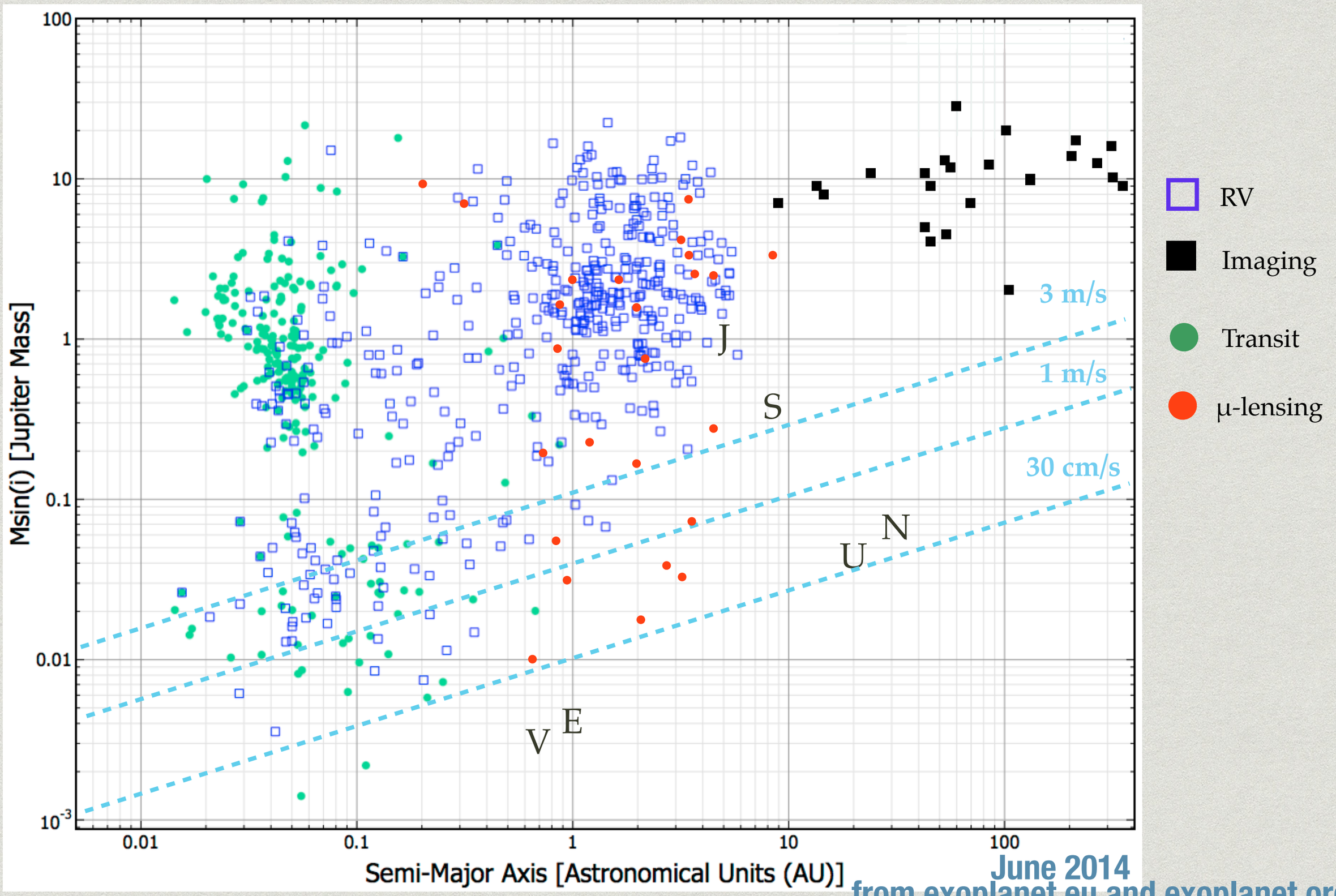
THE FIRST RADIAL VELOCITY MEASUREMENTS OF A MICROLENSING EVENT: NO EVIDENCE FOR THE PREDICTED BINARY

