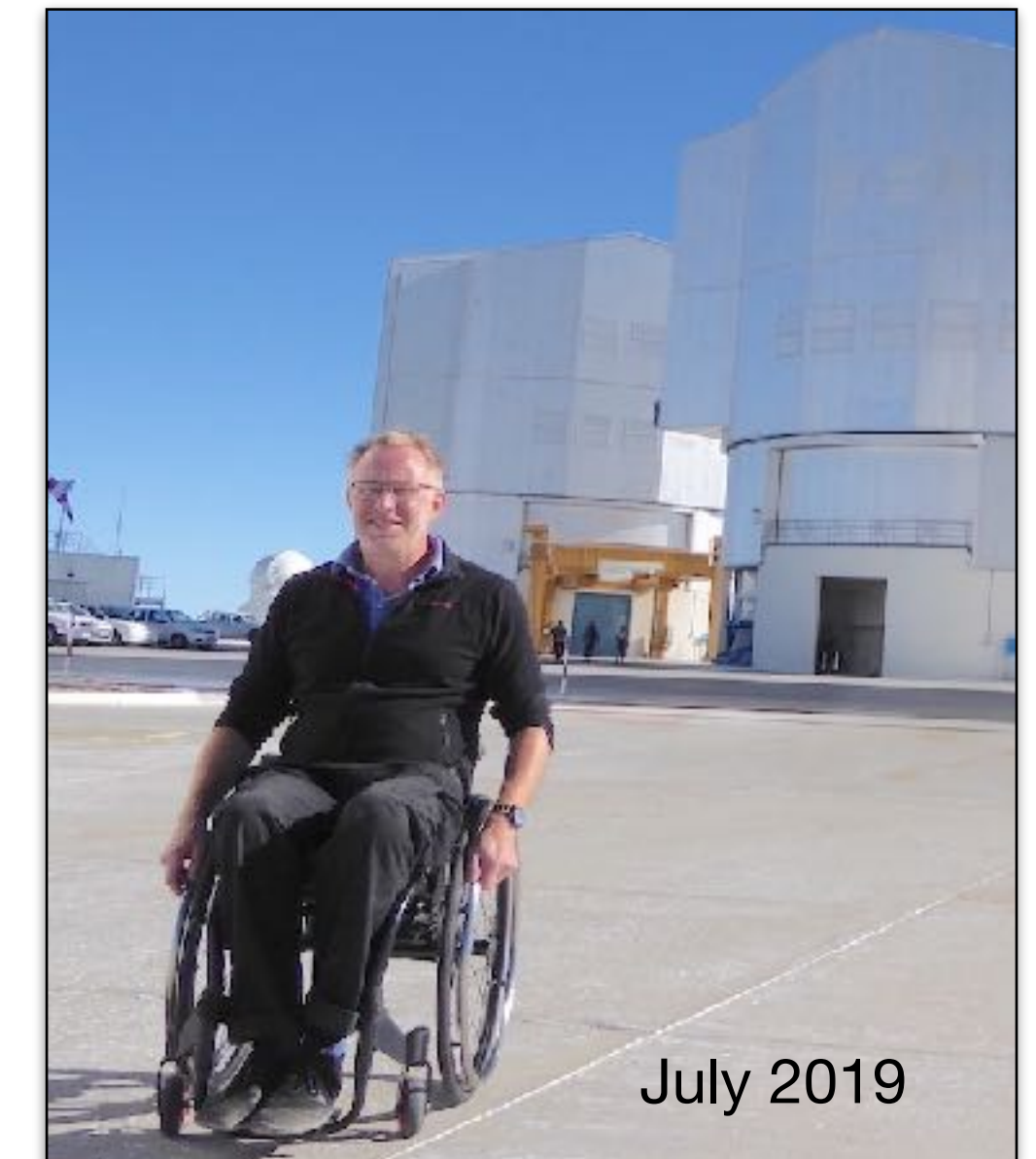


Radial **V**elocity **S**urvey for **P**lanets around **Y**oung Stars (**RVSPY**)

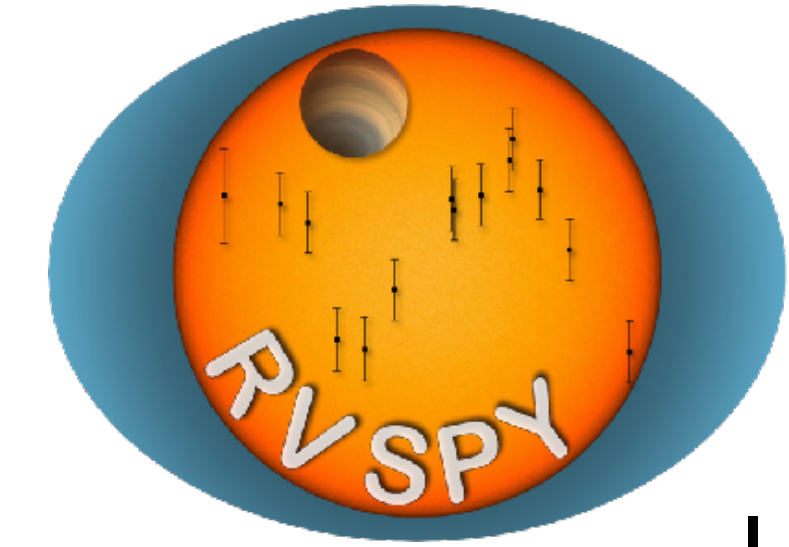
How the lessons learned paved the road to success



Ralf Launhardt

TH70 Colloquium

June 22-26, 2026



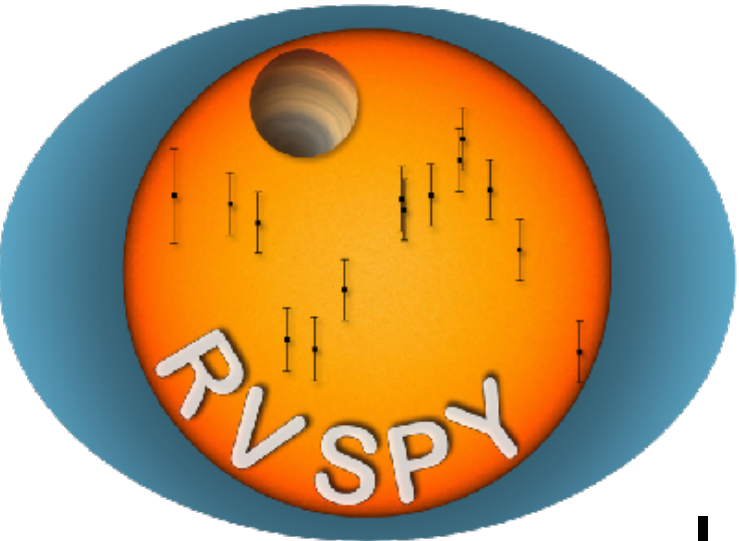
Radial **V**elocity **S**urvey for **P**lanets around **Y**oung Stars (**RVSPY**)

My way from University to RVSPY:

I know Thomas since about 1986 (i.e., ~40 years, Star formation lecture)



New Yera's Eve 1997 / 98 in Buenos Aires



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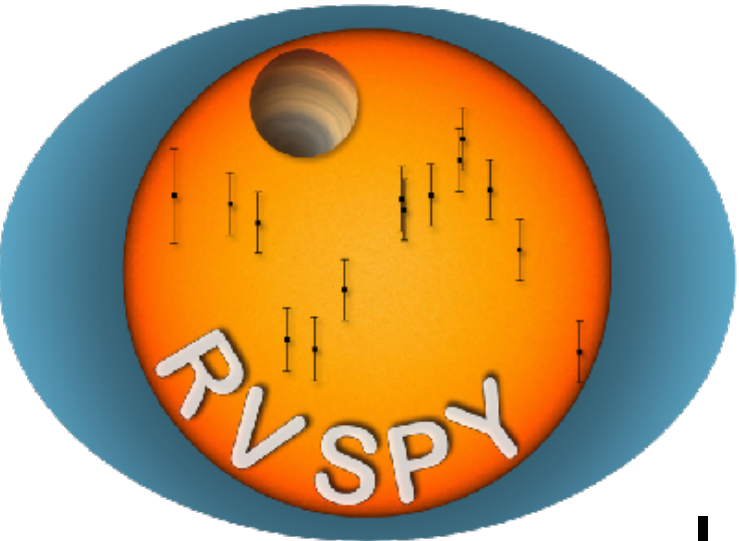
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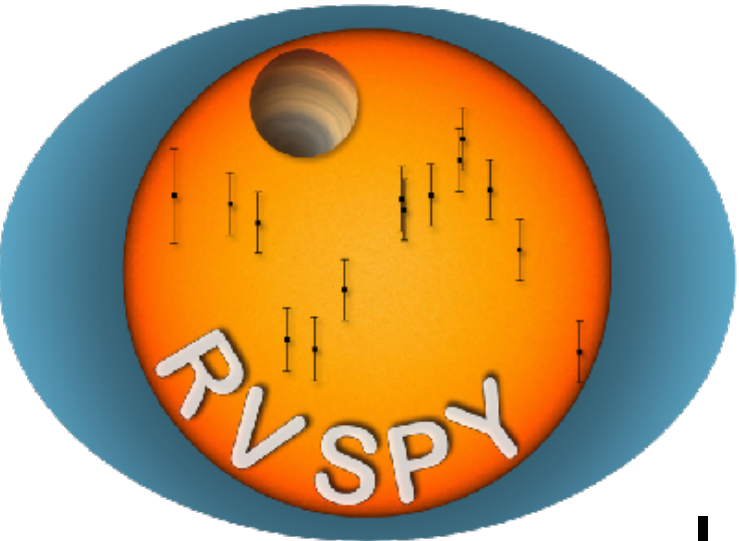


Potsdam '89 - '91:
ARGUS, Neues Forum



New Yera's Eve 1997 / 98 in Buenos Aires





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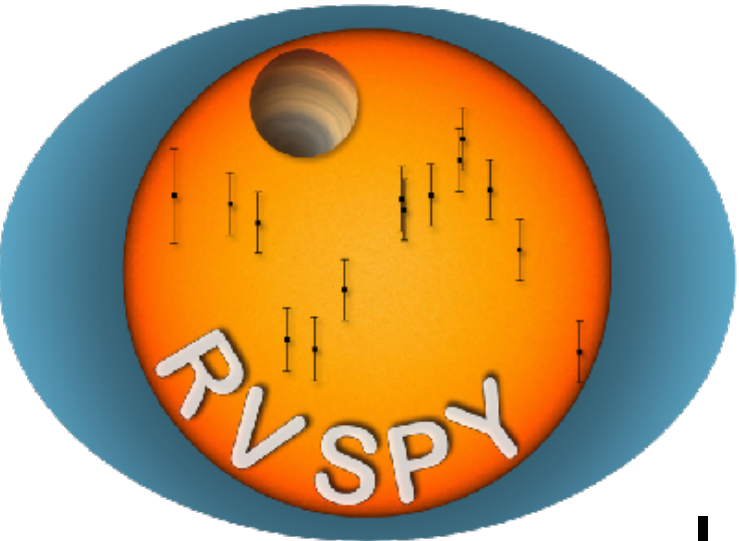


New Yera's Eve 1997 / 98 in Buenos Aires



Early 1992

Call from Thomas
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“**Dust in star-
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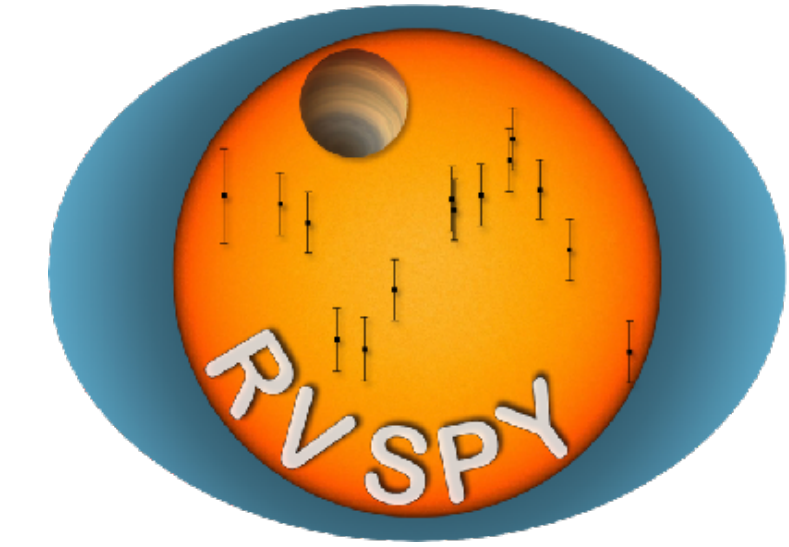
KAO, 1993



Torres del Paine, 1994

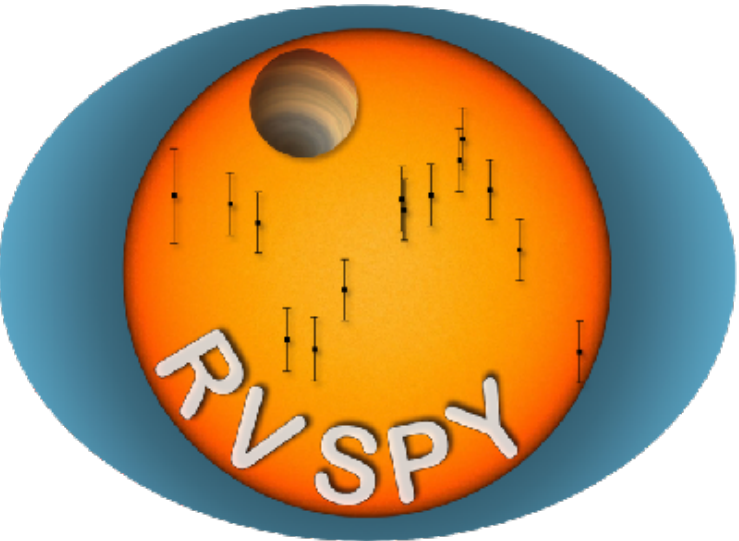


April 14, 1996



Radial **V**elocity **S**urvey for **P**lanets around **Y**oung Stars (**RVSPY**)

Students and collaborators who contributed to RVSPY:



Radial Velocity Survey for Planets around Young Stars (RVSPY)

Students and collaborators who contributed to RVSPY:



Patrick Weise (2007-2010)

Patrick Weise

Search for planets around young stars with the radial velocity technique

- Dissertation -

2010

A&A 517, A88 (2010)
DOI: [10.1051/0004-6361/201014453](https://doi.org/10.1051/0004-6361/201014453)
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Rotational velocities of nearby young stars*

P. Weise, R. Launhardt, J. Setiawan, and T. Henning

Max-Planck-Institute for Astronomy (MPIA), Königstuhl 17, 69117 Heidelberg, Germany
e-mail: weise@mpia.de

Received 18 March 2010 / Accepted 6 May 2010

Astronomy & Astrophysics



André Müller (2007-2012)

R. Launhardt

Untersuchung der Variabilität naher junger Sterne

eingereicht von
André Müller

DIPLOMARBEIT

A&A 530, A85 (2011)
DOI: [10.1051/0004-6361/201116732](https://doi.org/10.1051/0004-6361/201116732)
© ESO 2011

HD 135344B: a young star has reached its rotational limit*

A. Müller^{1,2}, M. E. van den Ancker¹, R. Launhardt², J. U. Pott², D. Fedele³, and Th. Henning²

¹ European Southern Observatory, Karl-Schwarzschild-Str. 2, 85748 Garching b. München, Germany
² Max Planck Institute for Astronomy, Königstuhl 17, 69117 Heidelberg, Germany
e-mail: amueller@mpia.de
³ Johns Hopkins University, Dept. of Physics and Astronomy, 3701 San Martin drive, Baltimore, MD 21210, USA

