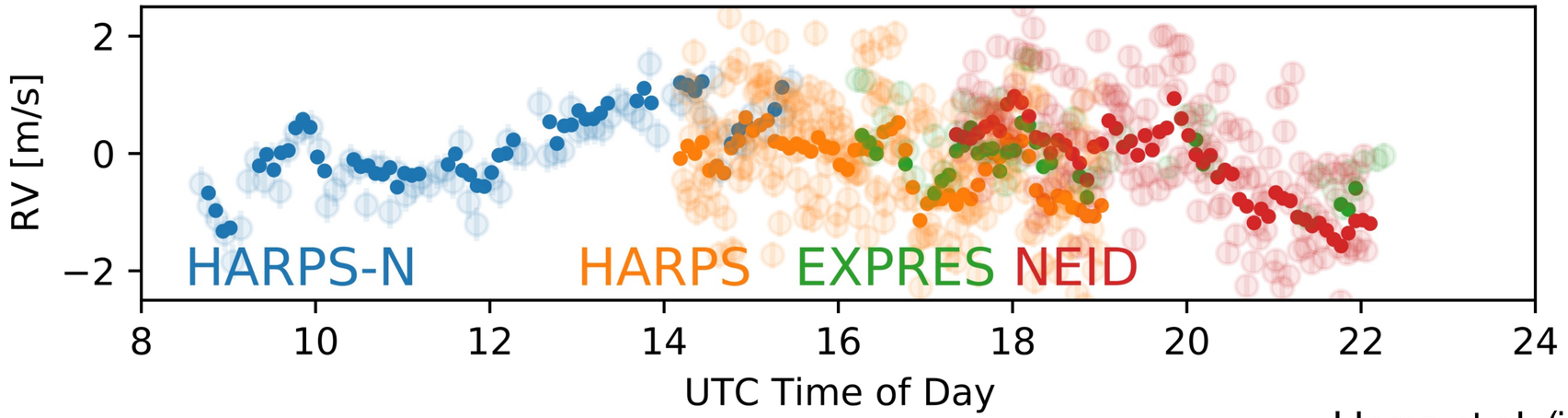

Llama et al. (in prep)

Zhao et al. (in prep)