I. BOISSE, A. SANTERNE, J.-P. BEAULIEU, W. FAKHARDJI, N.C. SANTOS, P. FIGUEIRA, S. SOUSA, C. RANC

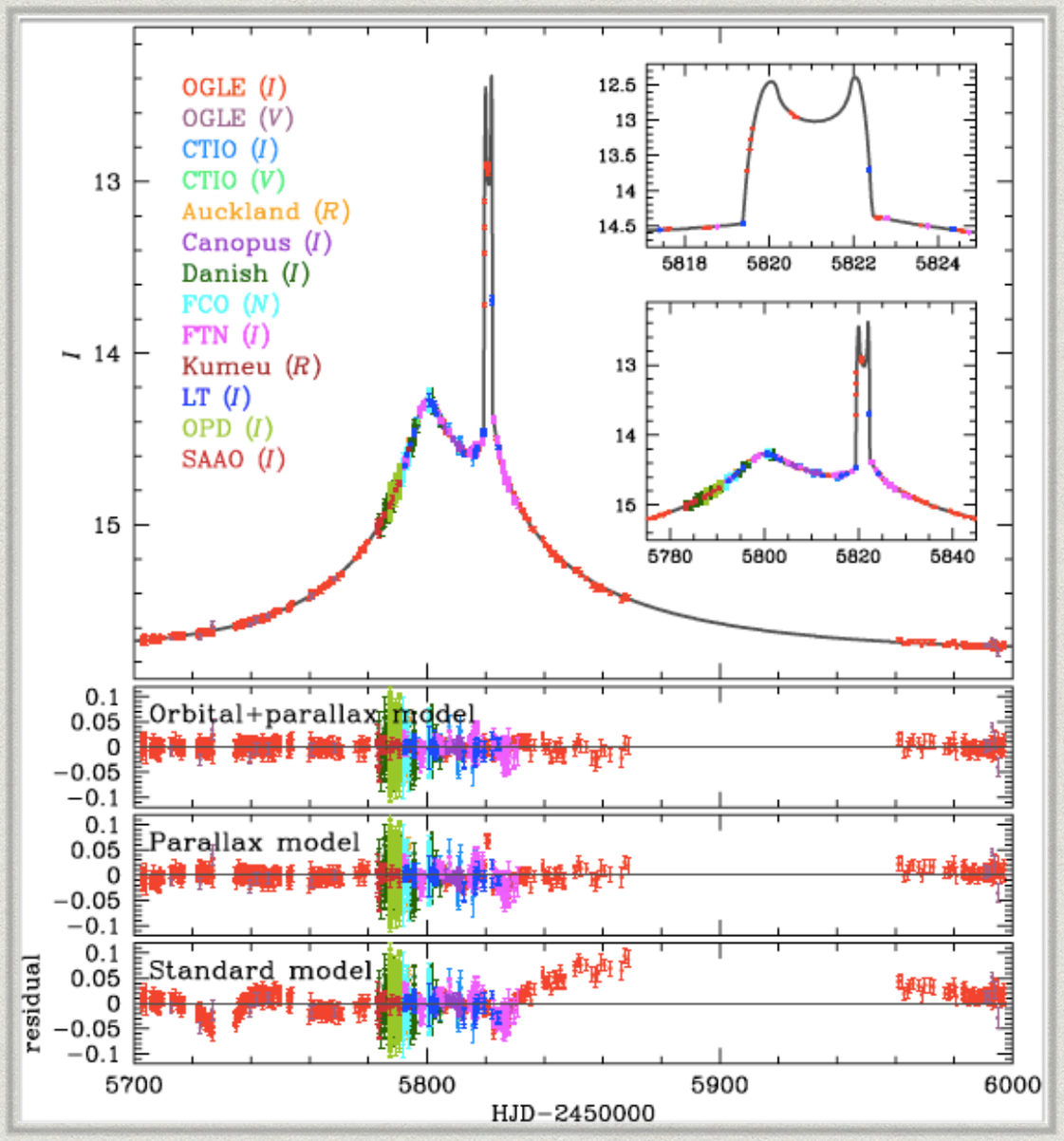
A&A LETTER, 2015

Introduction



June 2014
from exoplanet.eu and exoplanet.org

OGLE-2011-BLG-0417

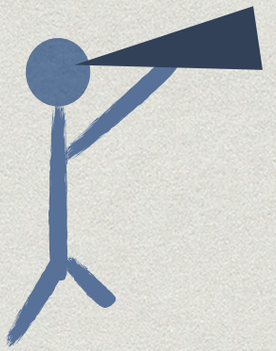


Binary system

Shin et al. 2012

OGLE-2011-BLG-0417

- Characteristics



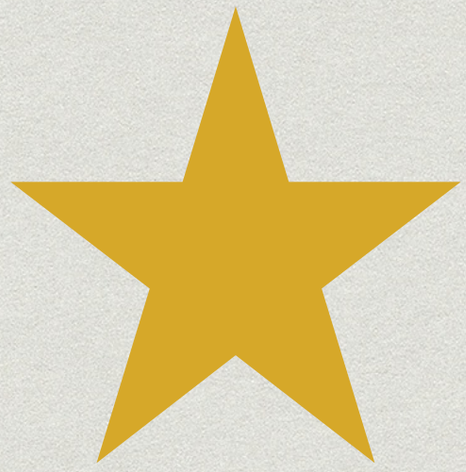
Lens

binary M dwarfs

0.95 kpc

I = 16.3

V = 18.23



Source

K3 red giant

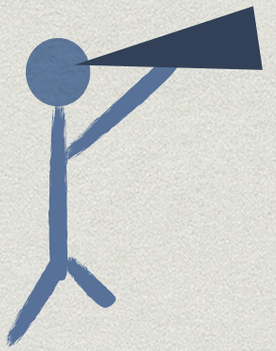
8 kpc

I = 16.74

V = 19.42

OGLE-2011-BLG-0417

- Characteristics



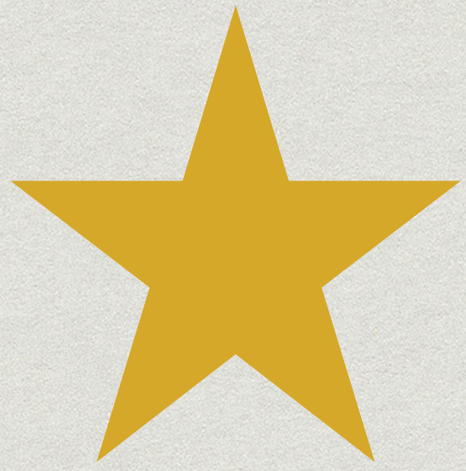
Lens

binary M dwarfs

0.95 kpc

I = 16.3

V = 18.23



Source

K3 red giant

8 kpc

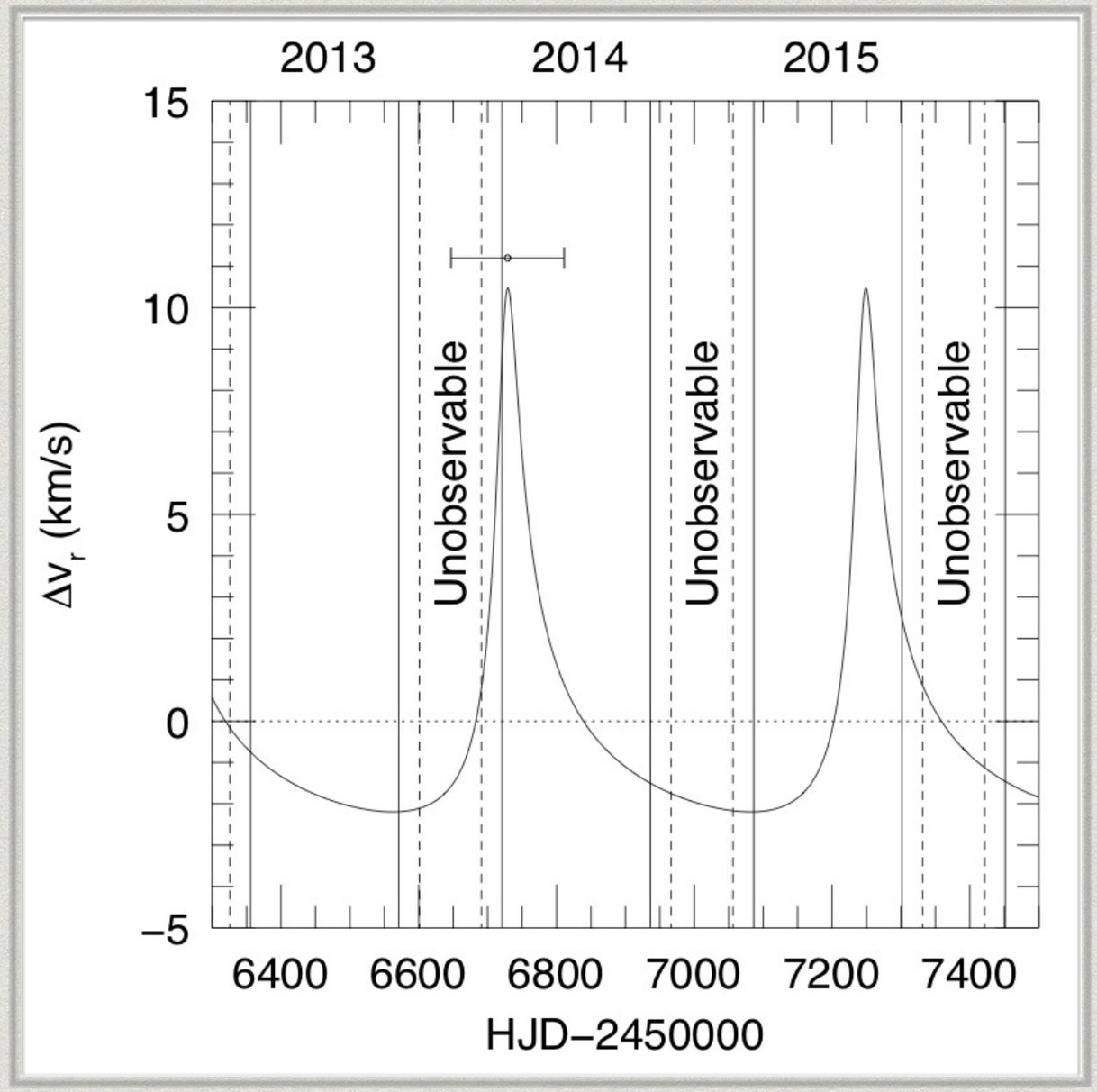
I = 16.74

V = 19.42

Brighter lens !!

OGLE-2011-BLG-0417

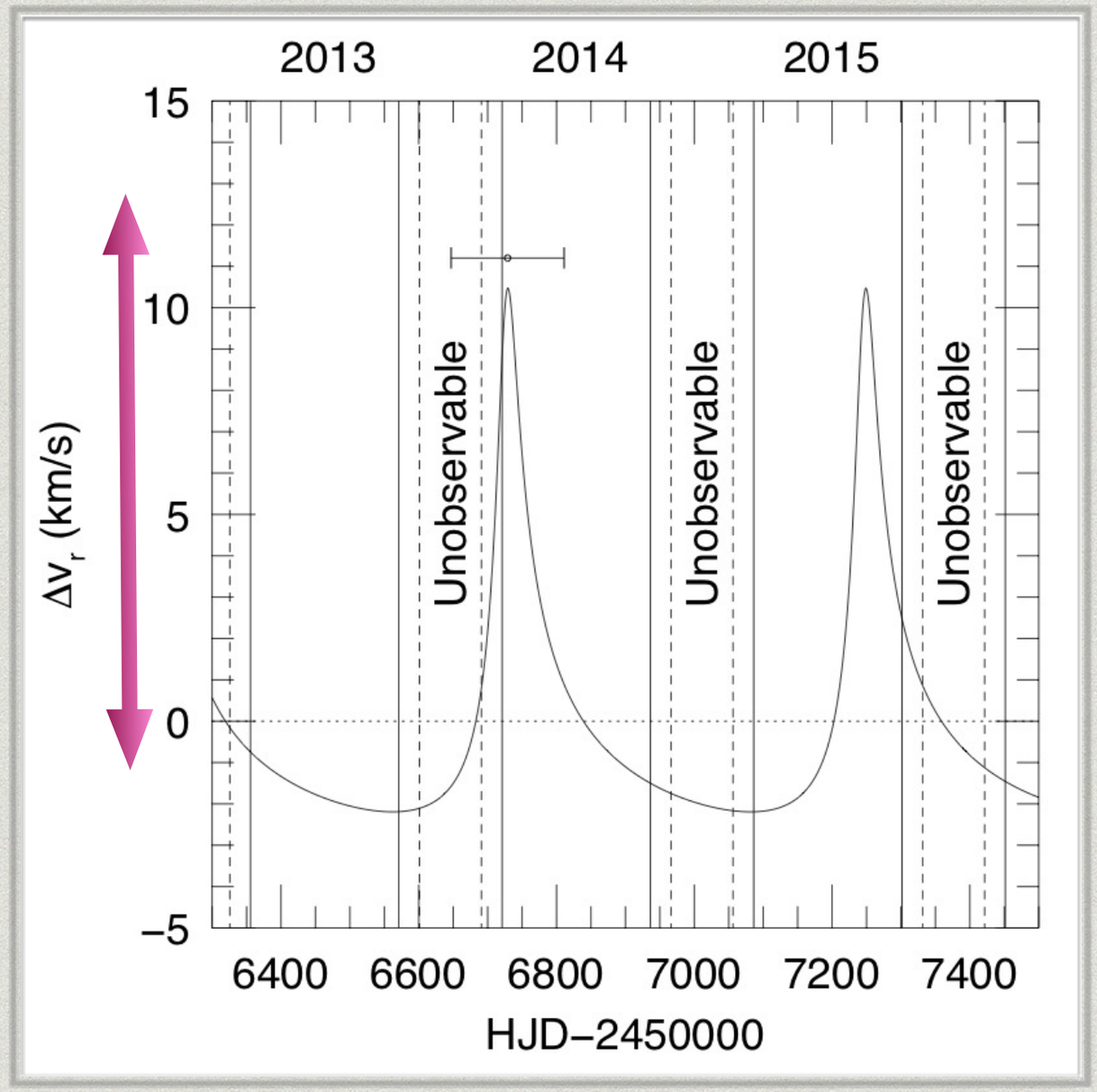
Predicted RV curve **Gould et al. 2013**