Received 16 February 2011 / Accepted 23 March 2011

Astronomy & Astrophysics



Norbert Schneider (2010-2011)

Charakterisierung von Targetsternen für die Exoplanetensuche

Ableitung stellarer Parameter aus optischen Spektren und Photometrie



Maren Mohler-Fischer (2010-2013)

Search for extrasolar planets around young stars in the presence of stellar activity

Dissertation



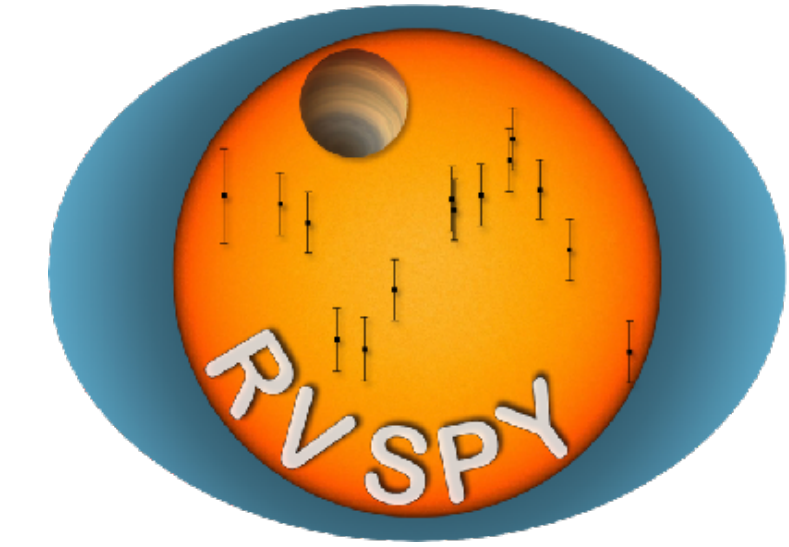
nature

Vol 451 | 3 January 2008 | [doi:10.1038/nature06426](https://doi.org/10.1038/nature06426)

LETTERS

A young massive planet in a star-disk system

J. Setiawan¹, Th. Henning¹, R. Launhardt¹, A. Müller¹, P. Weise¹ & M. Kürster¹

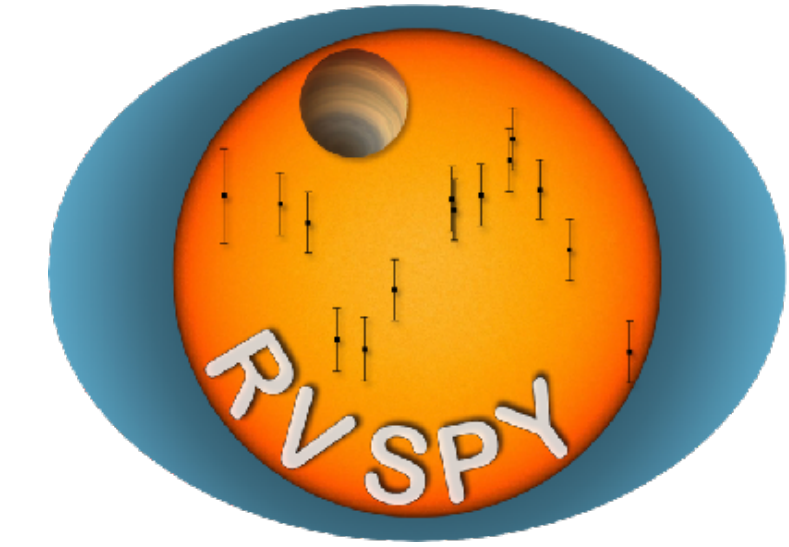


Radial **V**elocity **S**urvey for **P**lanets around **Y**oung Stars (**RVSPY**)

How the lessons learned paved the road to success

Lessons learned:

1. Such a survey cannot be done 'on the side', but needs a dedicated person working full time on it

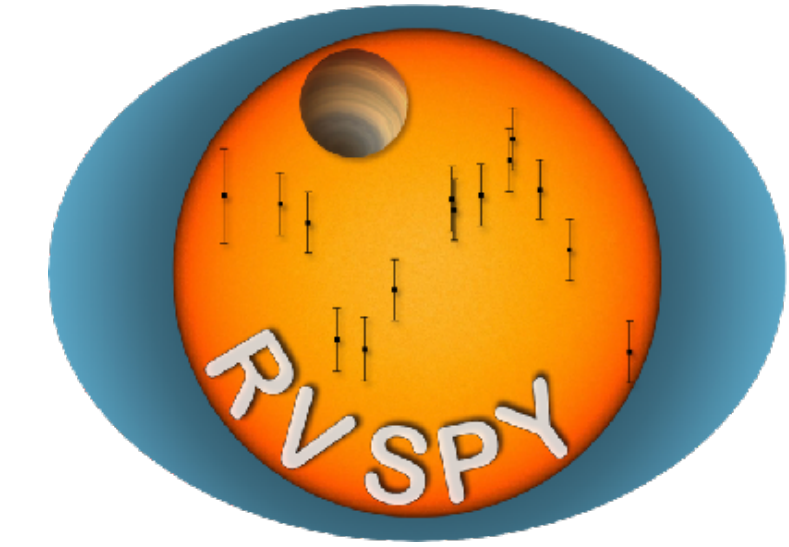


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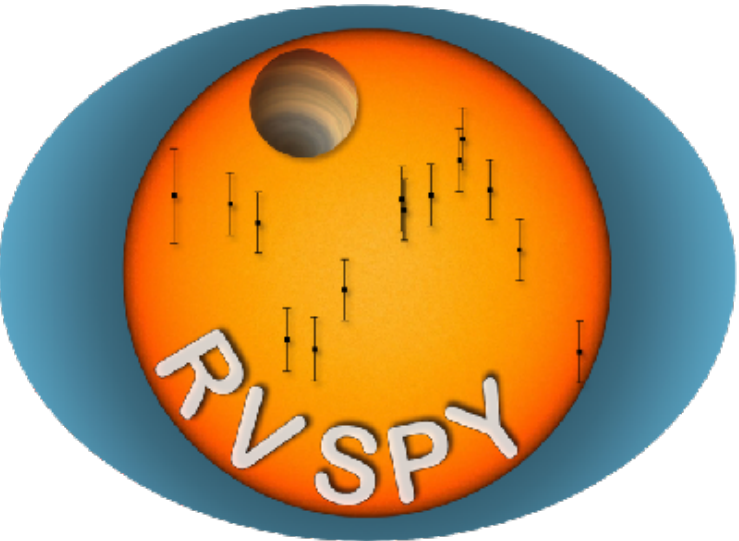


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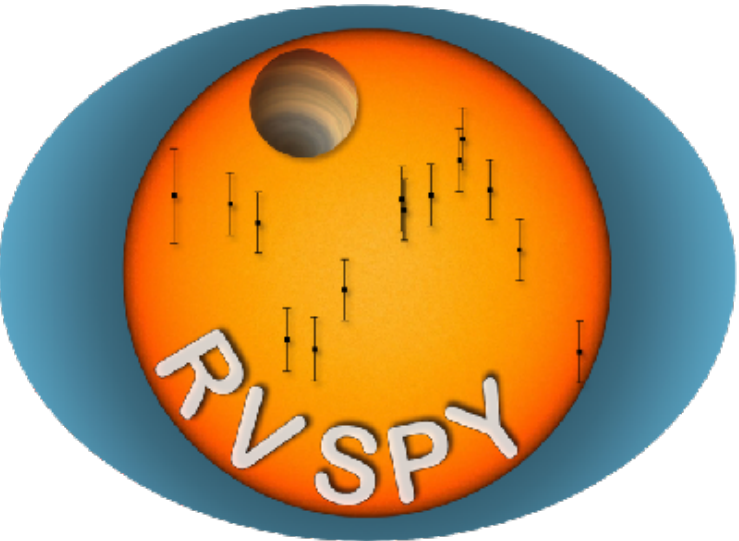


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Olga Zakhozhay (2017-2022) Yashodhan Manerikar (2019-2020)



RVSPY - Radial Velocity Survey for Planets around Young Stars
Target characterization and results from the first year of observations

Olga V. Zakhozhay^{1,2}, Ralf Launhardt¹, Andre Müller¹, Stefan S. Brems³, Trifon Trifonov¹, Martin Kürster¹, Thomas Henning¹, Sabine Reffert³, Alexey Pavlov¹, Grant M. Kennedy^{4,5}, Jayshil Patel⁶, Angela Hempel^{7,1}, Sam Kim^{8,1}, and Yashodhan Manerikar^{9,1}



Bachelor Thesis in Physics
submitted by

Tim Ebbinghaus

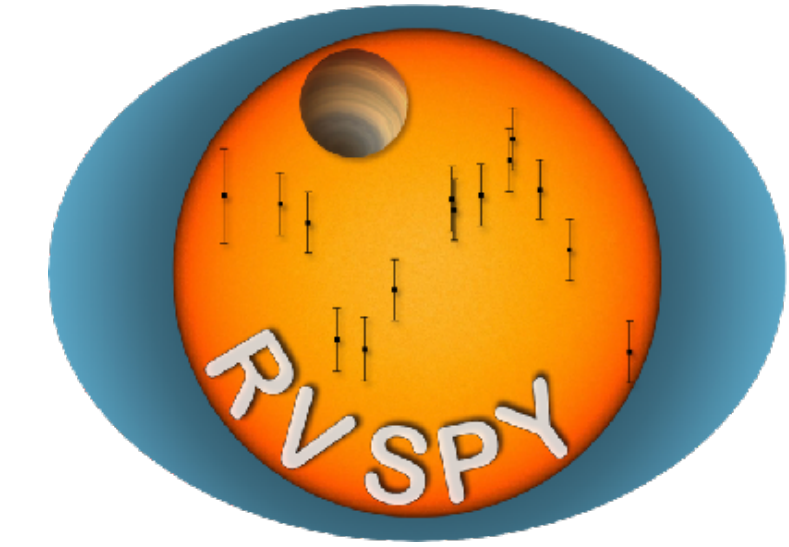
2023
Stellar rotational periods
for the stars of the
RVSPY program

Sasankan Vinod Kumar
(Master, 2025-2026)



Axel Thorel (Intern, 2026)



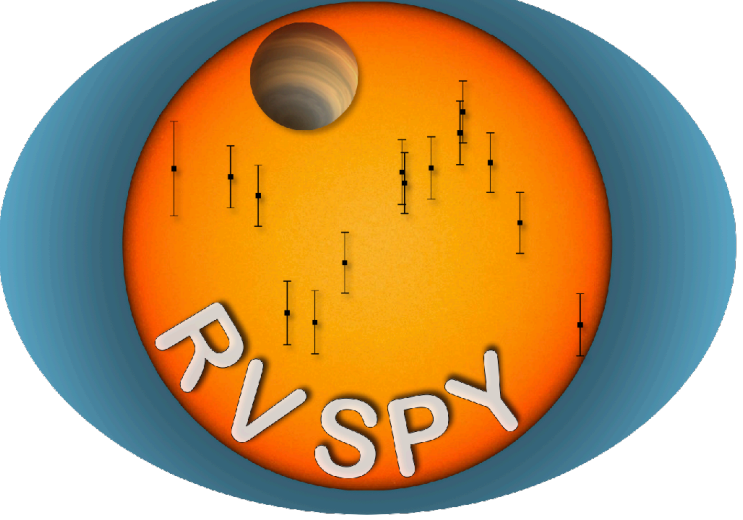


Radial **V**elocity **S**urvey for **P**lanets around **Y**oung Stars (**RVSPY**)

How the lessons learned paved the road to success

Three phases of the survey:

0. Target candidate list
1. Characterisation phase
2. Search phase
3. Consolidation phase



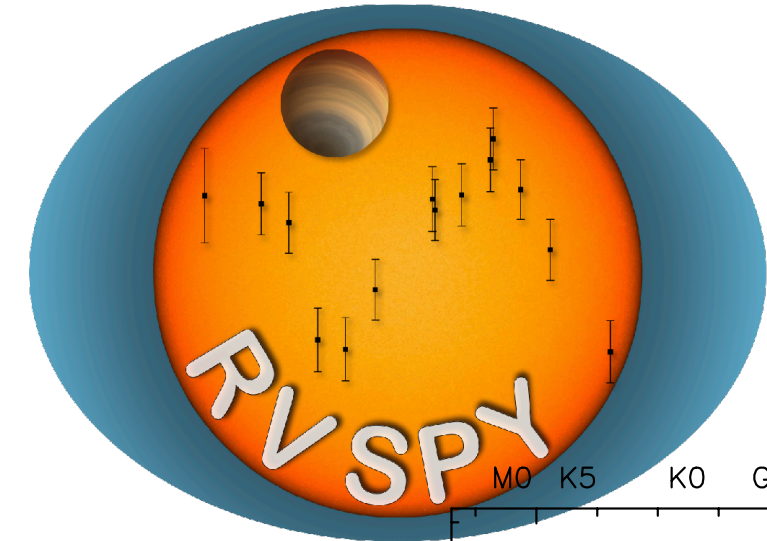
Radial Velocity Survey for Planets around Young Stars (RVSPY)

1. Characterisation Phase

This logo depicts an important part the characterisation phase:

Observe every star for about two weeks every night,
with occasional 2 spectra in one night,
and occasional weather losses

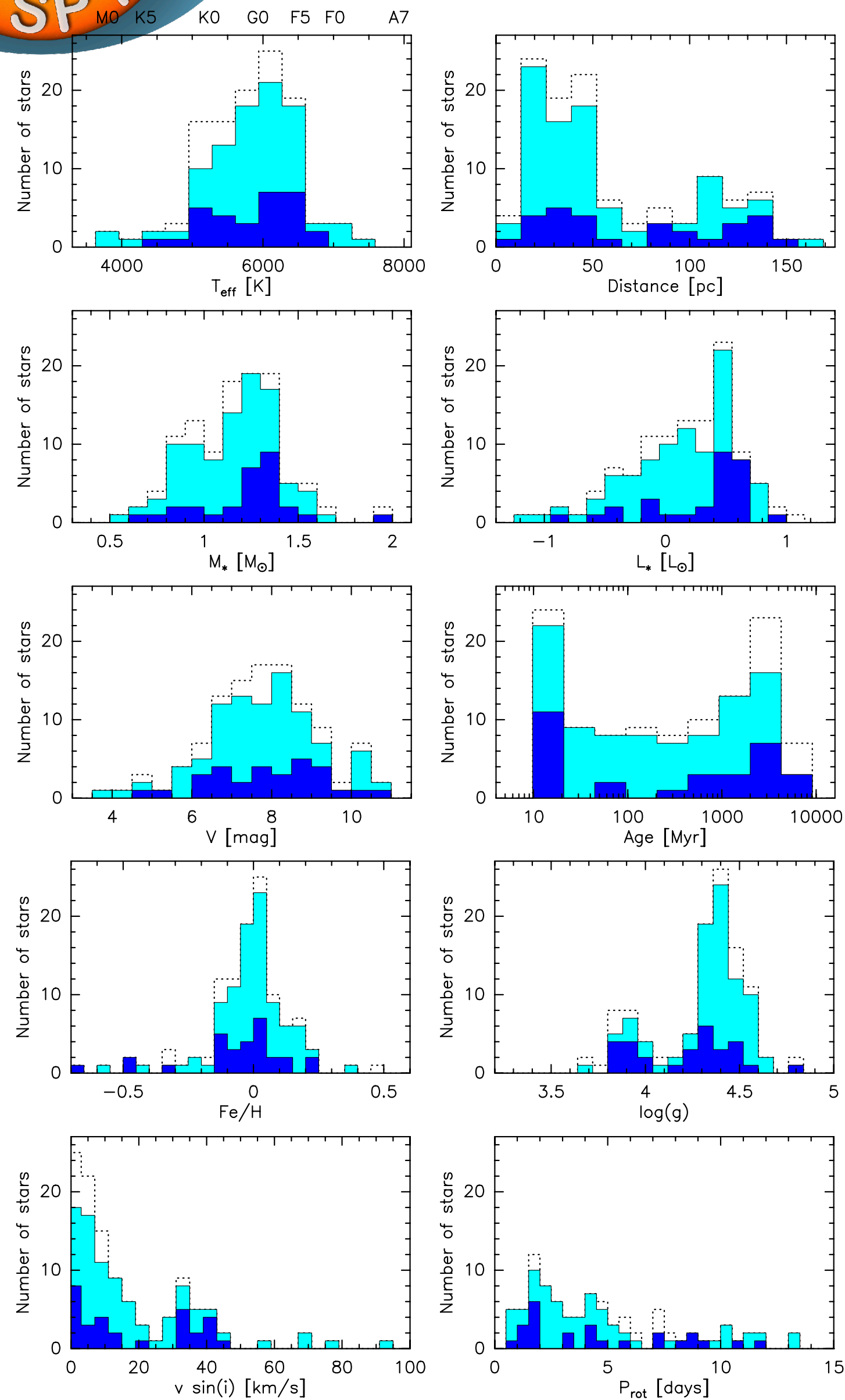
=> **High-cadence campaign** of all **110** initial target candidates
2017 - 2019

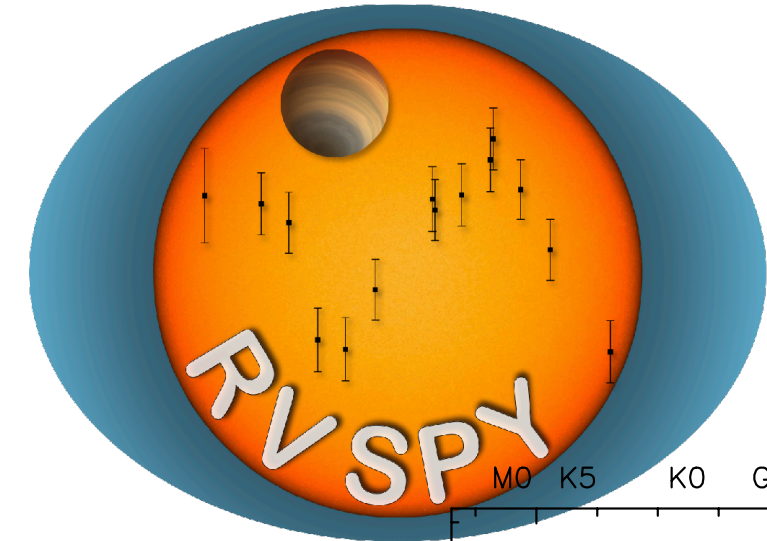


Radial Velocity Survey for Planets around Young Stars (RVSPY)

1. Characterisation Phase

Distribution plots

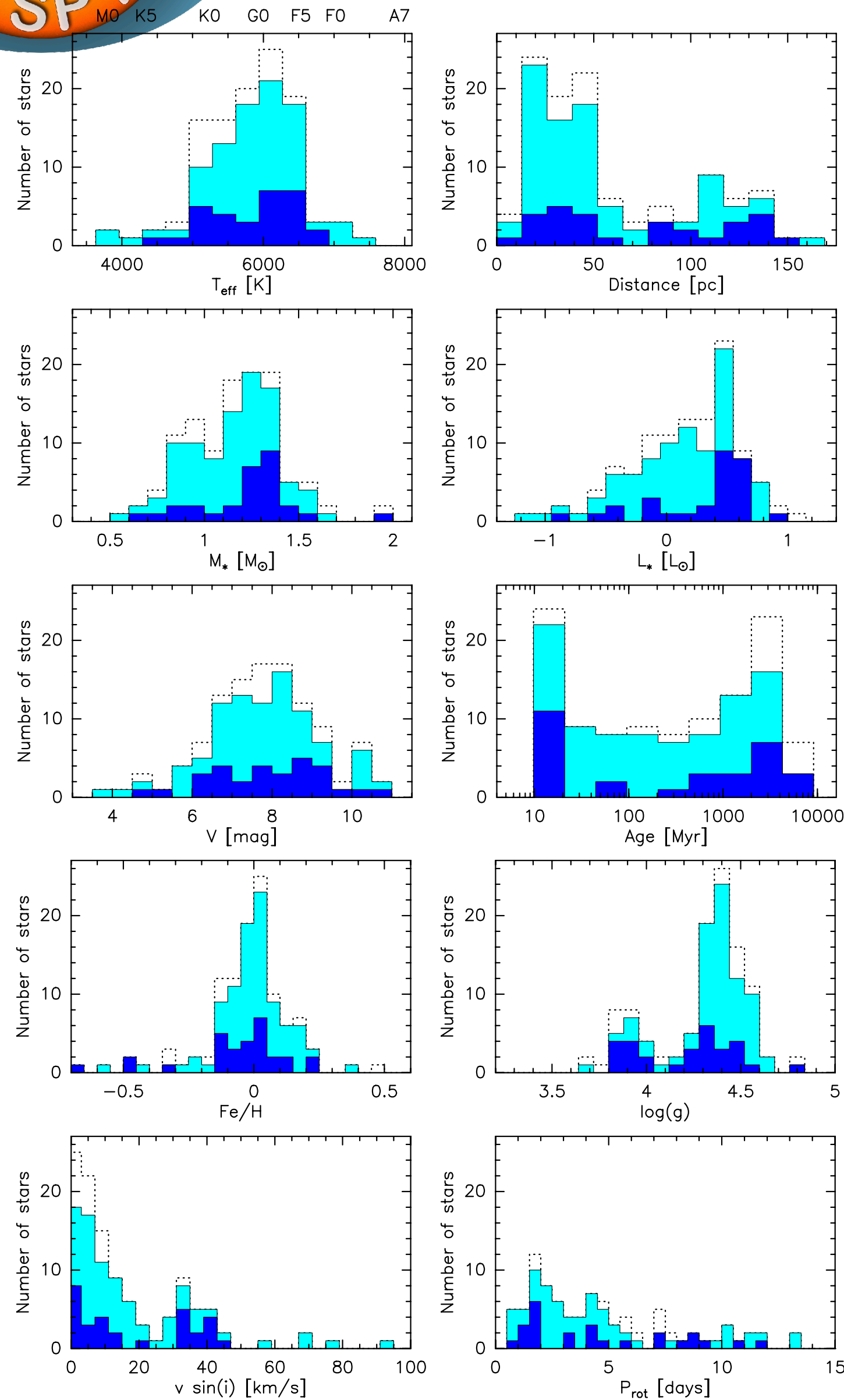




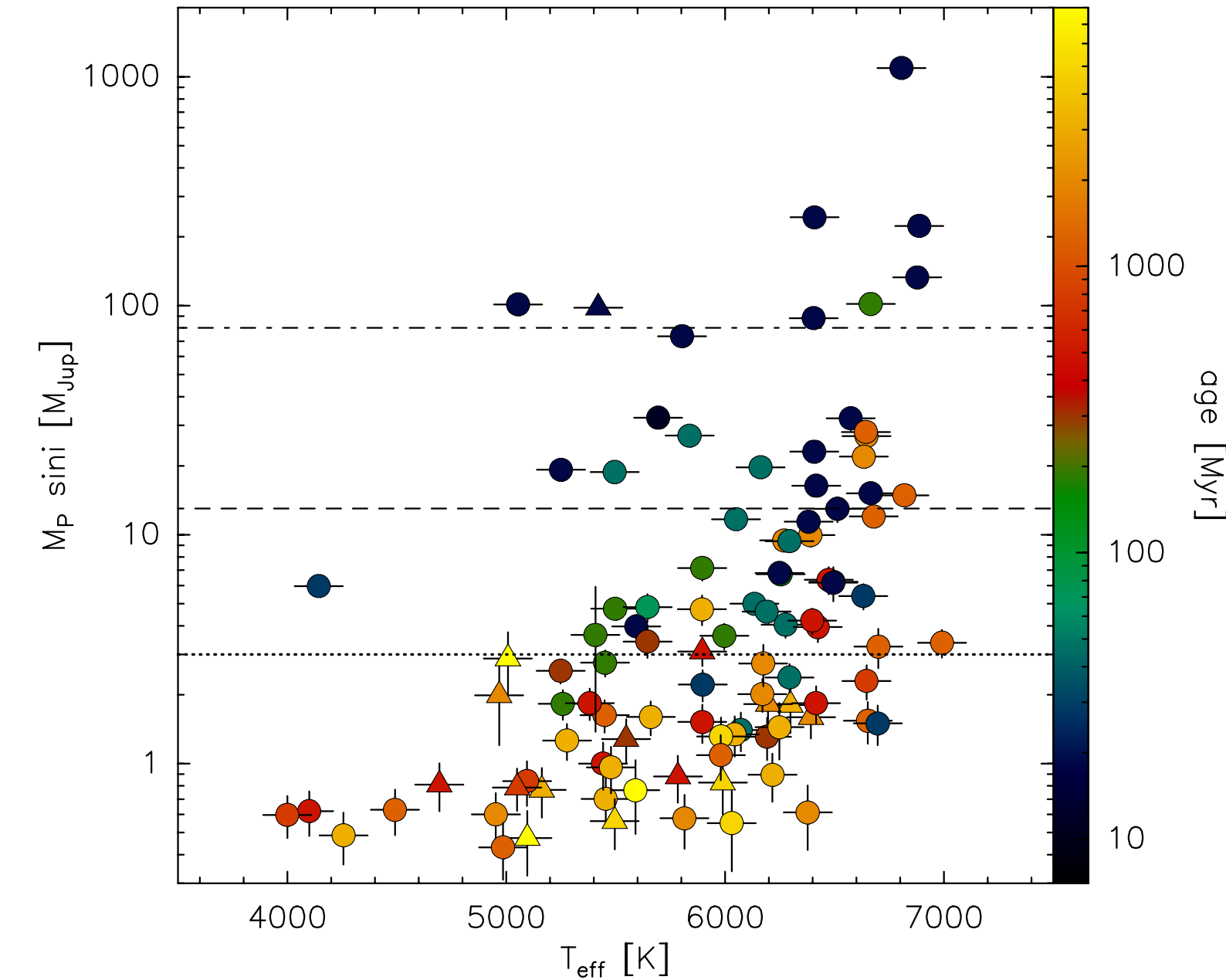
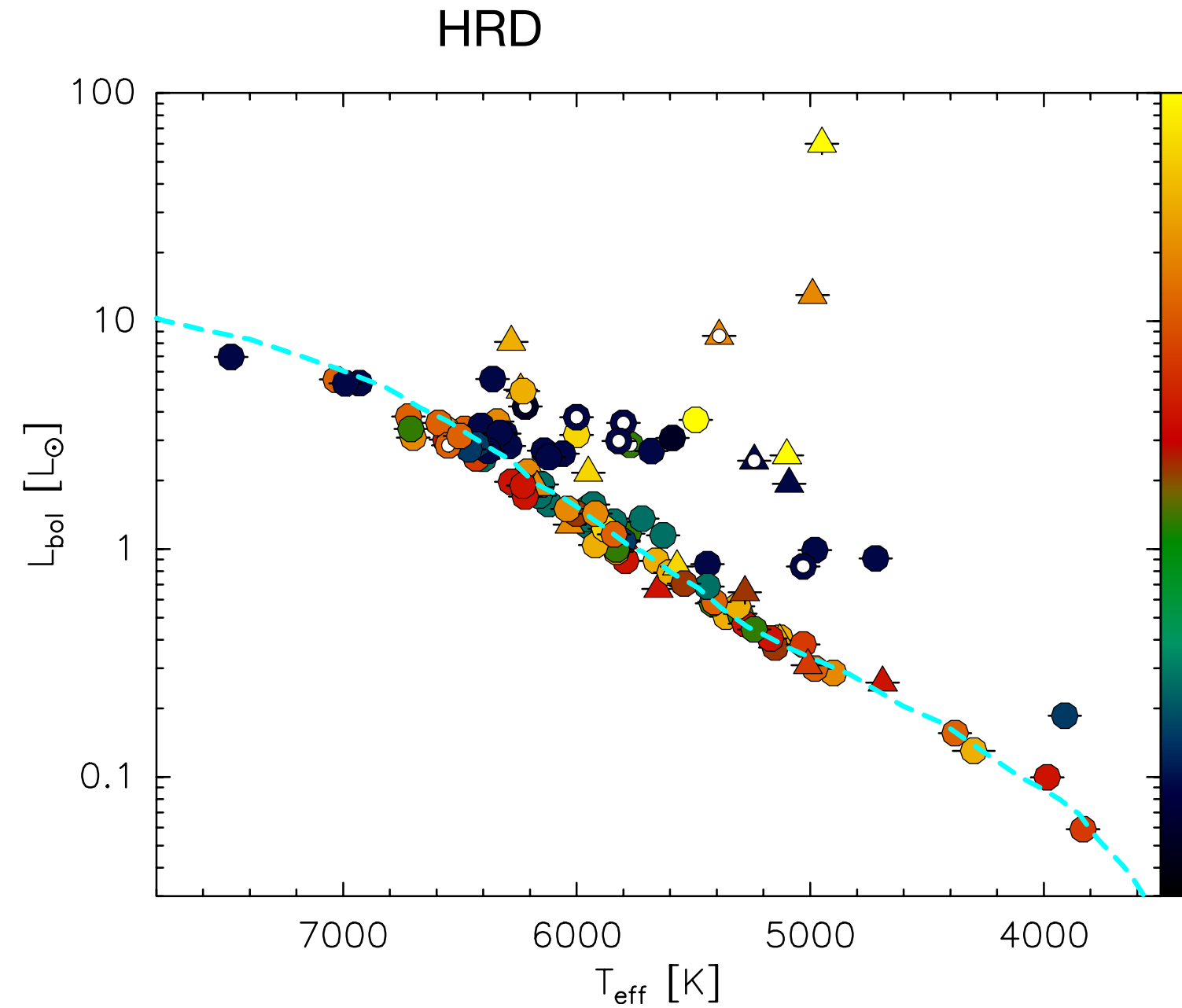
Radial Velocity Survey for Planets around Young Stars (RVSPY)

1. Characterisation Phase

Distribution plots



Mass-detection limits,
based on stellar properties and
RV scatter in high-cadence campaign



Astronomy & Astrophysics manuscript no. output
July 21, 2020

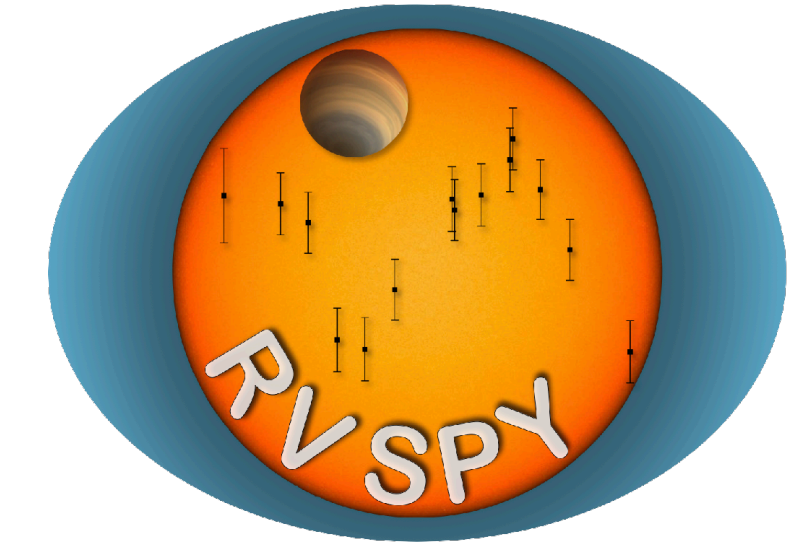
The resulting paper

©ESO 2020

RVSPY - Radial Velocity Survey for Planets around Young Stars

Target characterization and results from the first year of observations

Olga V. Zakhozay^{1,2}, Ralf Launhardt¹, Andre Müller¹, Stefan S. Brems³, Trifon Trifonov¹, Martin Kürster¹, Thomas Henning¹, Sabine Reffert³, Alexey Pavlov¹, Grant M. Kennedy^{4,5}, Jayshil Patel⁶, Angela Hempel^{7,1}, Sam Kim^{8,1}, and Yashodhan Manerikar^{9,1}

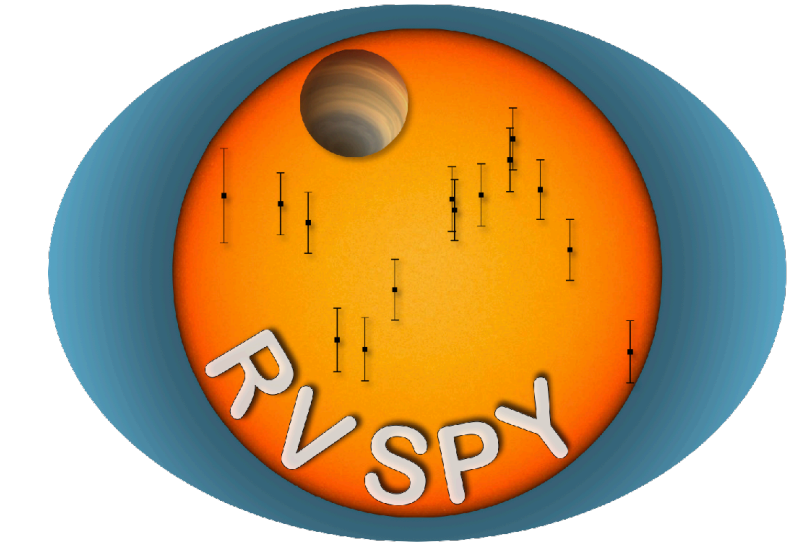


Radial **V**elocity **S**urvey for **P**lanets around **Y**oung Stars (**RVSPY**)

2. Search phase

Around about 10 stars, we could only detect stellar companions => reject and start search phase with 100 stars.
=> 2019 - 2022

One early result triggered by a by-chance discovery of a transit (later second transit, but from second planet!)