OGLE-2011-BLG-0417

Predicted RV curve **Gould et al. 2013**

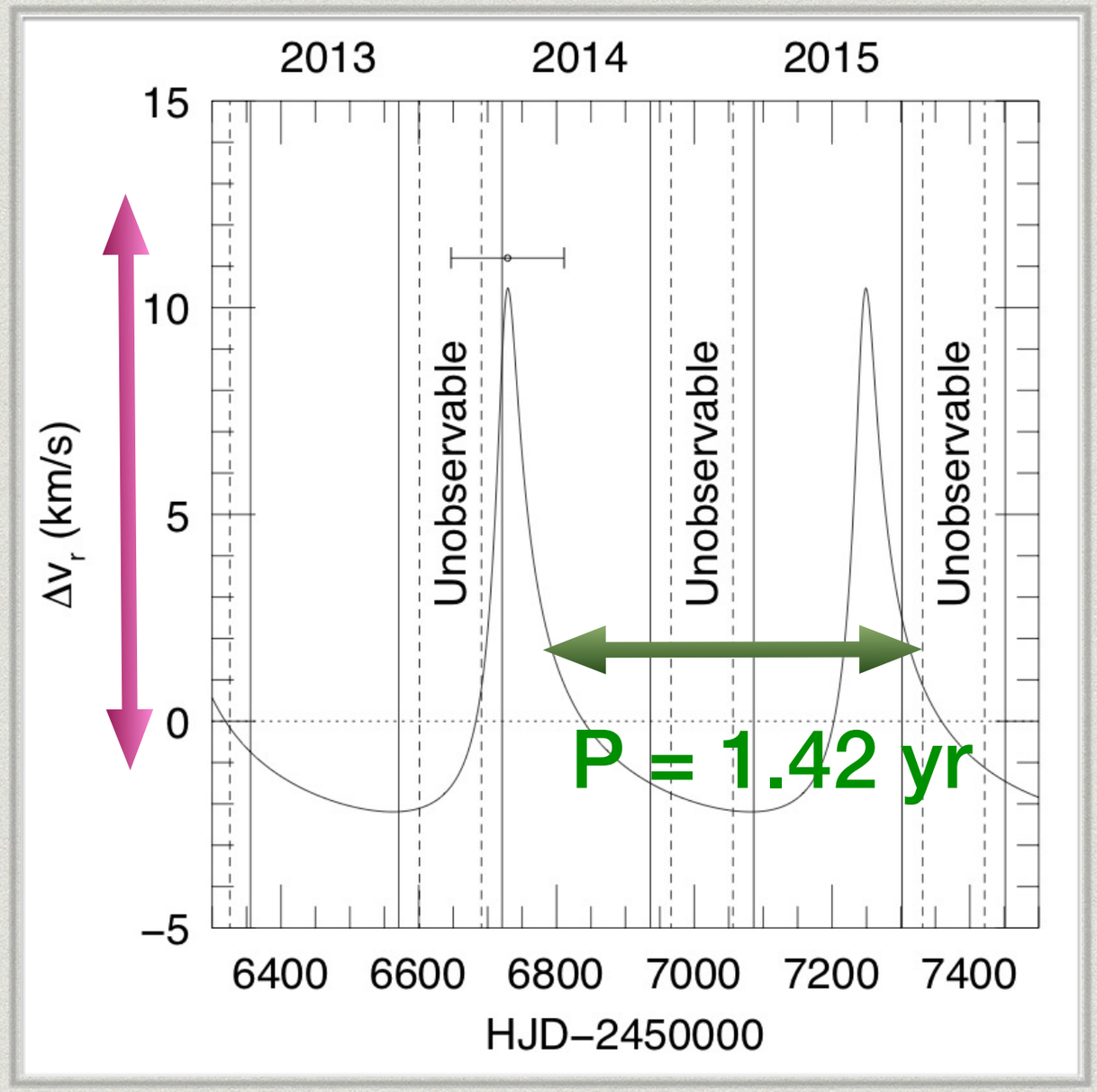
Several km/s



OGLE-2011-BLG-0417

Predicted RV curve **Gould et al. 2013**

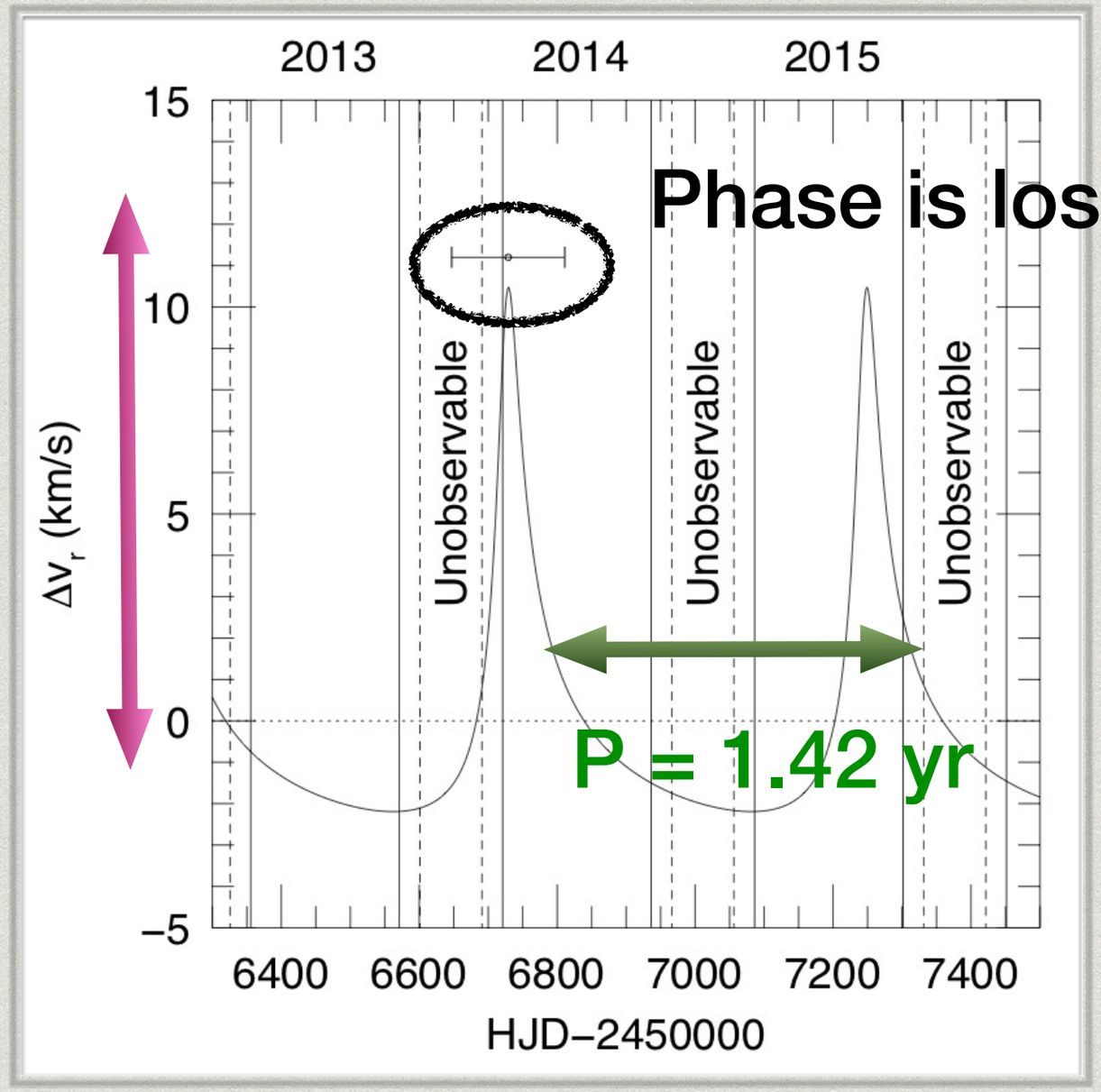
Several km/s



OGLE-2011-BLG-0417

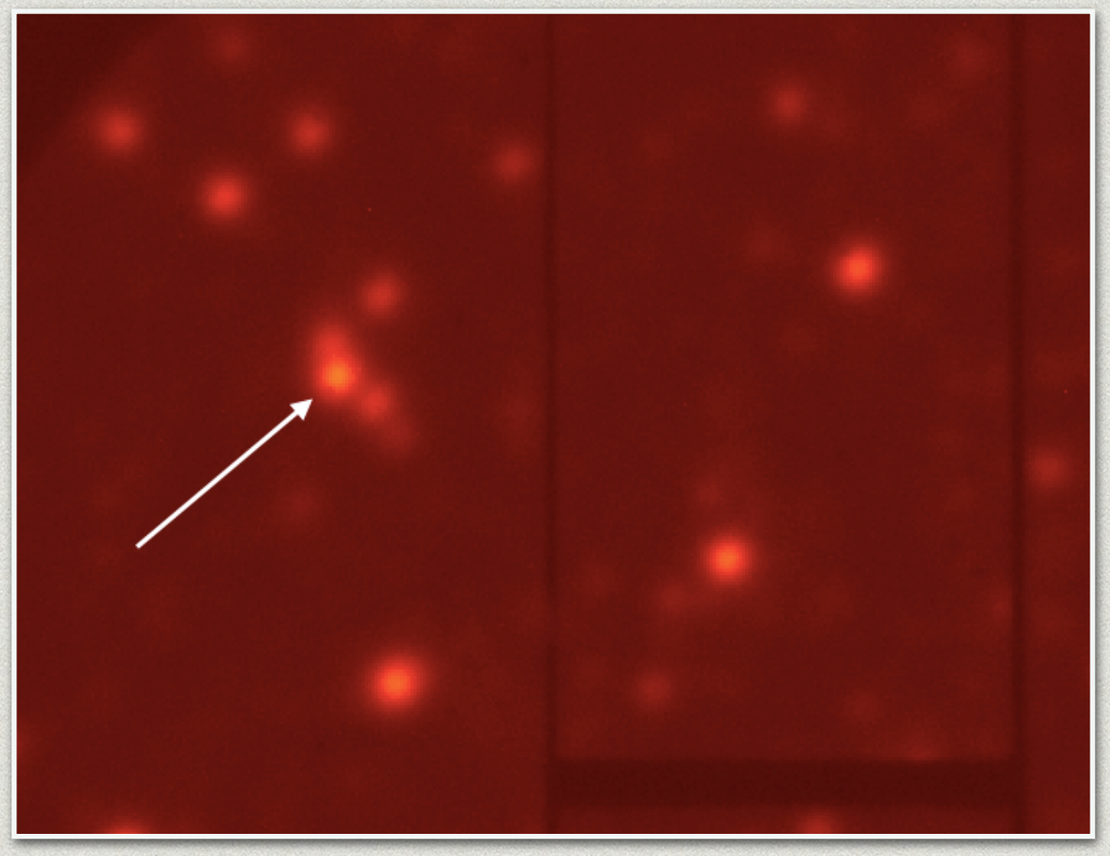
Predicted RV curve — Gould et al. 2013

Several km/s



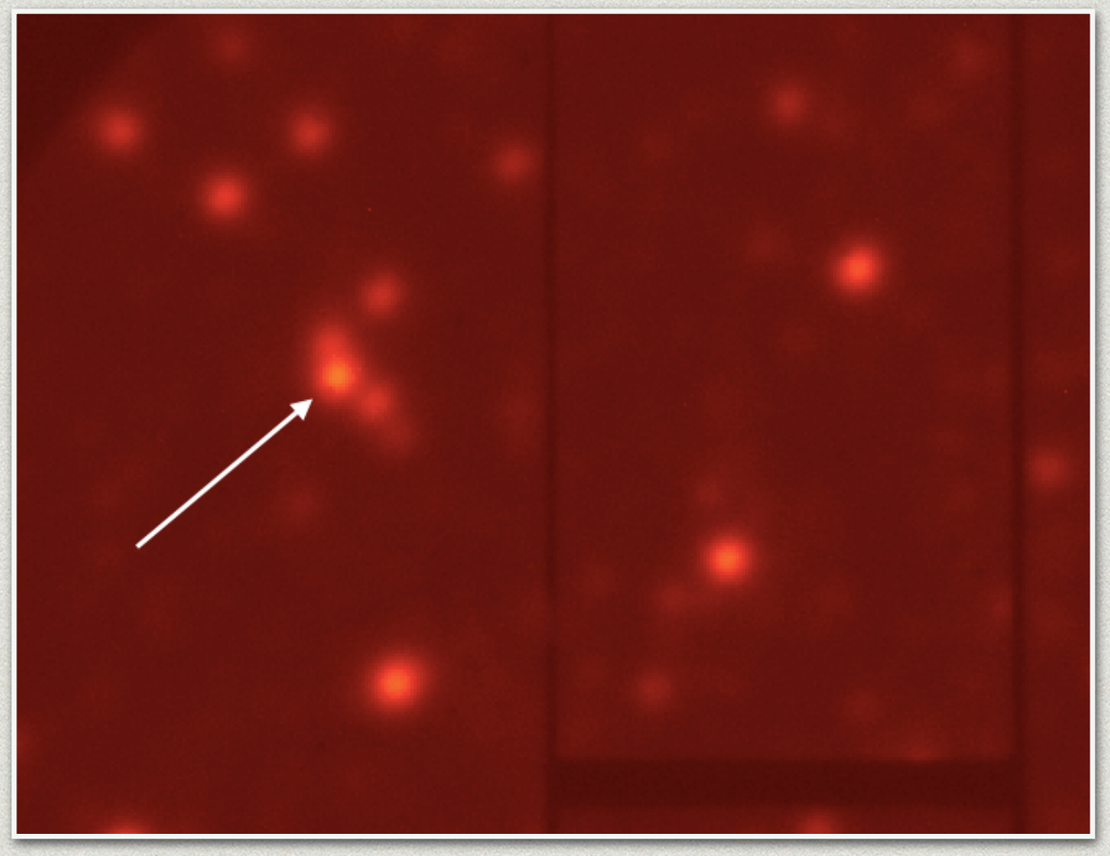
Observations

- UVES @ VLT, ESO



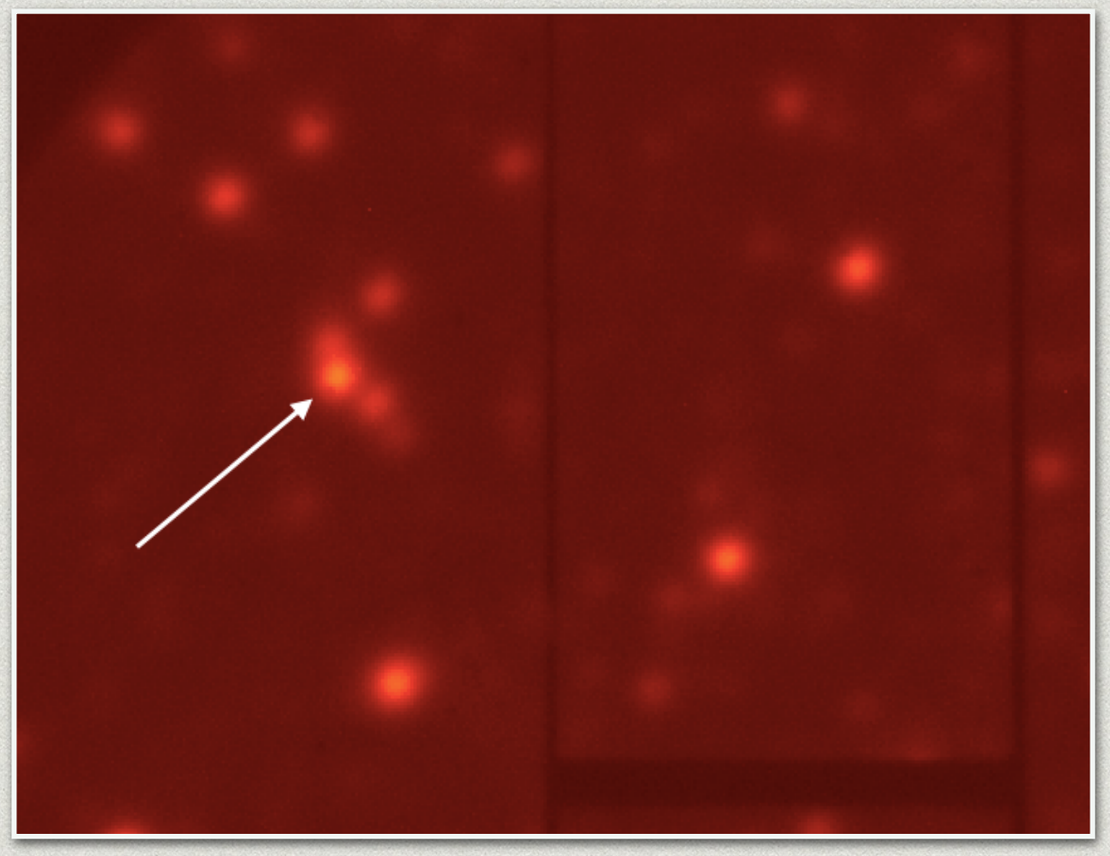
Observations

- UVES @ VLT, ESO
- Crowded field



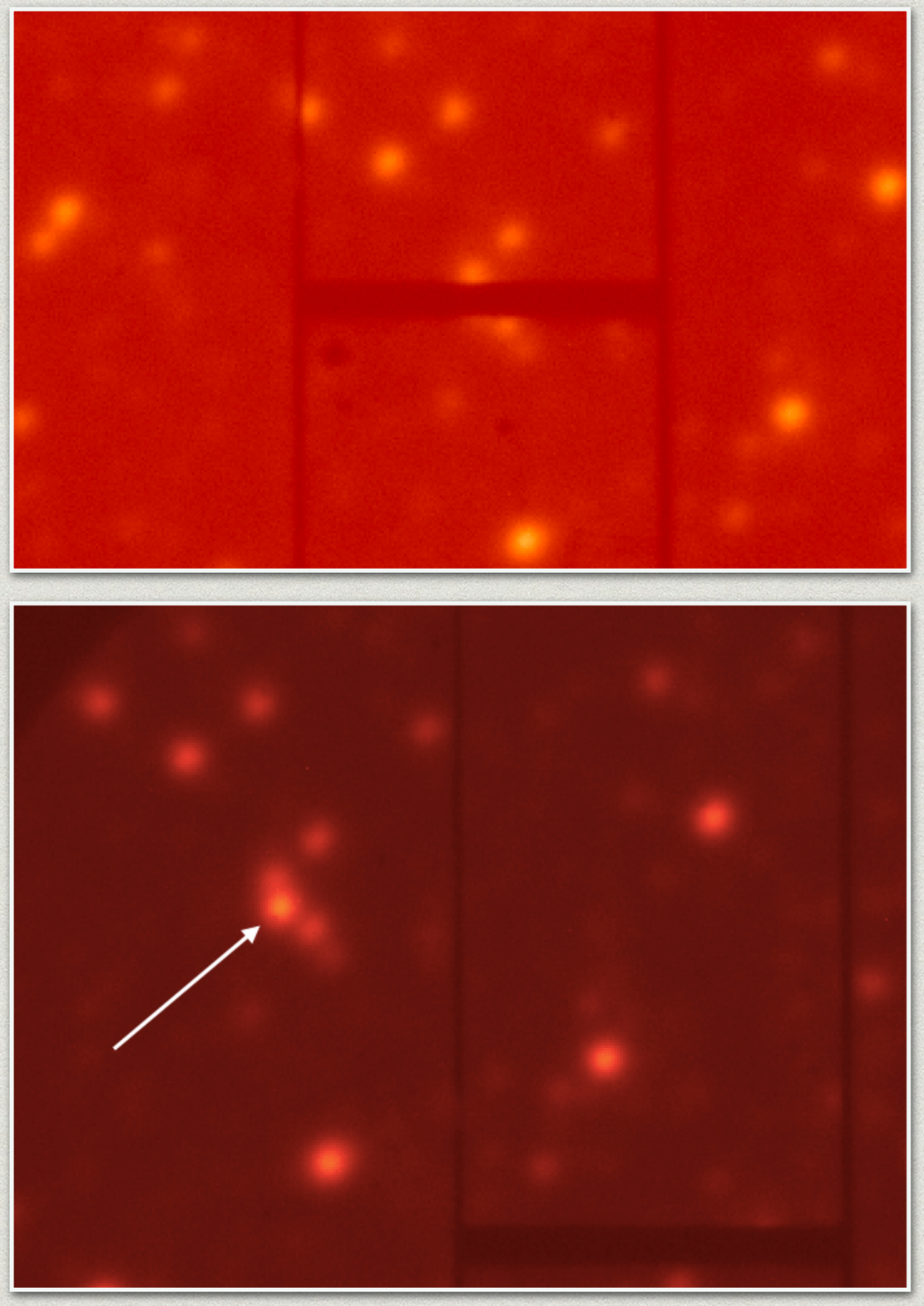
Observations

- UVES @ VLT, ESO
- Crowded field
- 10 spectra of ~1h
- SNR ~ 20 (550nm)