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A&A 667, L14 (2022)
<https://doi.org/10.1051/0004-6361/202244747>
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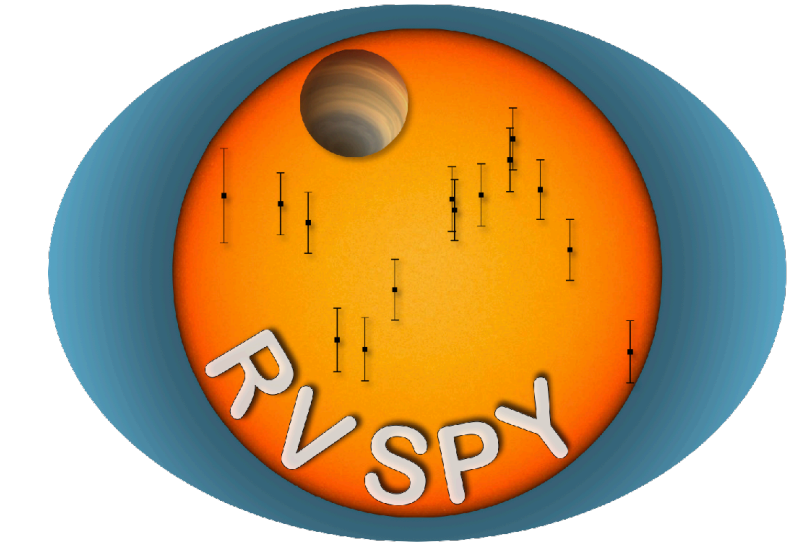
**Astronomy
&
Astrophysics**

LETTER TO THE EDITOR

Radial velocity survey for planets around young stars (RVSPY)

**A transiting warm super-Jovian planet around HD 114082,
a young star with a debris disk★**

Olga V. Zakhozhay^{1,2}, Ralf Launhardt¹, Trifon Trifonov^{1,3,4}, Martin Kürster¹, Sabine Reffert⁴,
Thomas Henning¹, Rafael Brahm^{5,6,7}, José I. Vinés⁸, Gabriel-Dominique Marleau^{9,10,11,1}, and Jayshil A. Patel¹²



Radial **V**elocity **S**urvey for **P**lanets around **Y**oung Stars (**RVSPY**)

3. Consolidation phase

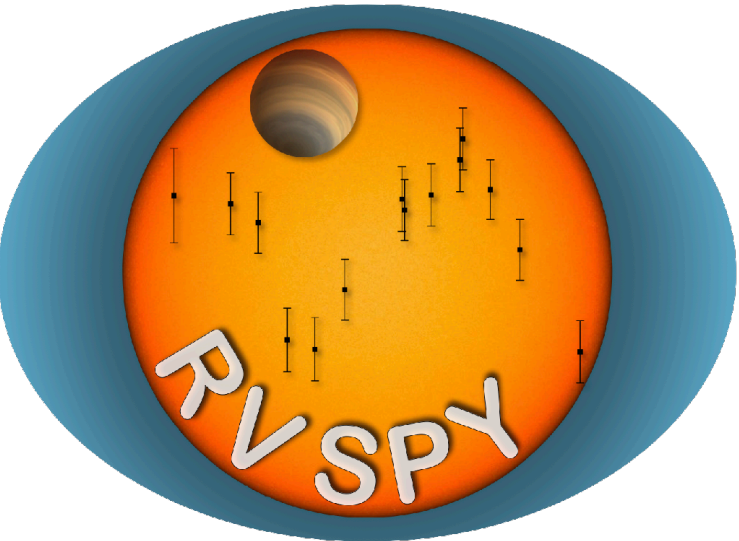
2021 - still ongoing

No significant companion signal around 82 stars

6 SB2

2 stellar-mass companions

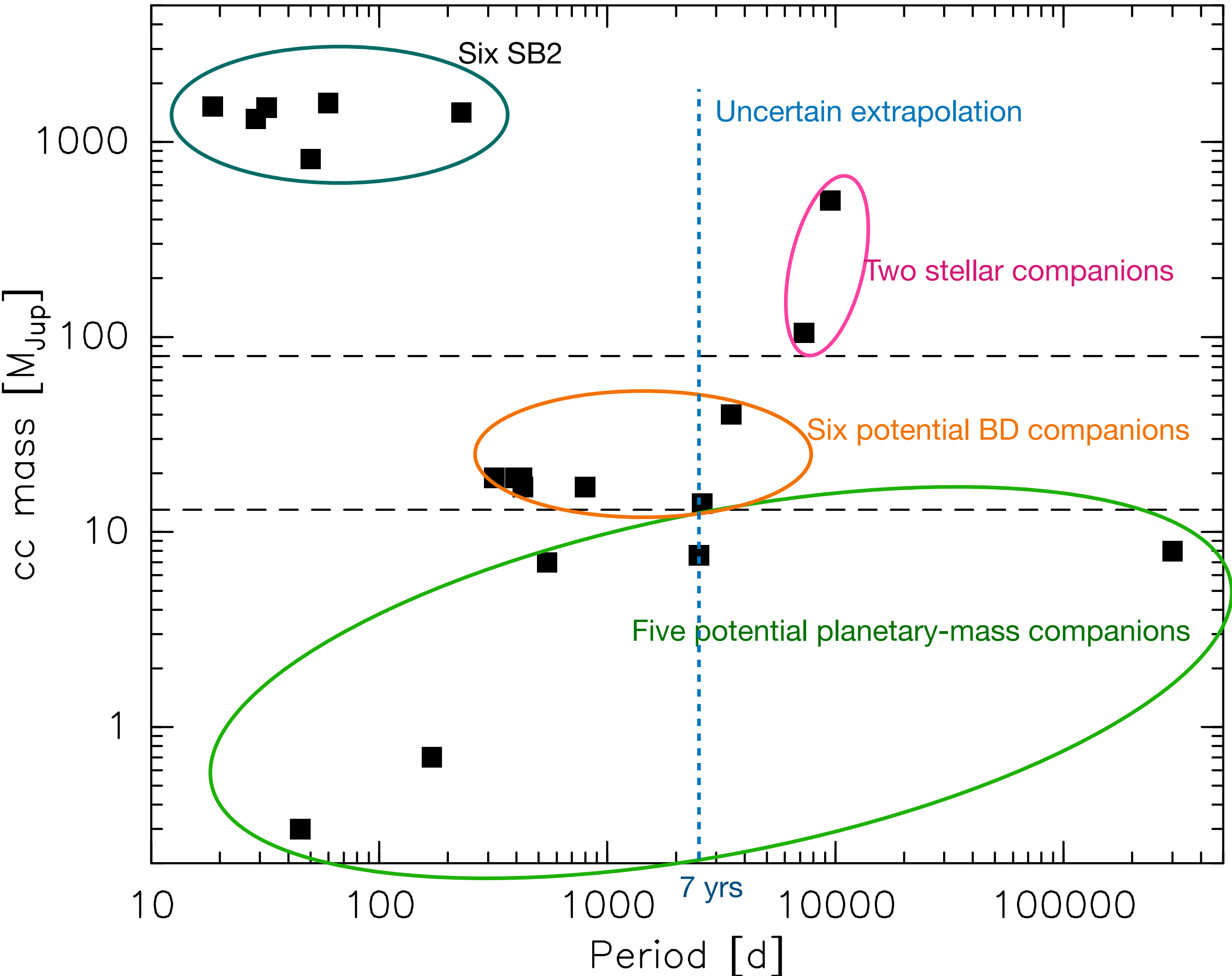
10 substellar (GP and BD) companion candidates

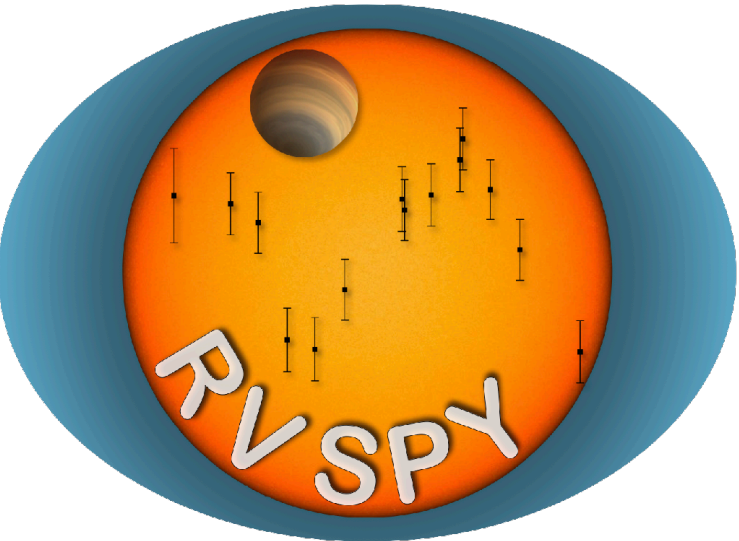


Radial Velocity Survey for Planets around Young Stars (RVSPY)

3. Consolidation phase

- 2021 - still ongoing
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Radial Velocity Survey for Planets around Young Stars (RVSPY)