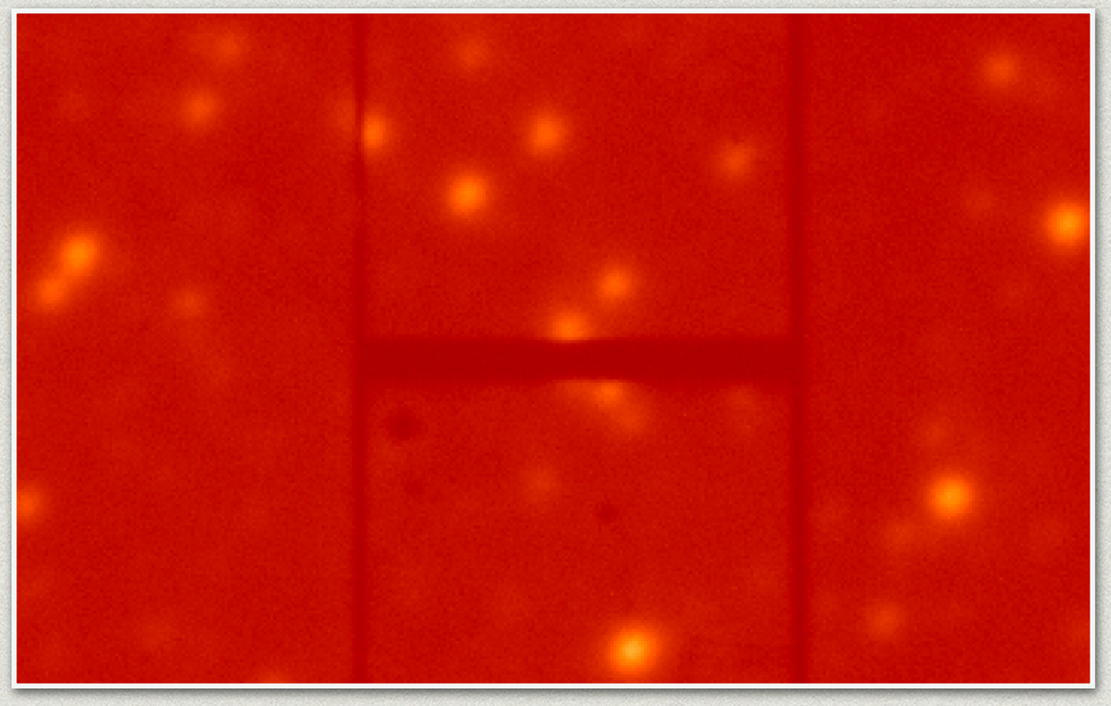
Observations

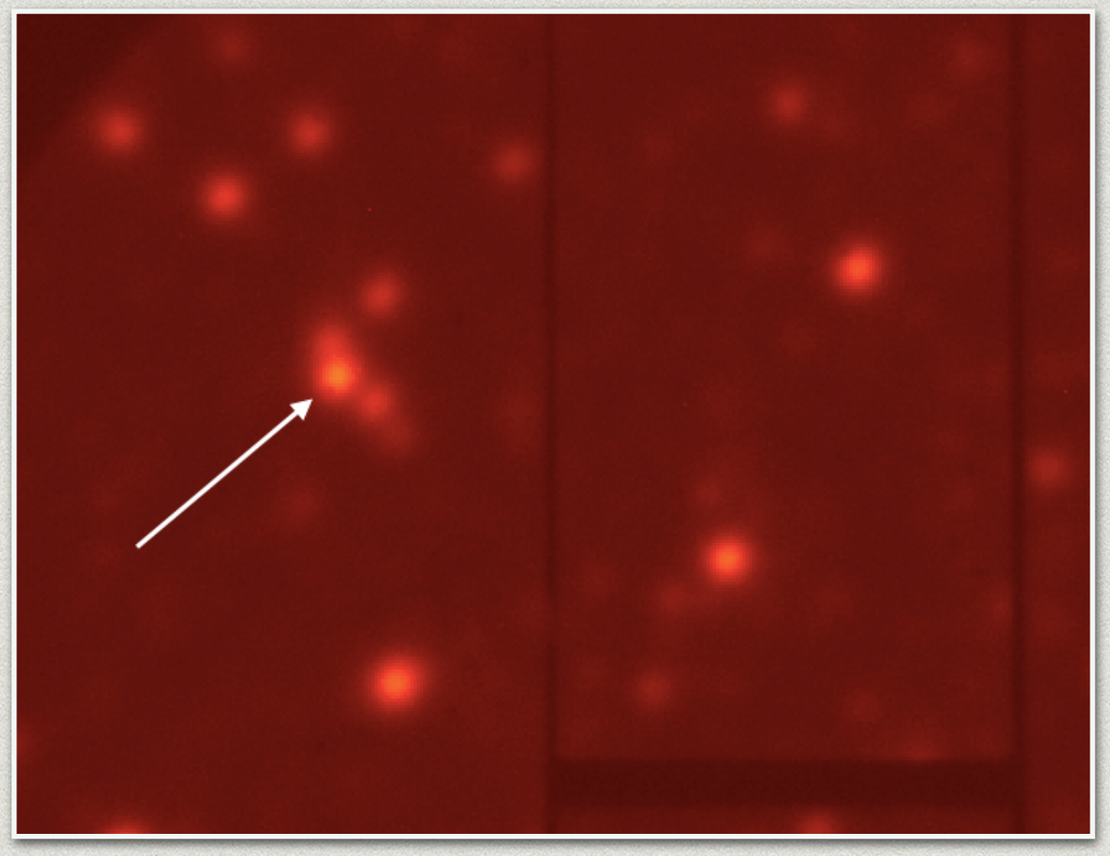
- UVES @ VLT, ESO
- Crowded field
- 10 spectra of ~1h
- SNR ~ 20 (550nm)
- 1” slit: R~40 000



Observations

- UVES @ VLT, ESO
- Crowded field
- 10 spectra of ~1h
- SNR ~ 20 (550nm)
- 1” slit: R~40 000
- Th-Ar calib before and after exposures





Data reduction

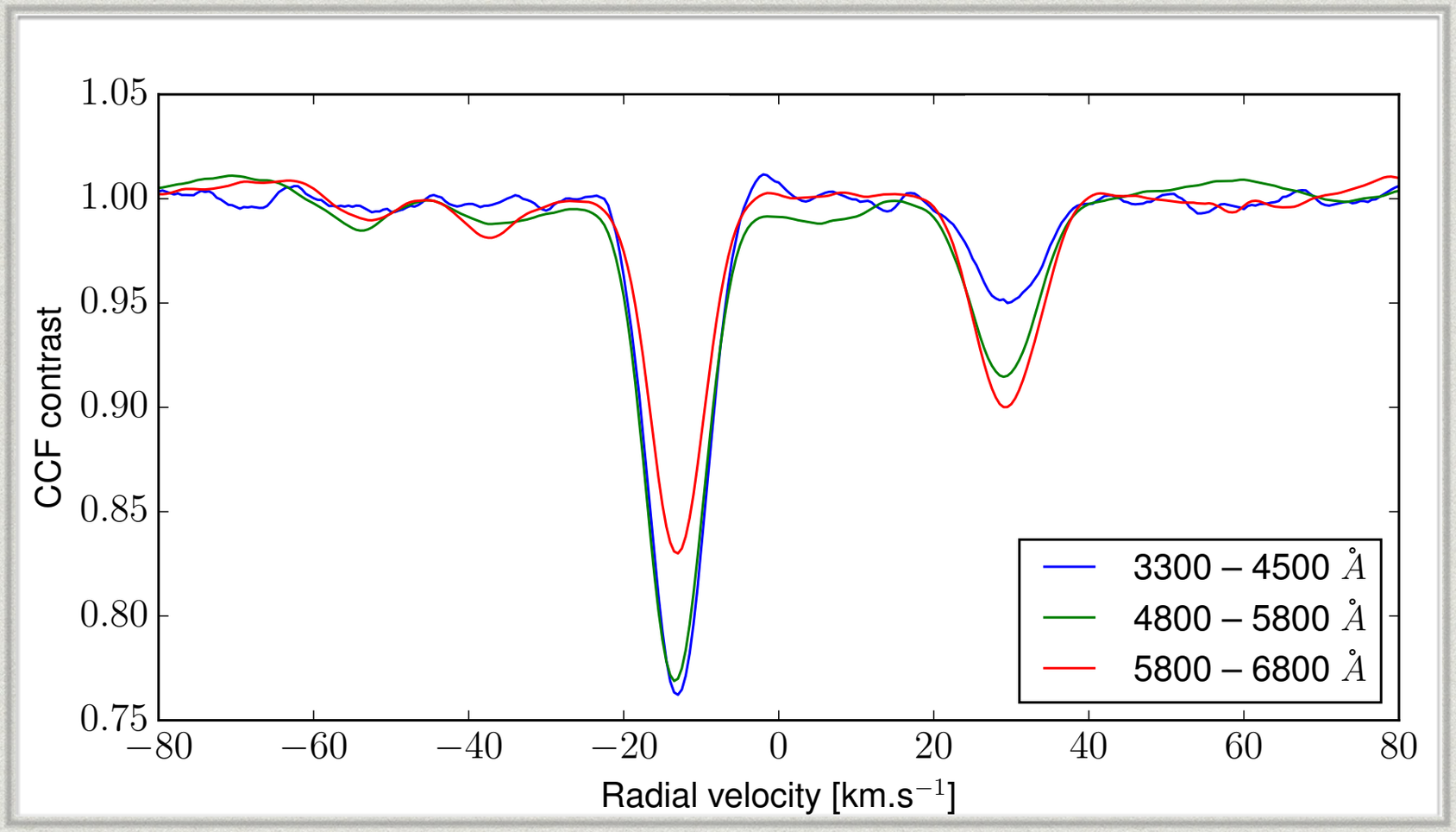
- Reduced with Reflex (ESO)

Data reduction

- Reduced with Reflex (ESO)
- CCF with K5 mask

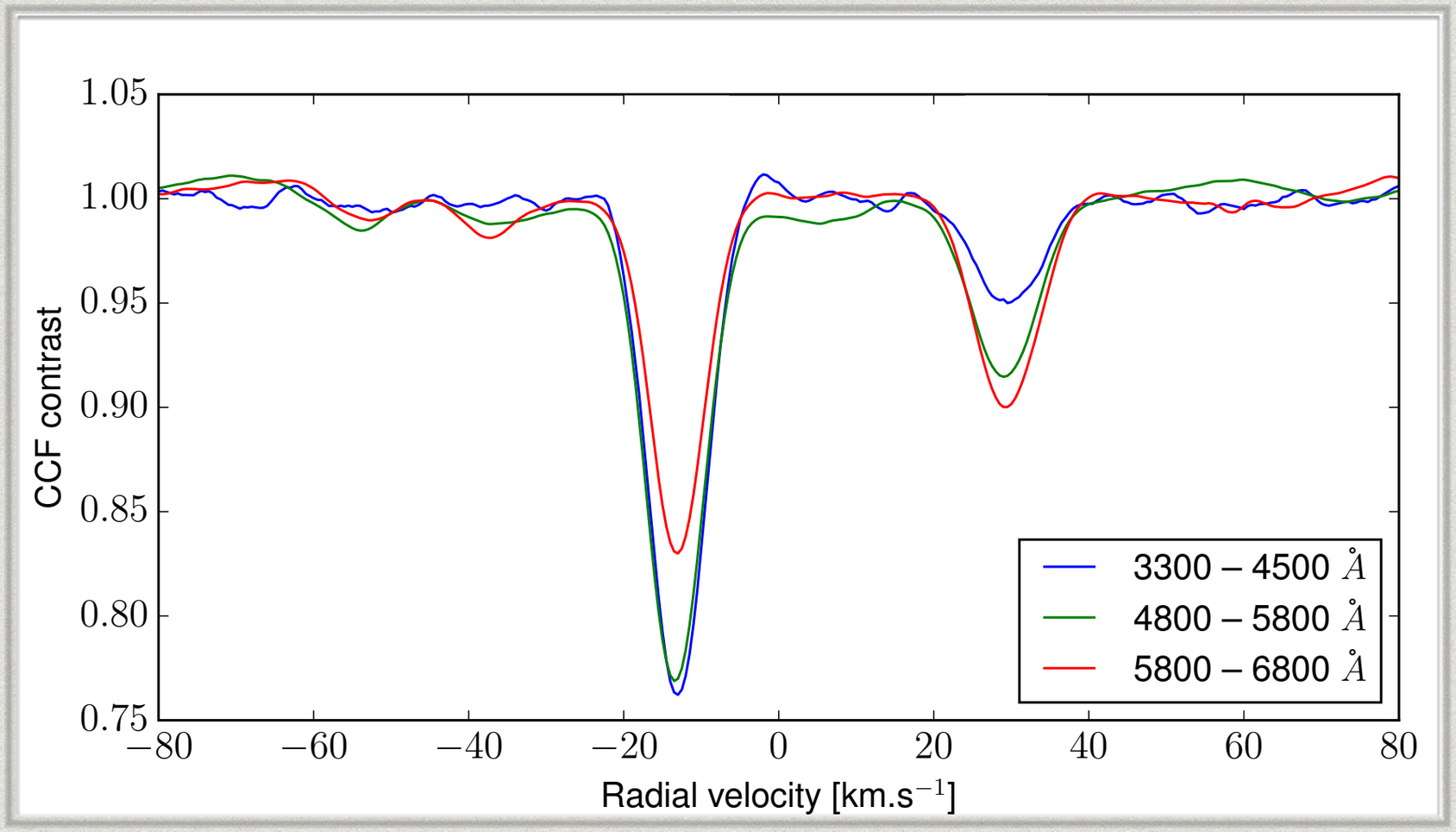
Data reduction

- Reduced with Reflex (ESO)
- CCF with K5 mask



Data reduction

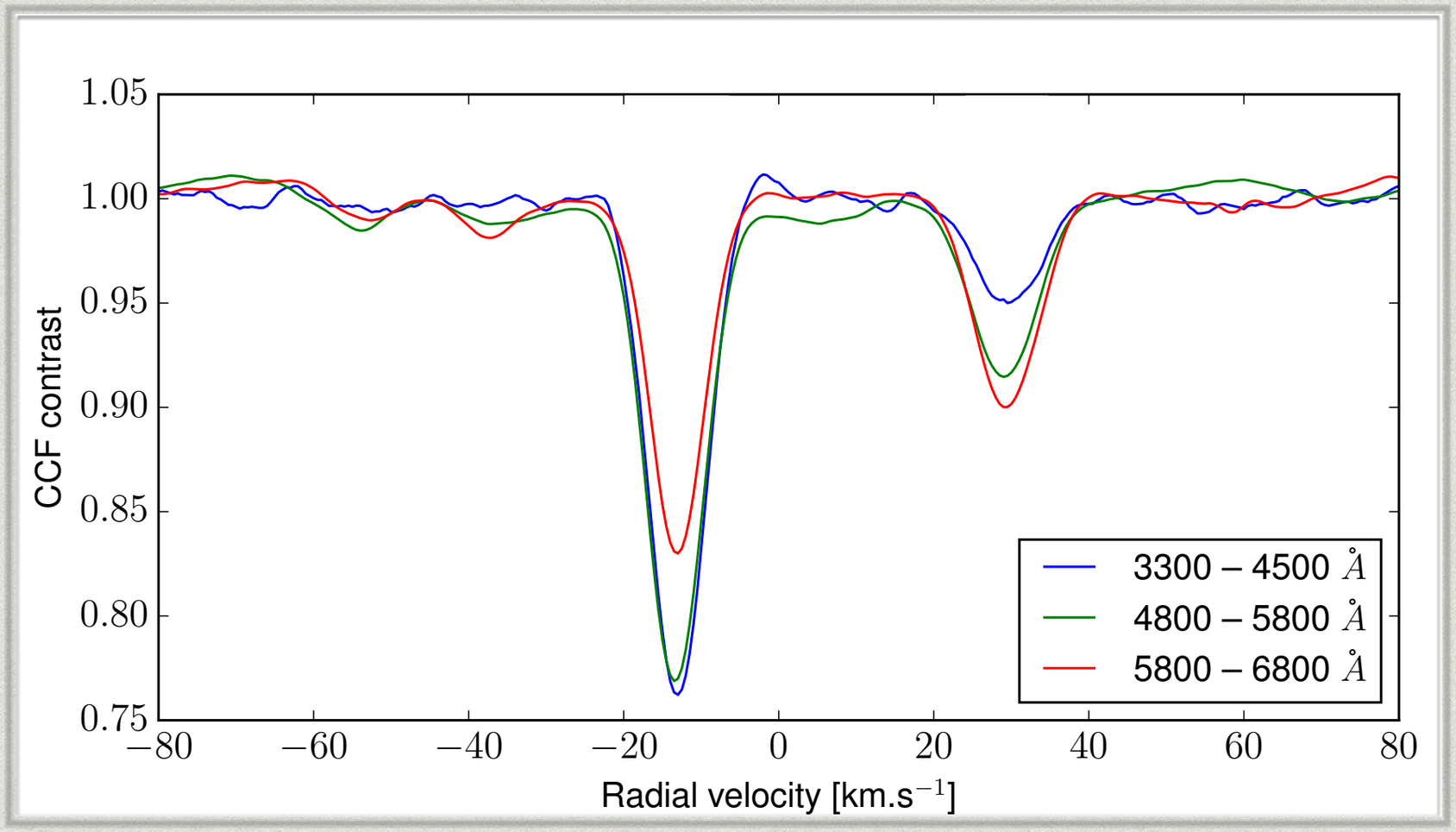
- Reduced with Reflex (ESO)
- CCF with K5 mask



- $(V\text{-}I)_{lens} = 1.93$; $(V\text{-}I)_{source} = 2.68$

Data reduction

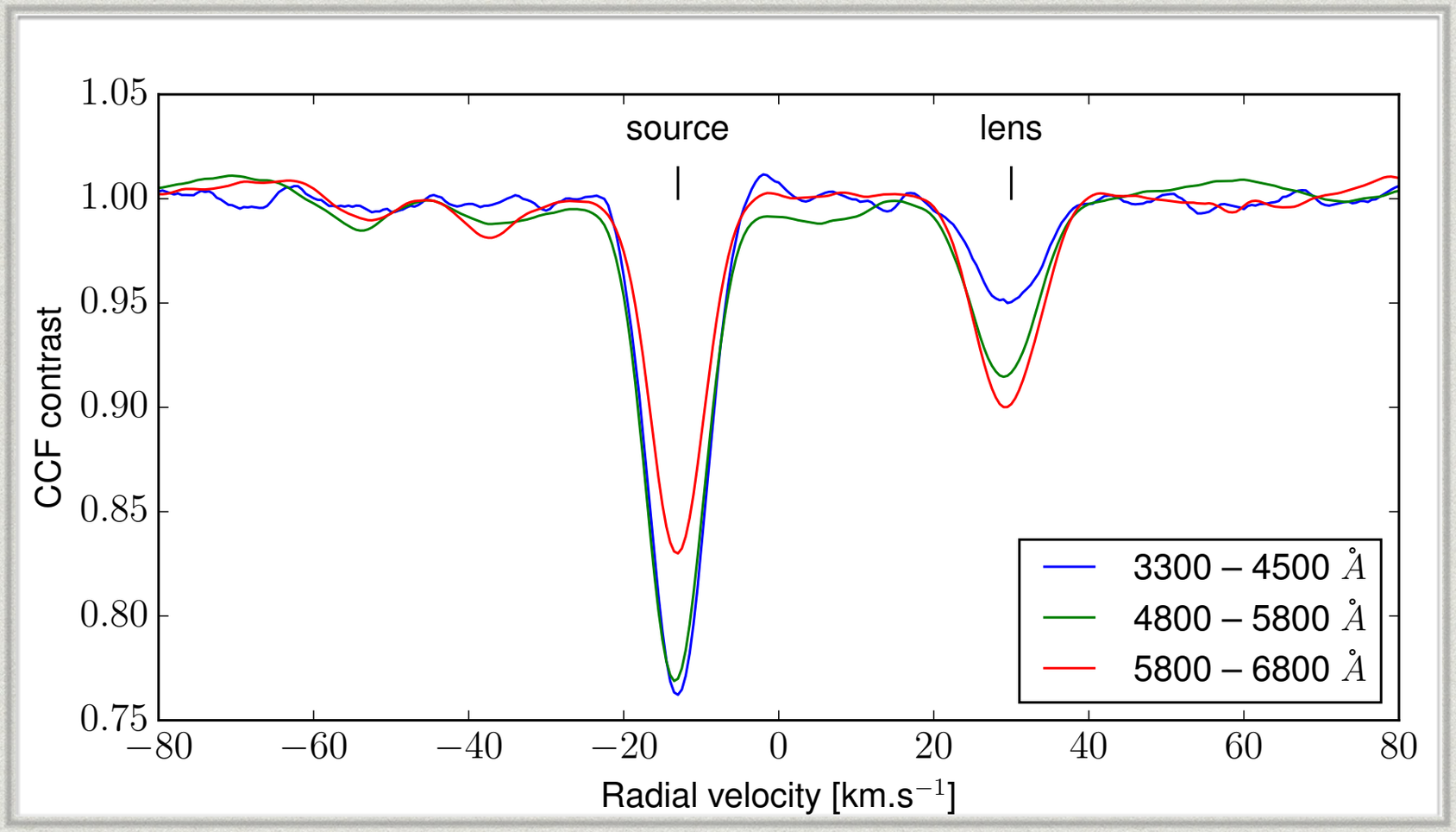
- Reduced with Reflex (ESO)
- CCF with K5 mask



- $(V\text{-}I)_{lens} = 1.93$; $(V\text{-}I)_{source} = 2.68$ → Bluer source

Data reduction

- Reduced with Reflex (ESO)
- CCF with K5 mask



- $(V\text{-}I)_{lens} = 1.93$; $(V\text{-}I)_{source} = 2.68$ → Bluer source

Data reduction

- Corrected from BERV

Data reduction

- Corrected from BERV
- Corrected from spectrograph drift (15 to 400 m/s in 1 h)

Data reduction

- Corrected from BERV
- Corrected from spectrograph drift (15 to 400 m/s in 1 h)