3. Consolidation phase



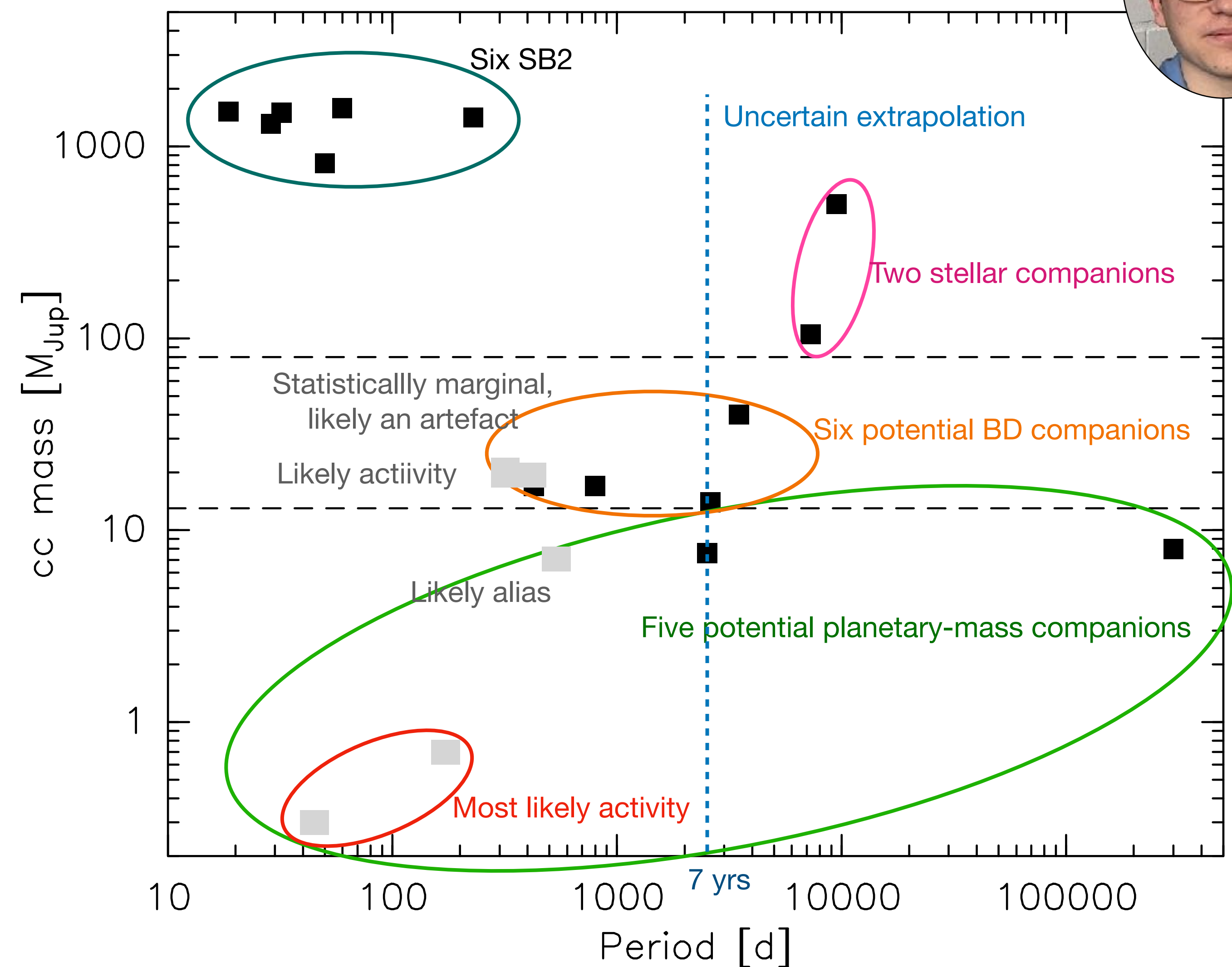
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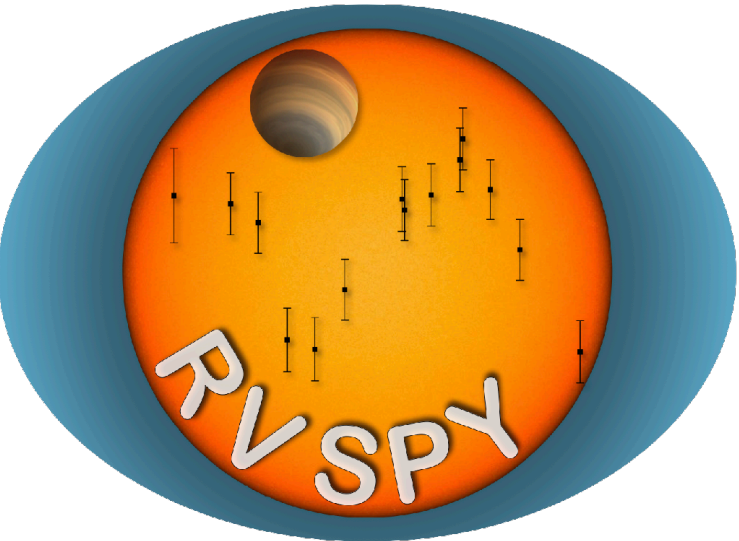
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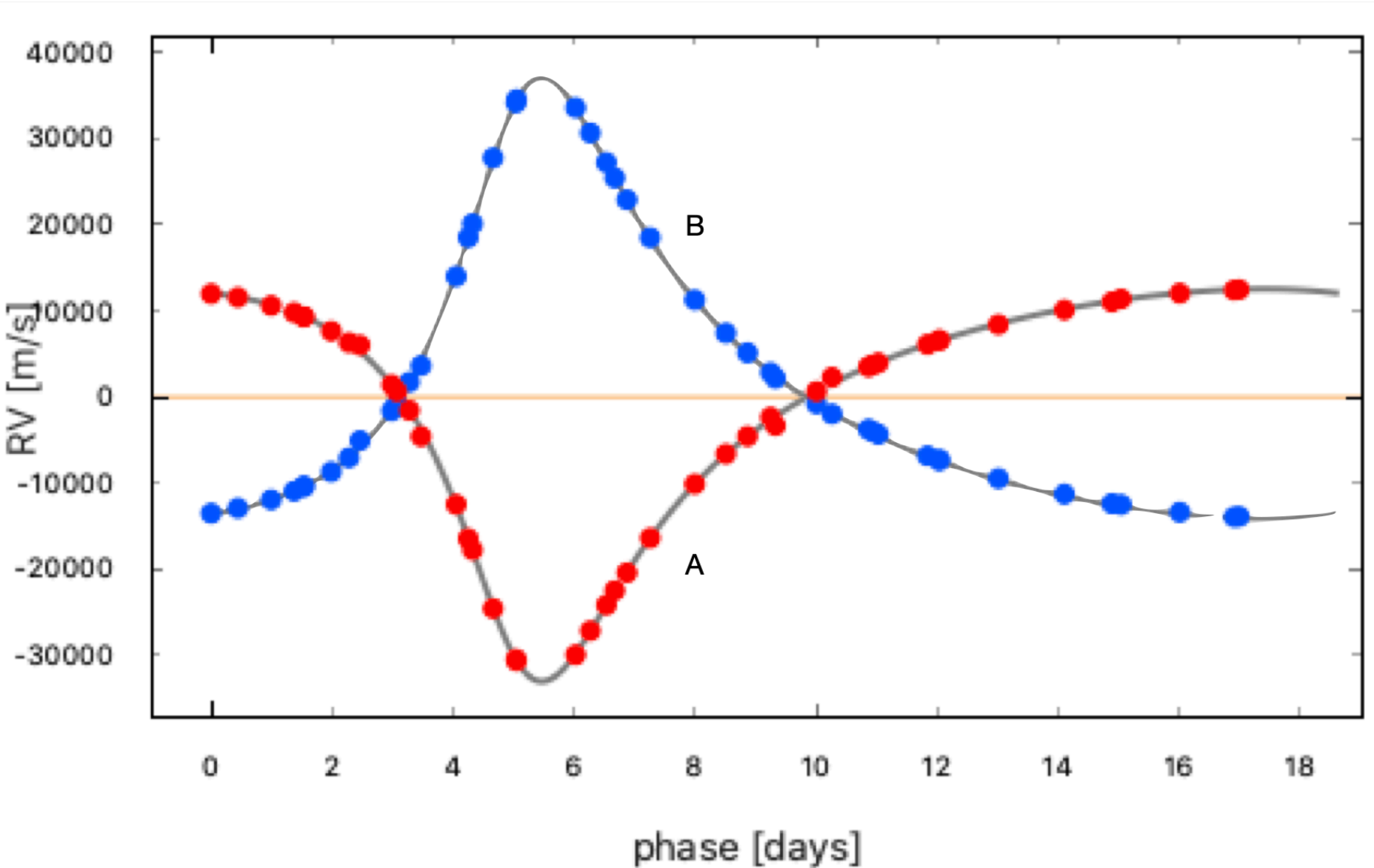
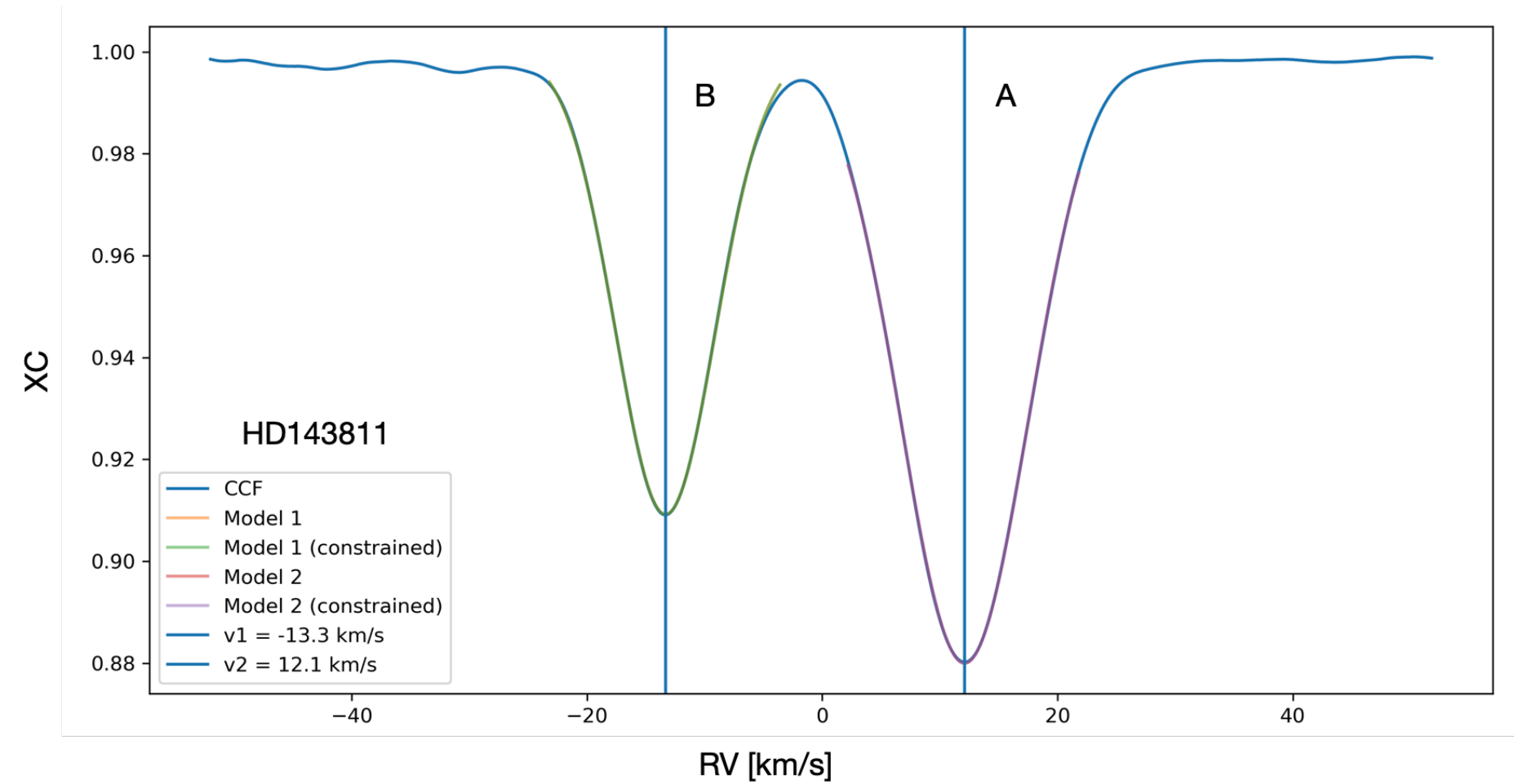
~~10~~ substellar (GP and BD) companion candidates ≤ 6

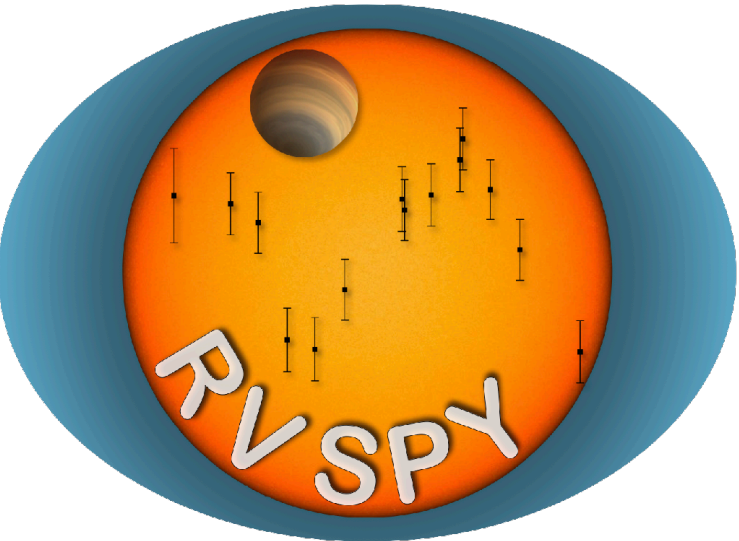




Radial Velocity Survey for Planets around Young Stars (RVSPY)

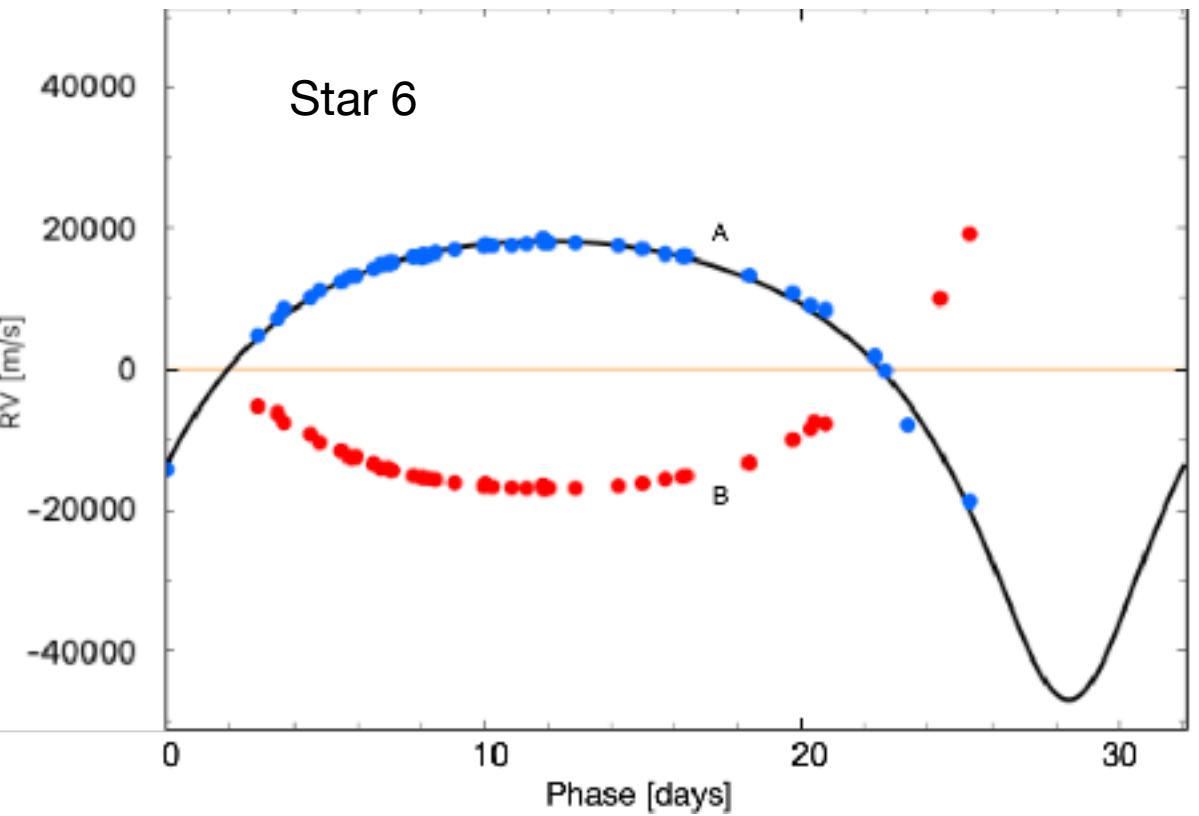
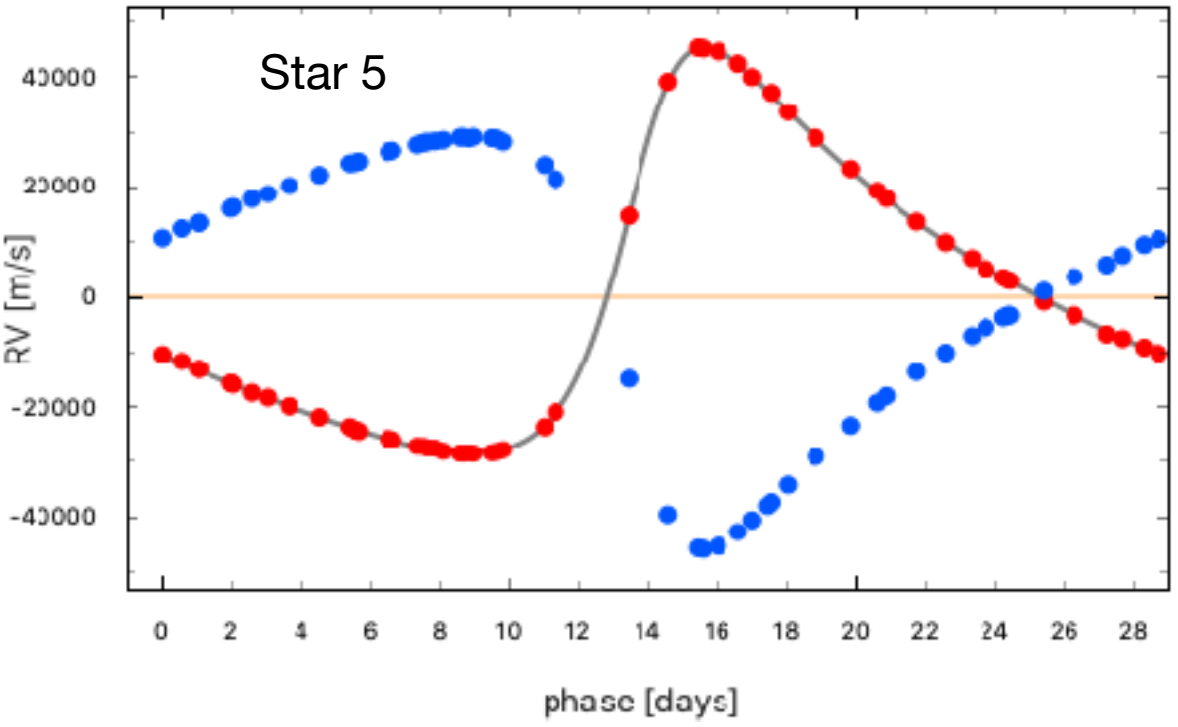
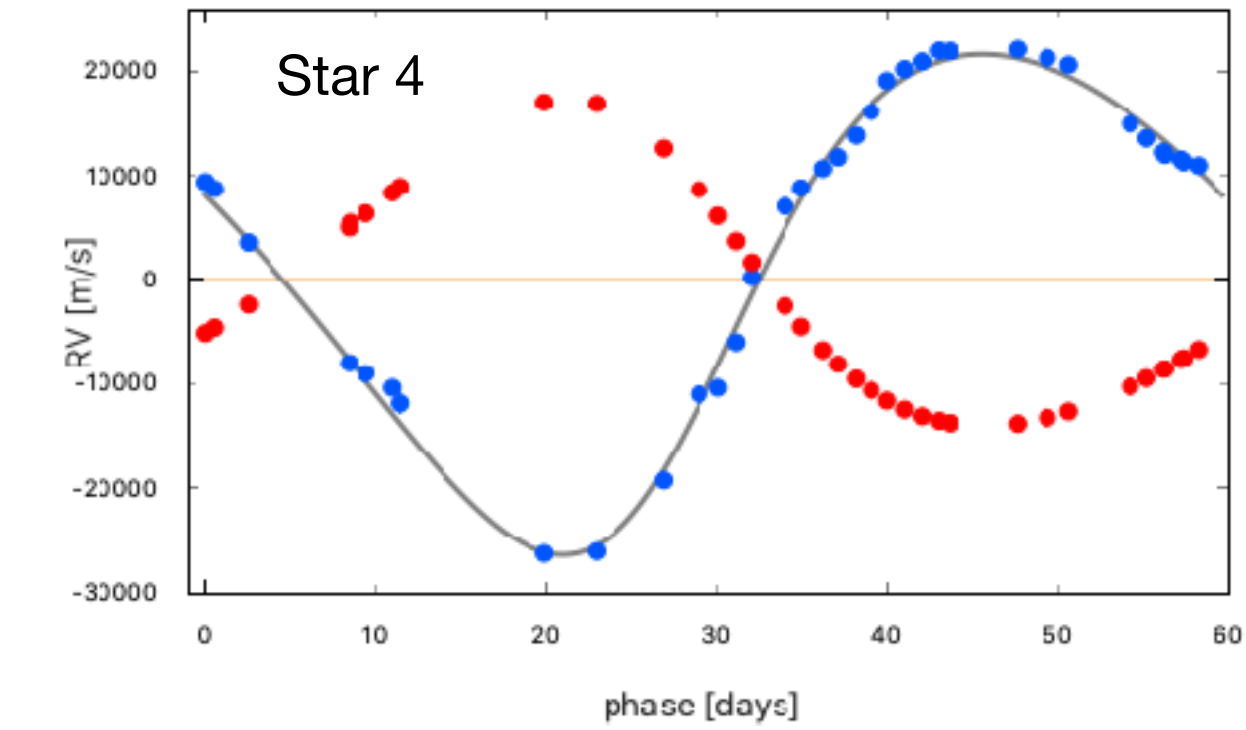
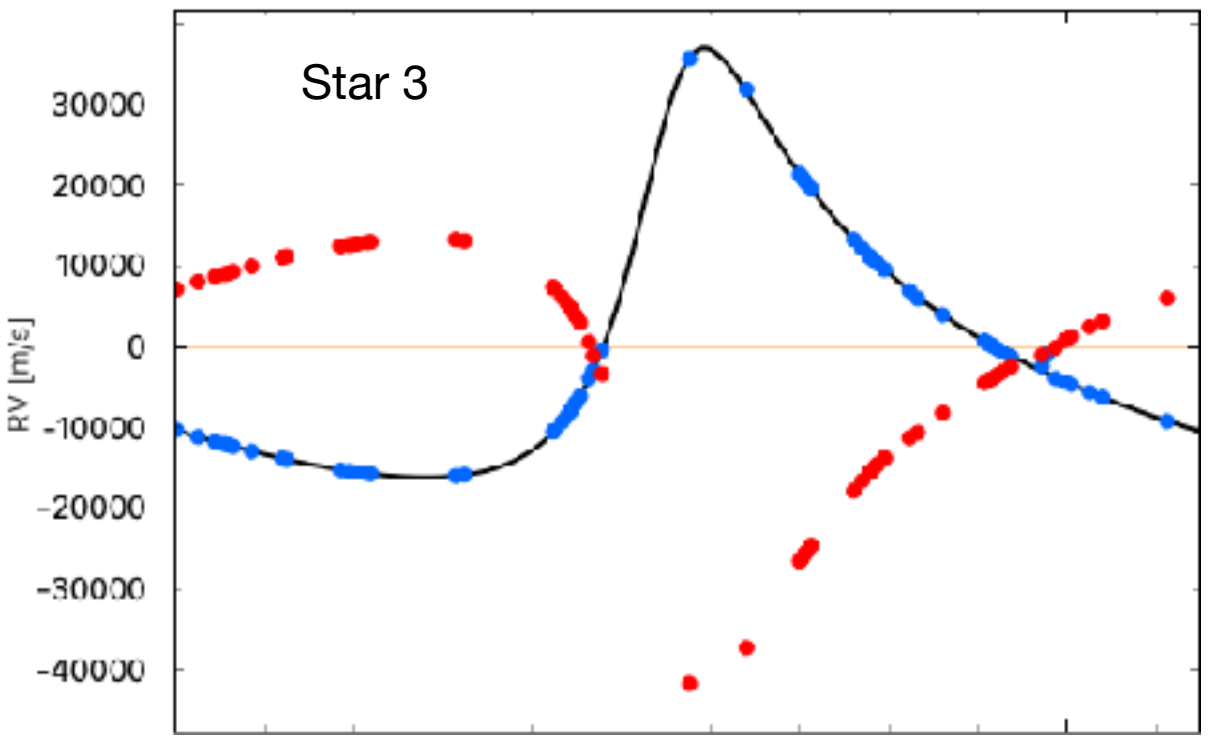
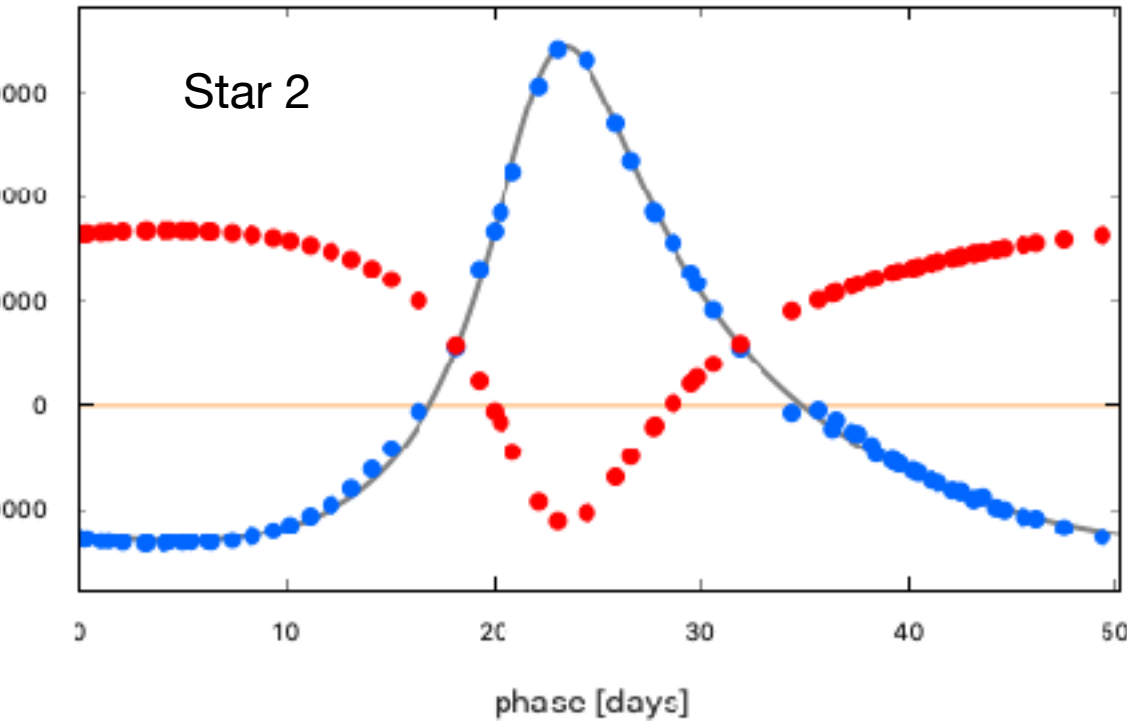
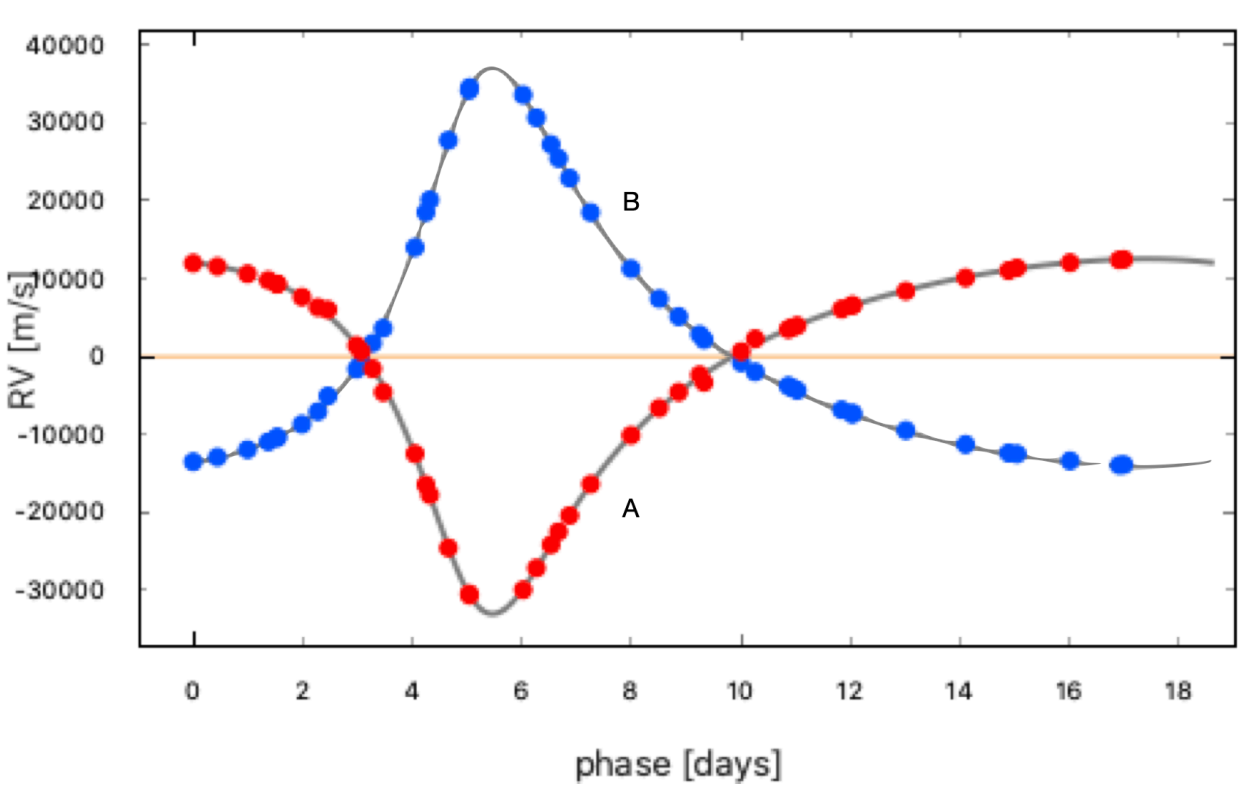
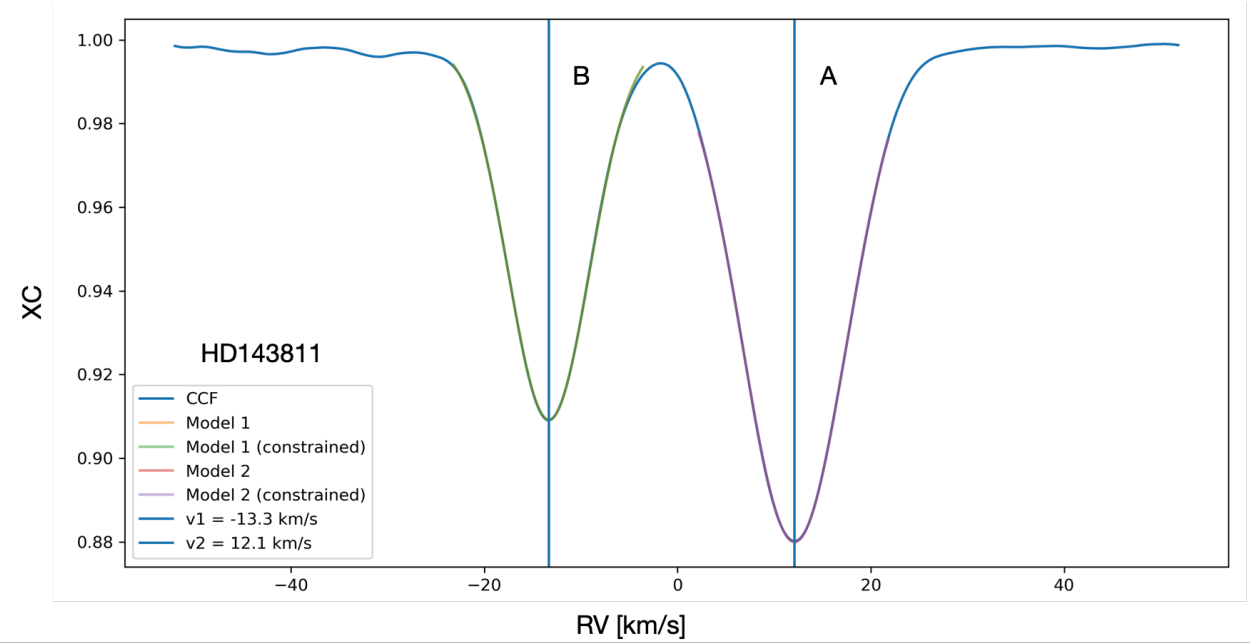
Six double-lined spectroscopic binaries (SB2)





Radial Velocity Survey for Planets around Young Stars (RVSPY)

Six double-lined spectroscopic binaries (SB2)

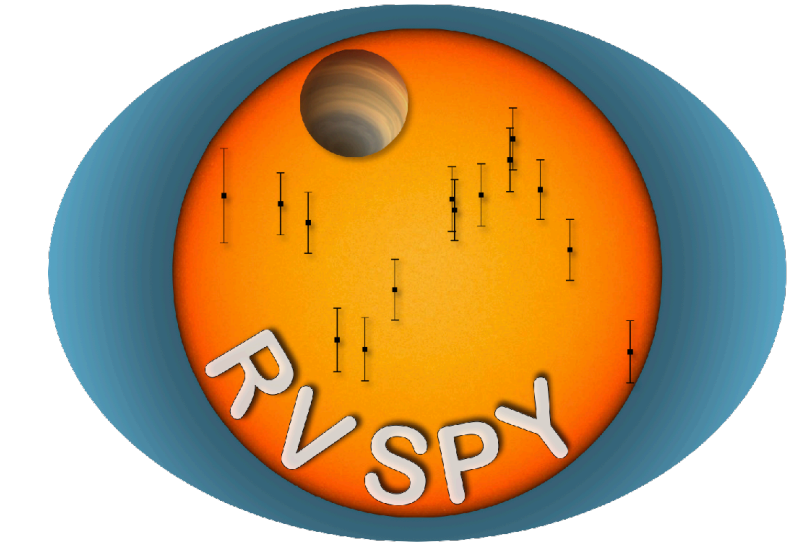


Astronomy & Astrophysics manuscript no. output
June 15, 2026

RVSPY - Radial Velocity Survey for Planets around Young Stars

Orbit solutions for six new double-lined spectroscopic binary stars

Ralf Launhardt¹, Paul Heeren², Trifon Trifonov^{1,2}, Sasankan Vinod Kumar^{1,3}, Olga V. Zakhozhay^{1,4}, and Thomas K. Henning¹



Radial **V**elocity **S**urvey for **P**lanets around **Y**oung Stars (**RVSPY**)