But Variation of the illumination of the slit

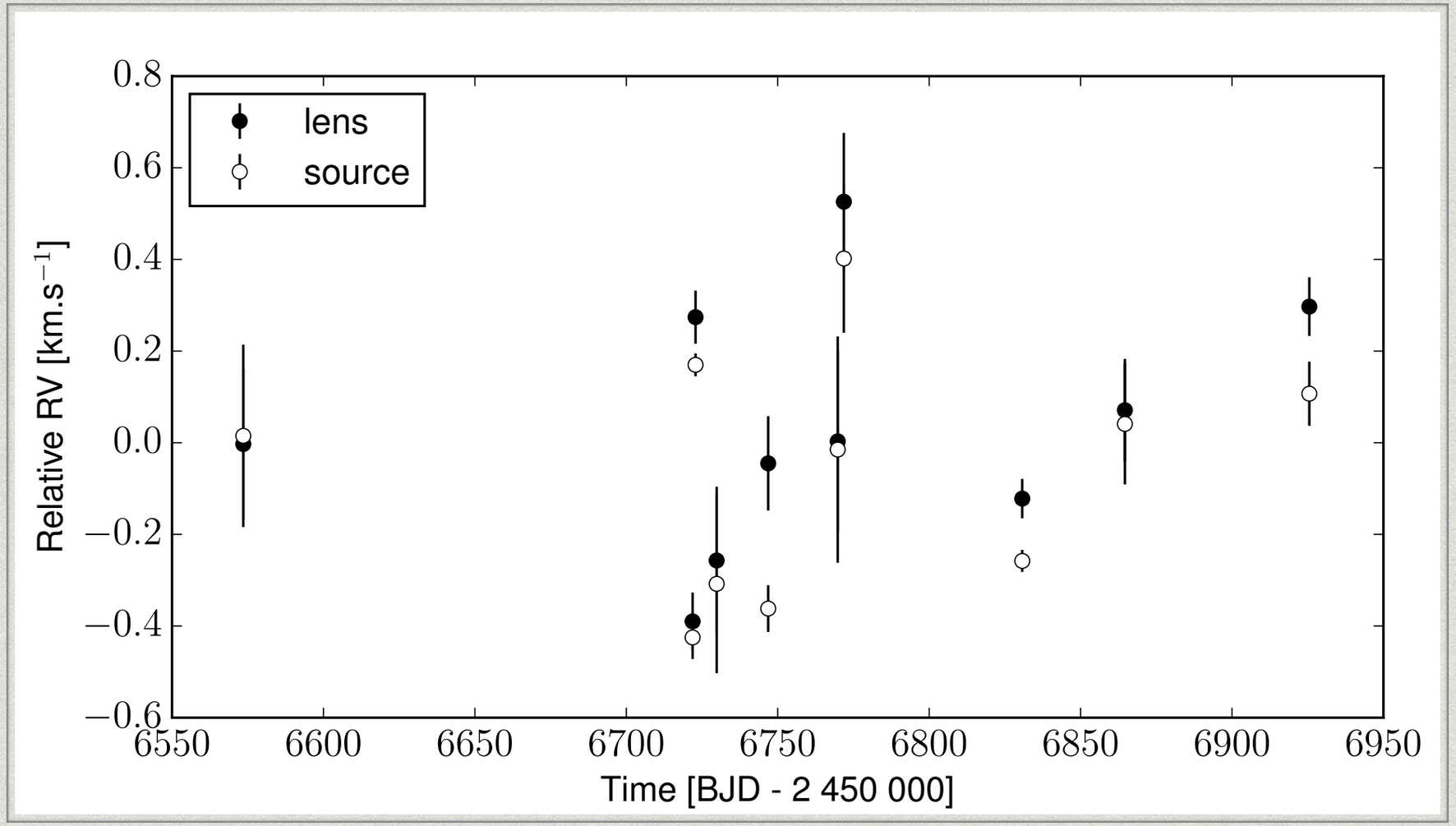
Data reduction

- Corrected from BERV
- Corrected from spectrograph drift (15 to 400 m/s in 1 h)

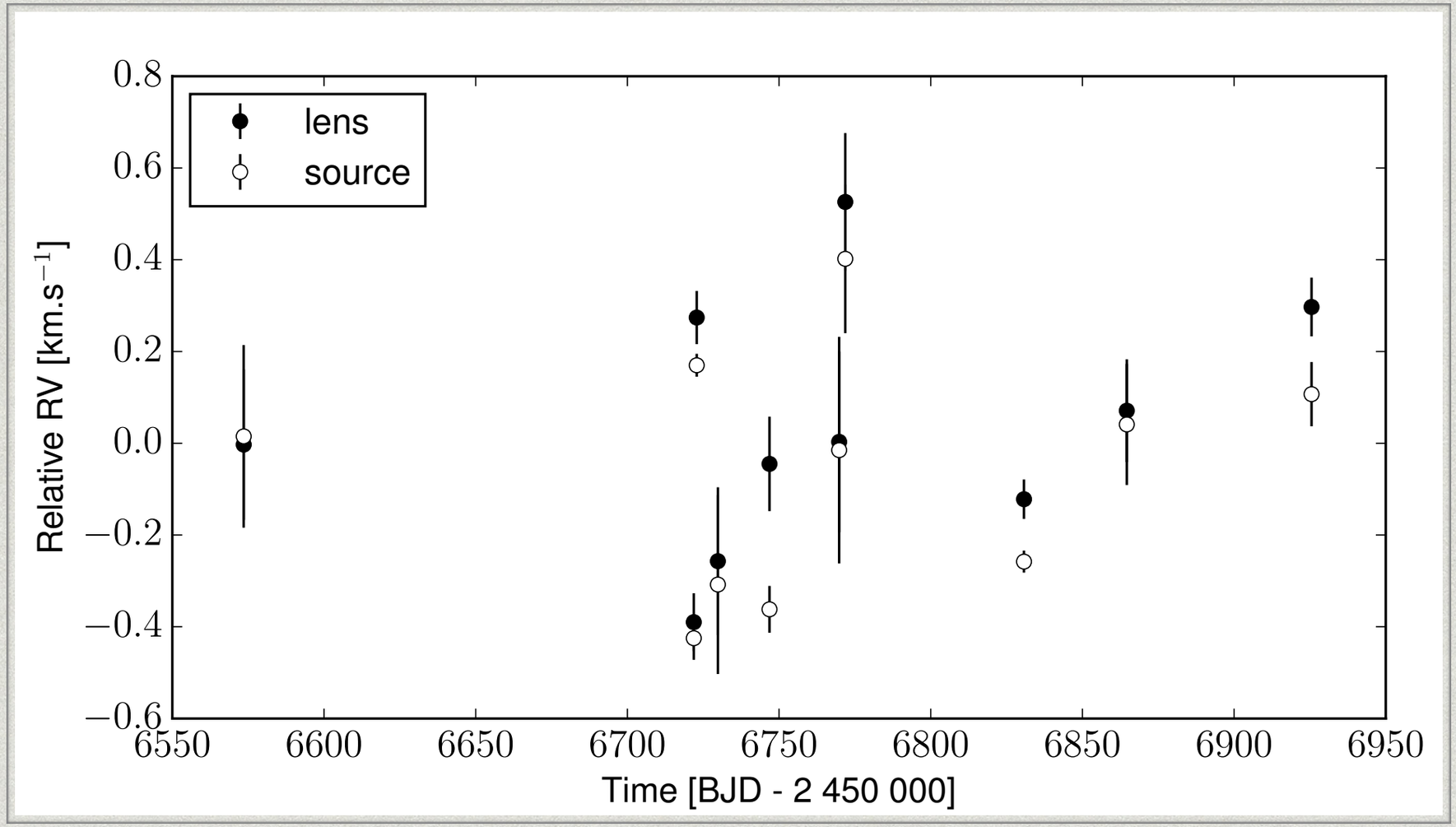
But Variation of the illumination of the slit

→ Corrected from RV telluric reference (O_2 lines)

Data reduction

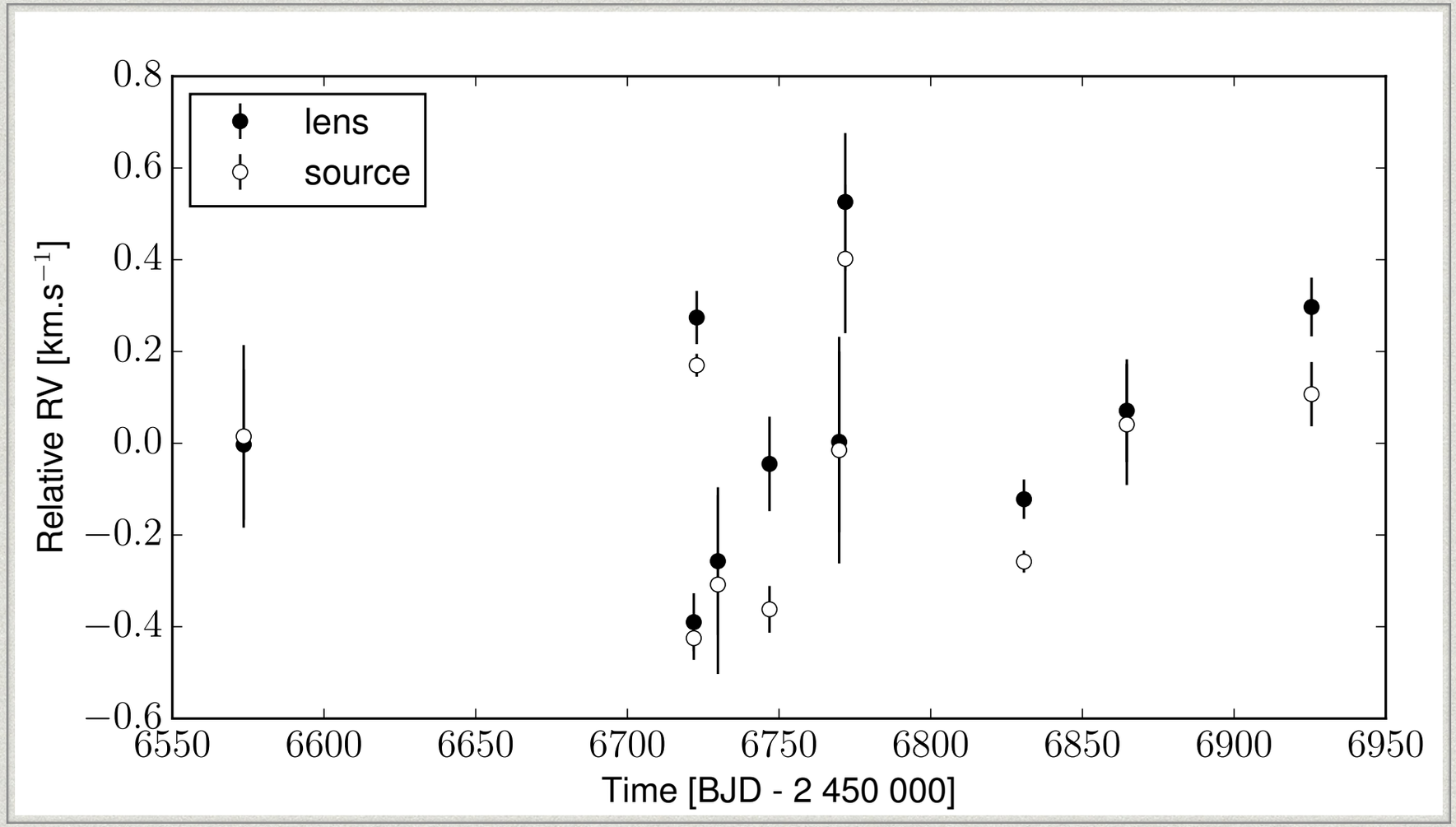


Data reduction



→ Stars RV share same systematics !