Discovery paper in preparation

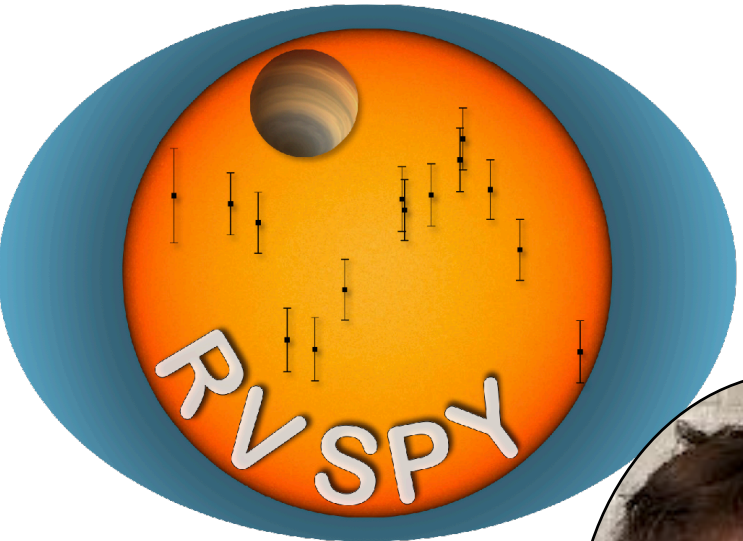
Astronomy & Astrophysics manuscript no. output
June 15, 2026

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RVSPY - Radial Velocity Survey for Planets around Young Stars

Discovery of planets and brown dwarfs with orbit solutions for eleven debris disk stars

Sasankan Vinod Kumar^{1,2}, Axel Thorel^{1,3}, Ralf Launhardt¹, Trifon Trifonov^{2,1}, Matias Jones⁴, Rafael Brahm⁴, Olga V. Zakhozhay^{1,5}, and Thomas K. Henning¹



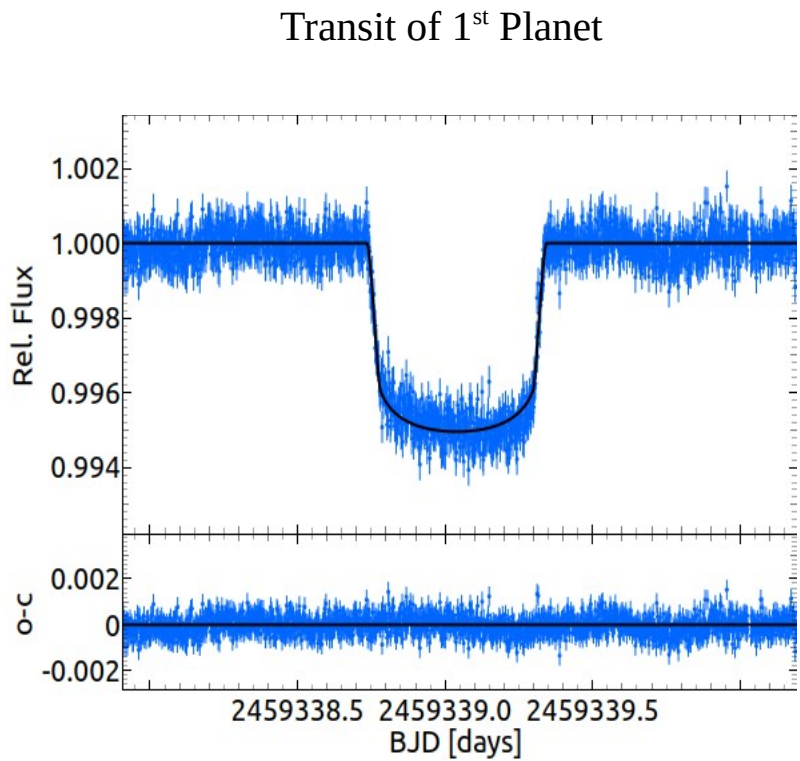
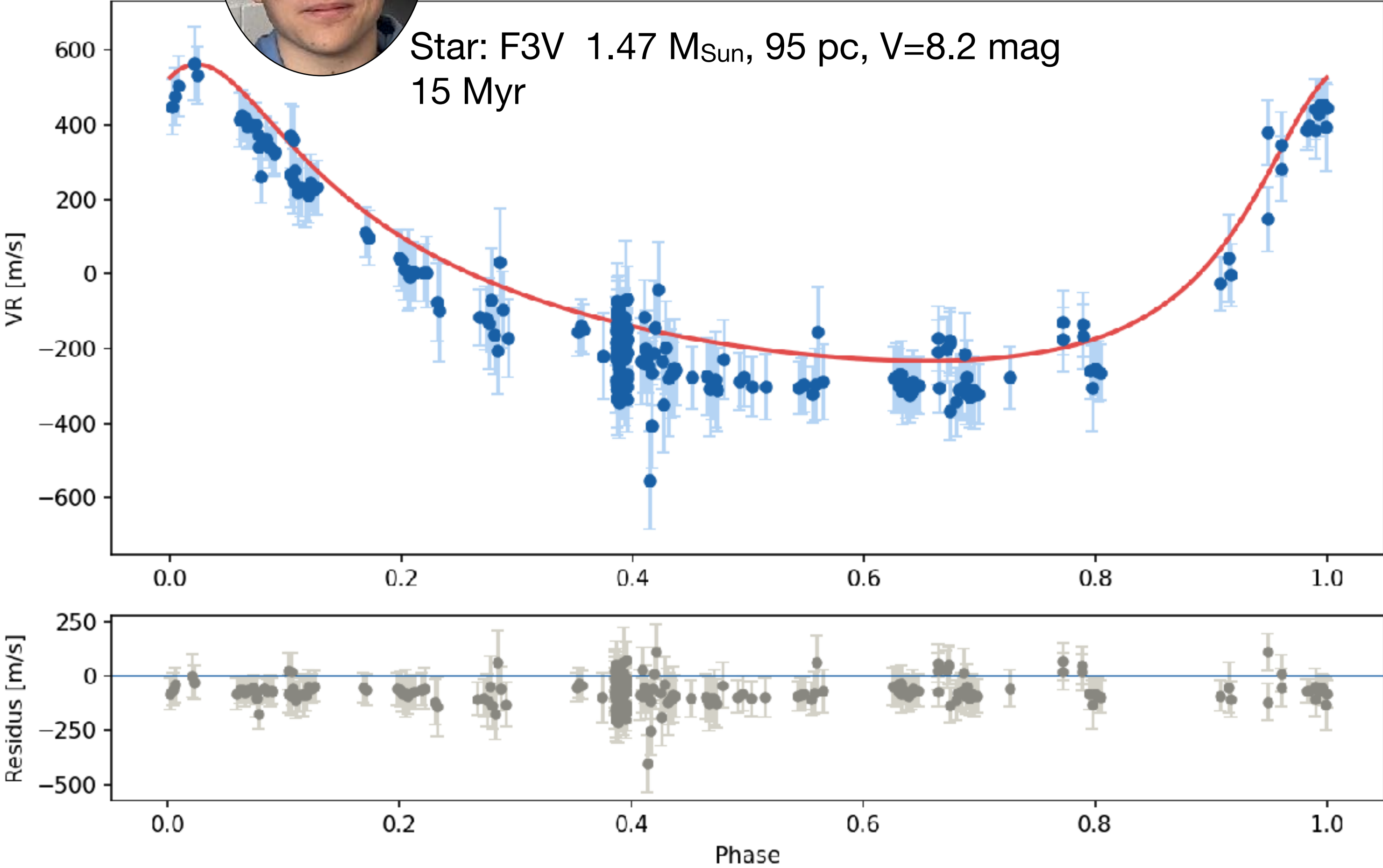
Radial Velocity Survey for Planets around Young Stars (RVSPY)

Orbit solution example

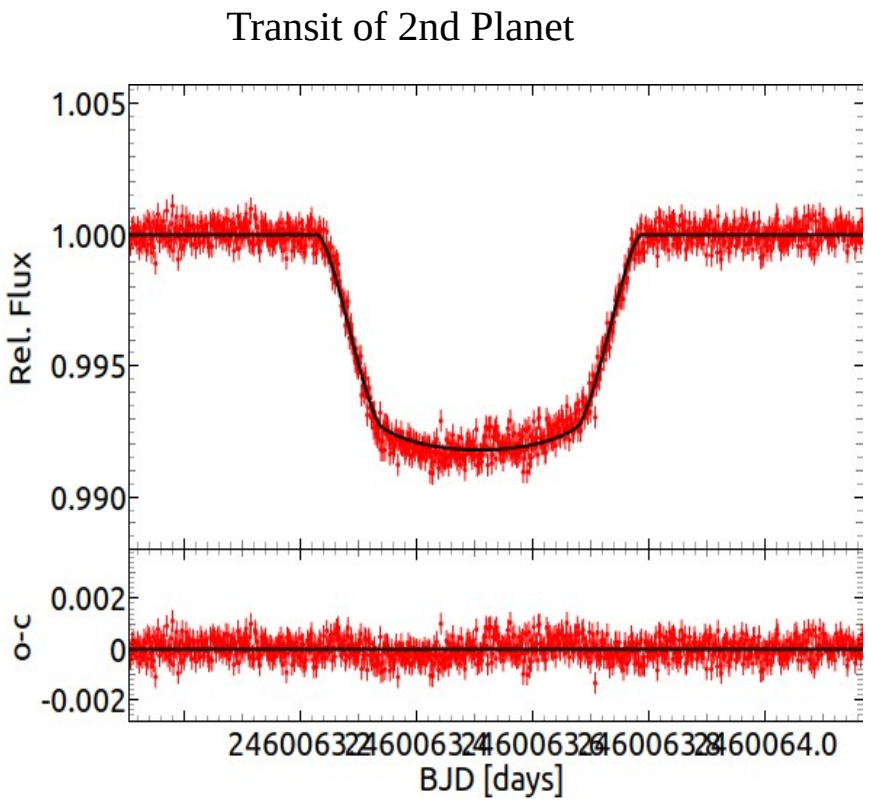


Planete b $P=423.701j$ $K=397.74m/s$ $e=0.456$ $M_{PI} \approx 14 M_{Jup}$

Star: F3V $1.47 M_{Sun}$, 95 pc, $V=8.2$ mag
15 Myr



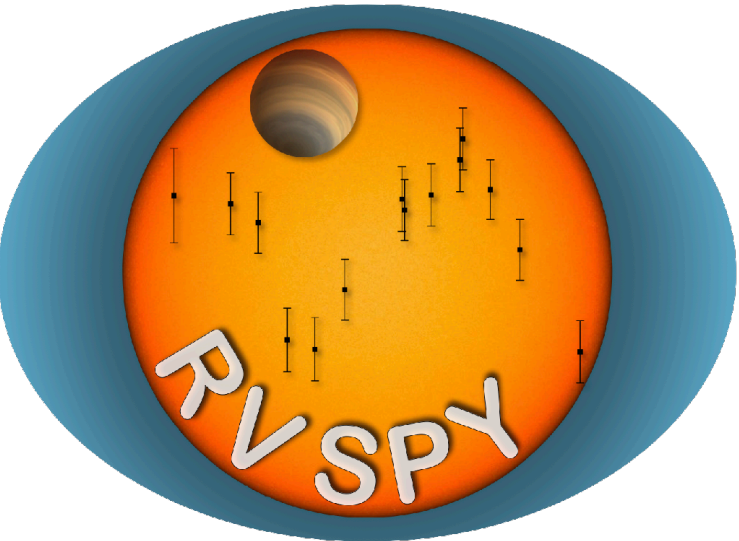
1st planet b:



$P \approx 424$ d, $M_{PI} \approx 13 M_{Jup}$

2nd planet c (fit not shown): $P \approx 209$ d, $M_{PI} \approx 6 M_{Jup}$

Early version!

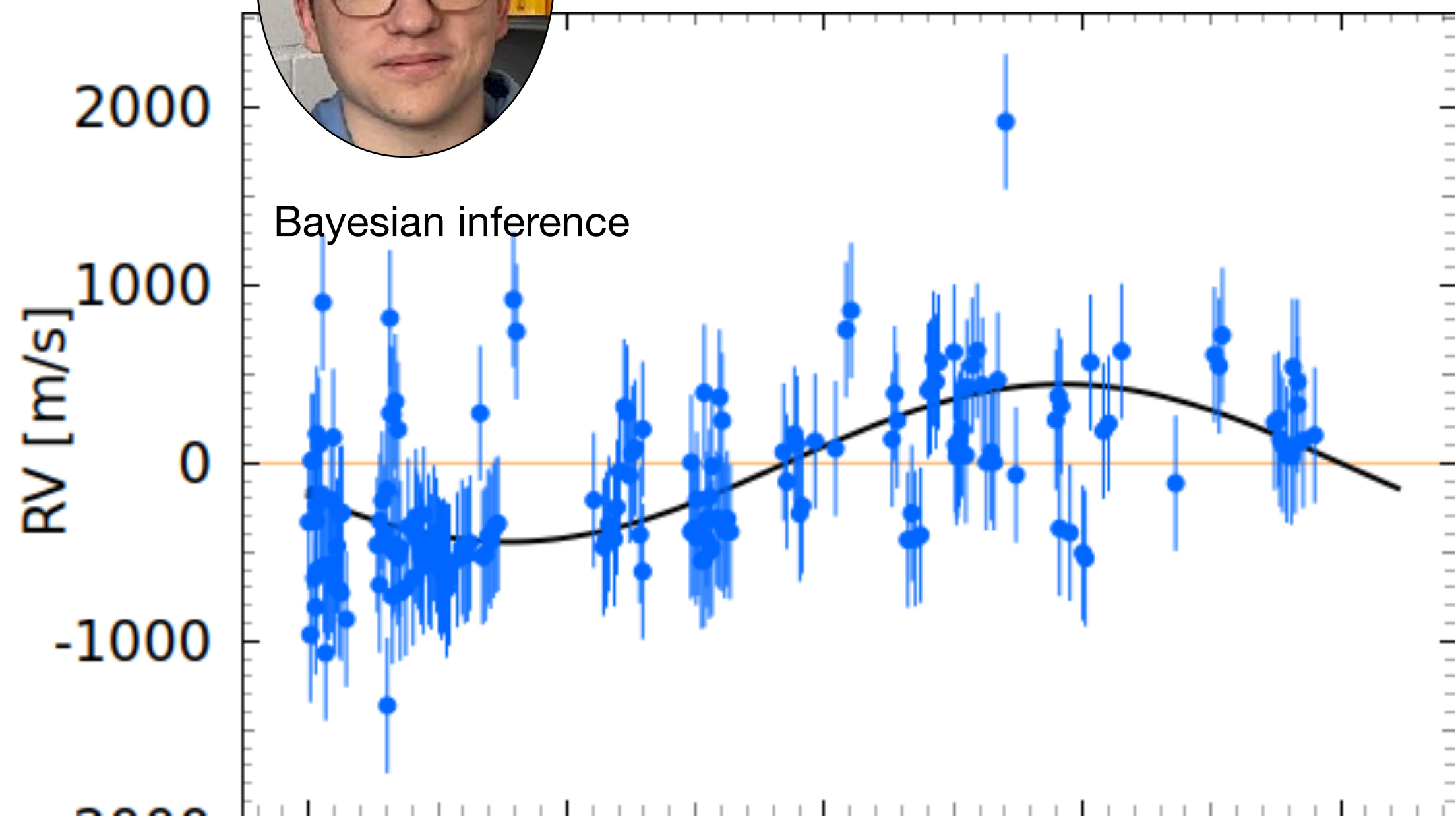


Radial Velocity Survey for Planets around Young Stars (RVSPY)

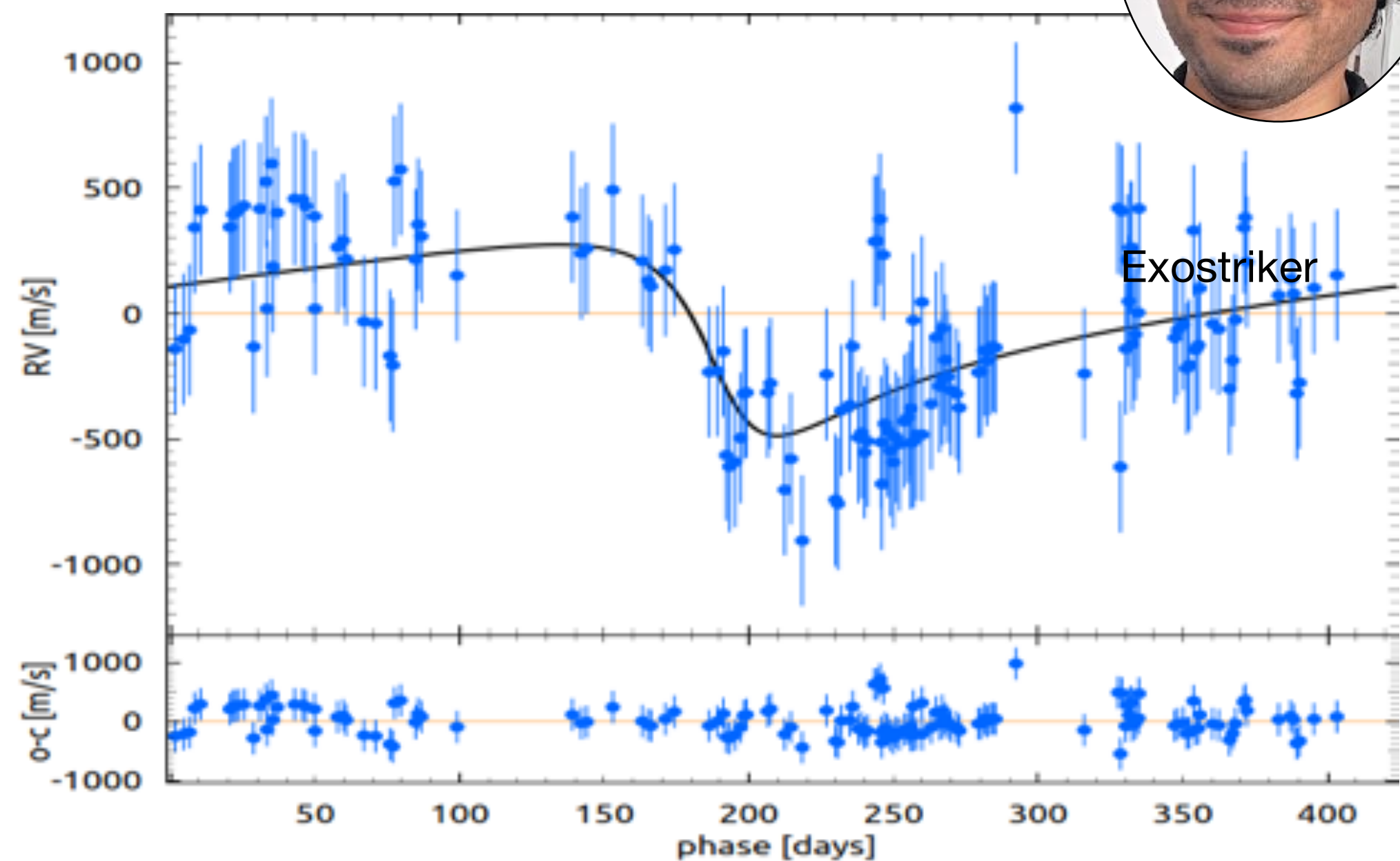
Orbit solution example with two different approaches



Star: F5 V, 1.32 M_{Sun} , 34 pc, $V=6.1$ mag, 2.0 Gyrs

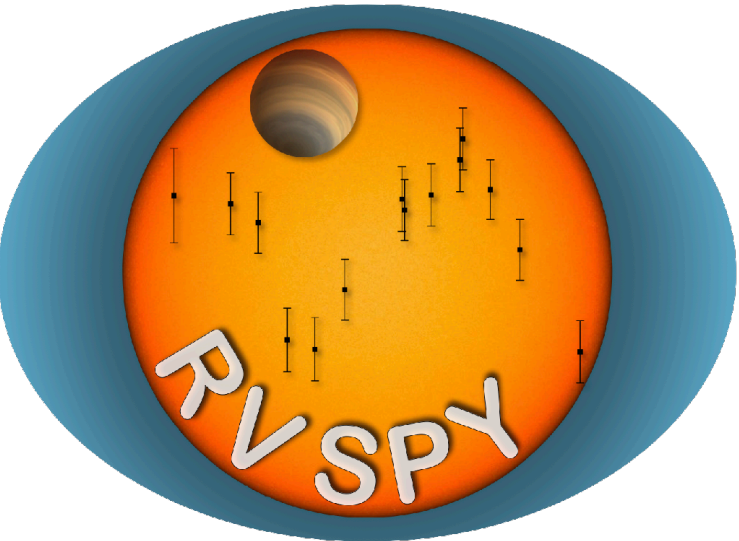


Cand. b: $P \sim 424$ d, $M_{\text{Pl}} \approx 13.5 M_{\text{Jup}}$
Cand. c: $P \sim 169$ d, $M_{\text{Pl}} \approx 9.2 M_{\text{Jup}}$



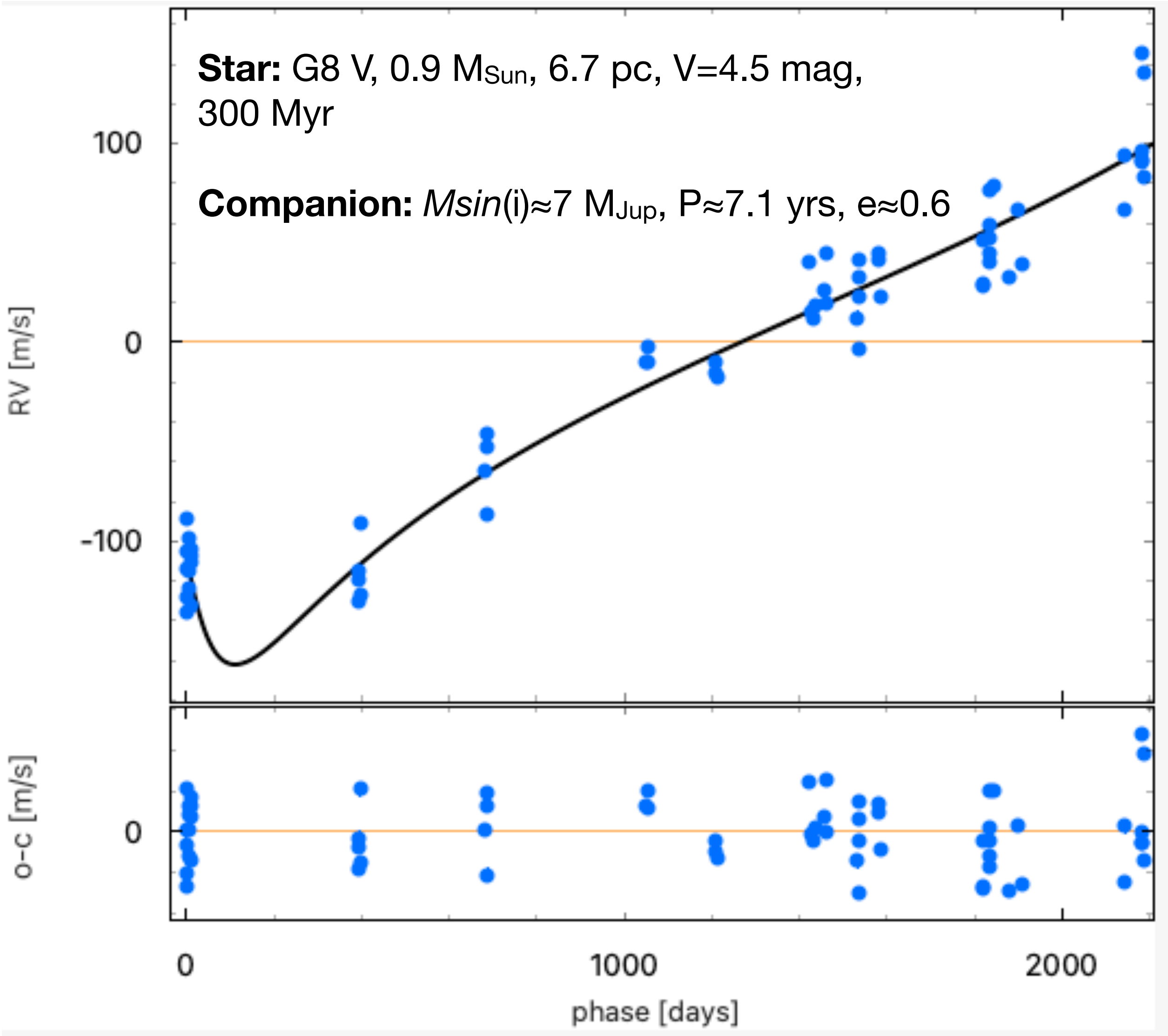
Cand. b: $P \sim 423$ d, $M_{\text{Pl}} \approx 15.1 M_{\text{Jup}}$
Cand. c: $P \sim 69$ d, $M_{\text{Pl}} \approx 3.9 M_{\text{Jup}}$

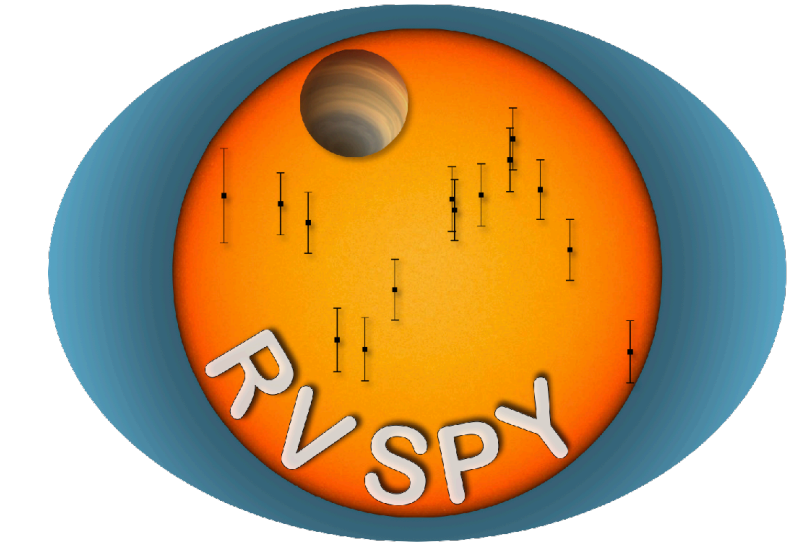
=> approx. Agreement on b (most significant)
Large discrepancy on c



Radial Velocity Survey for Planets around Young Stars (RVSPY)

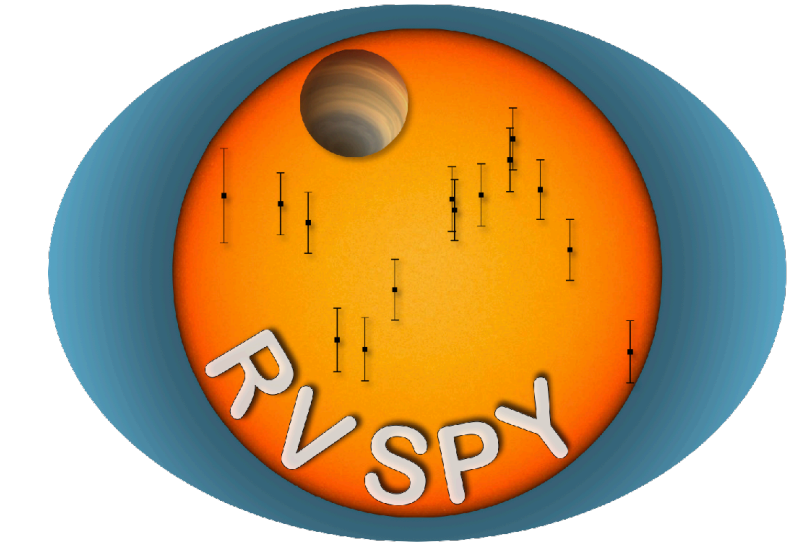
Orbit solution example





Radial **V**elocity **S**urvey for **P**lanets around **Y**oung Stars (**RVSPY**)

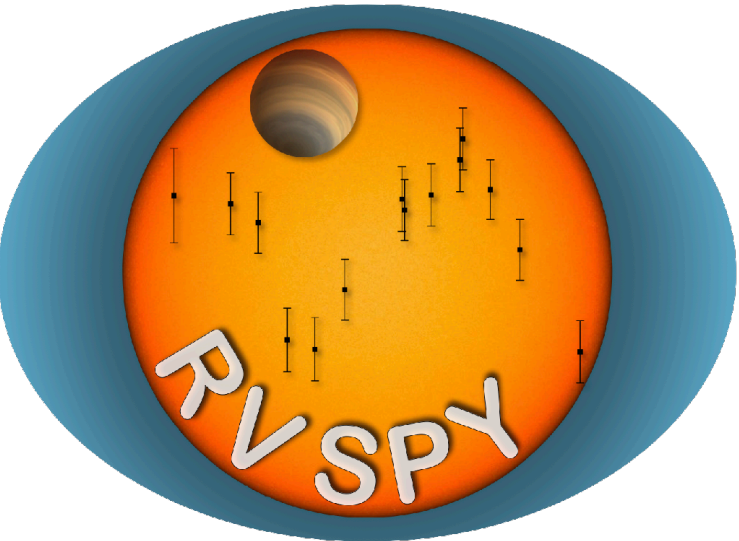
Conclusions:



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1. Our 1 + 3 stages strategy was a good decision!
2. The early enthusiasm about how we came closer to success, was a good motivation to continue along this line.
3. The “Lessons learned” were important!
4. Young and active stars remain highly problematic, and before careful analysis of activity indicators, detections must not be claimed!
5. We definitely still underestimated the difficulties and the effort it takes, to deal with them. 
6. It was still the only systematic attempt to search for planets around young stars world wide (to my knowledge)
7. The survey is still on-going to follow up five long-period cc: (~7 to ~25 yrs)

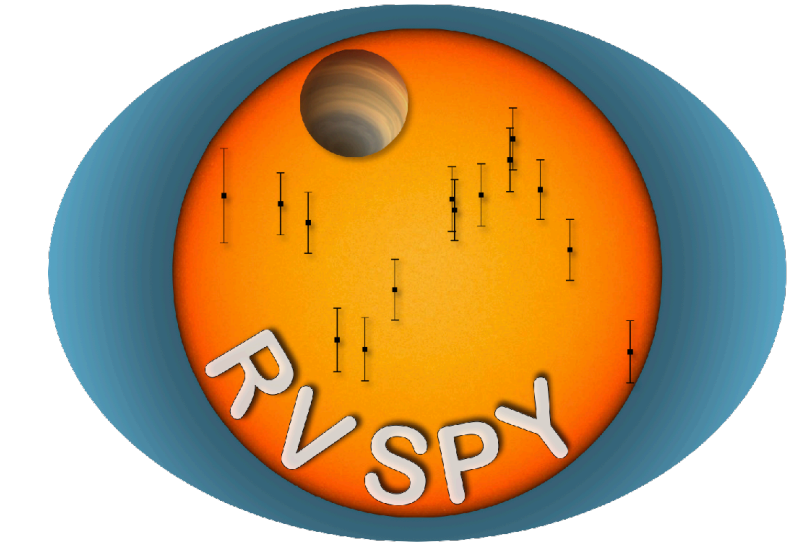


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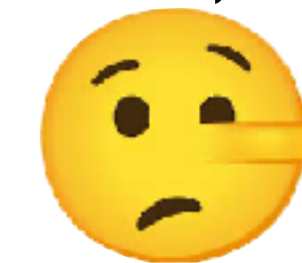
8. **Radial **V**elocity **S**urvey for **P**lanets around **Y**oung Stars (**RVSPY**)**
How the lessons learned paved the road to success



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How the lessons learned paved the road to, at least, a little success