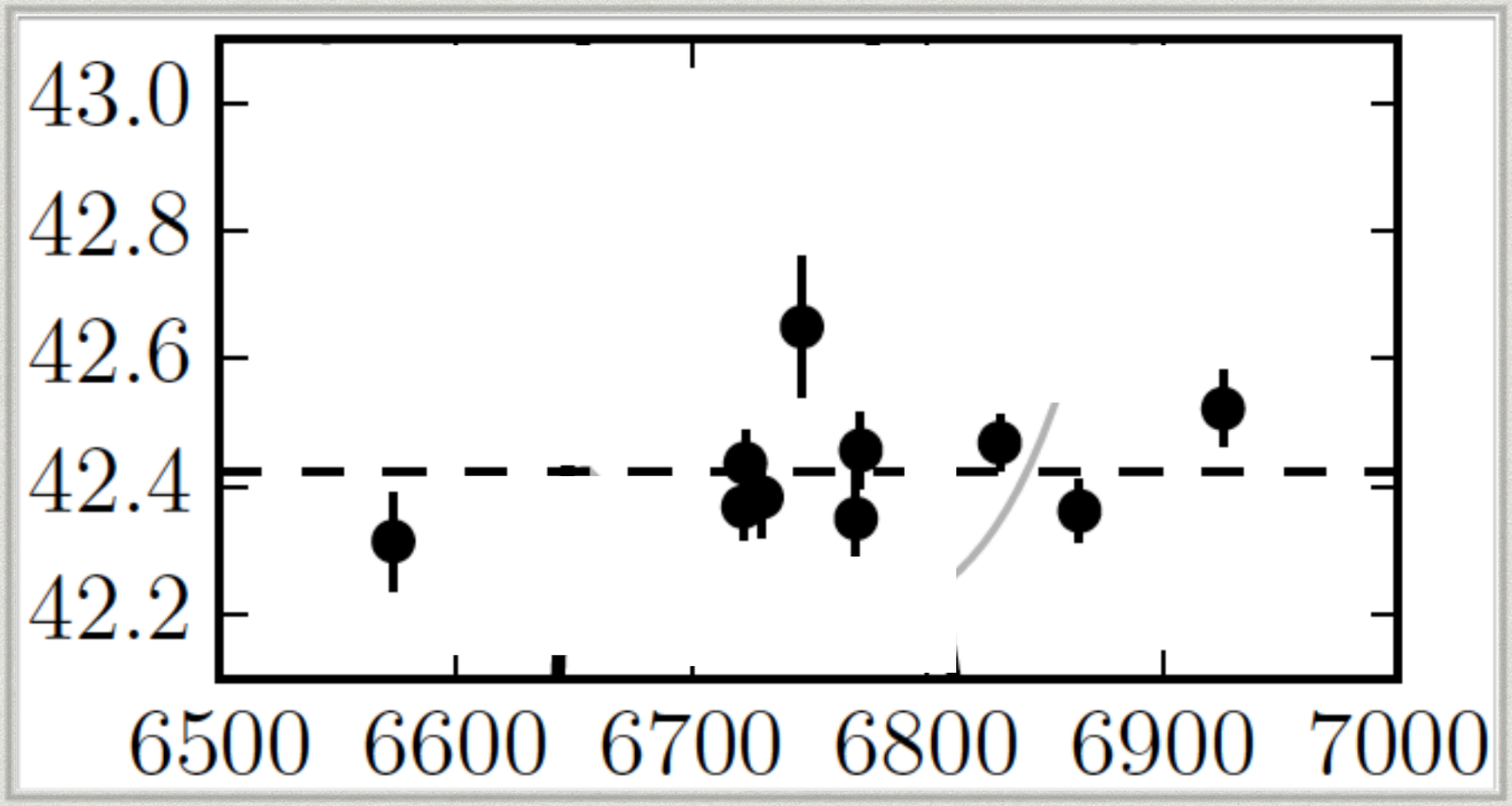
Data reduction



→ Stars RV share same systematics !

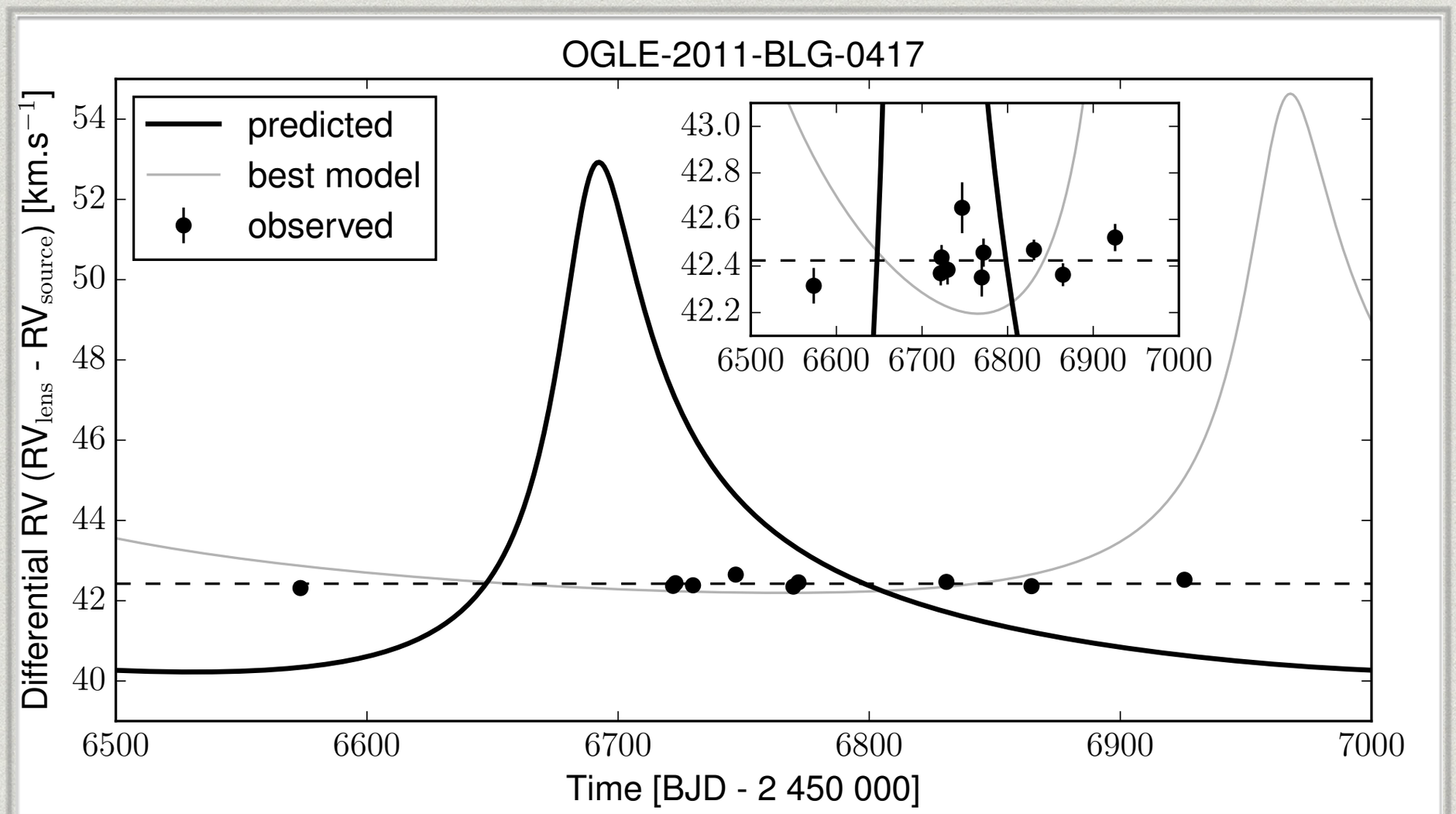
→ Used RV source as a reference for RV lens

Results



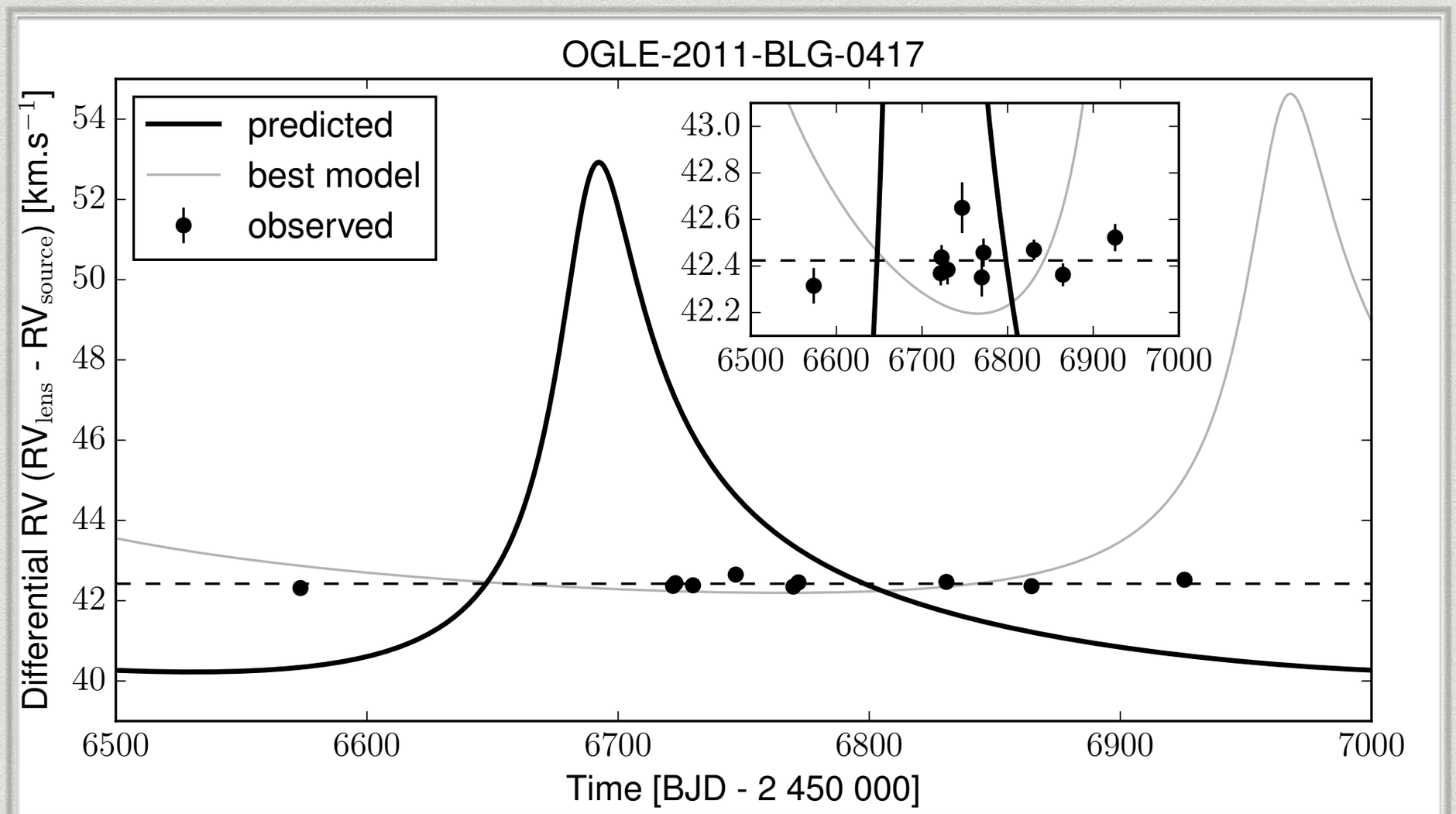
- RMS = 94 m/s

Results



- RMS = 94 m/s

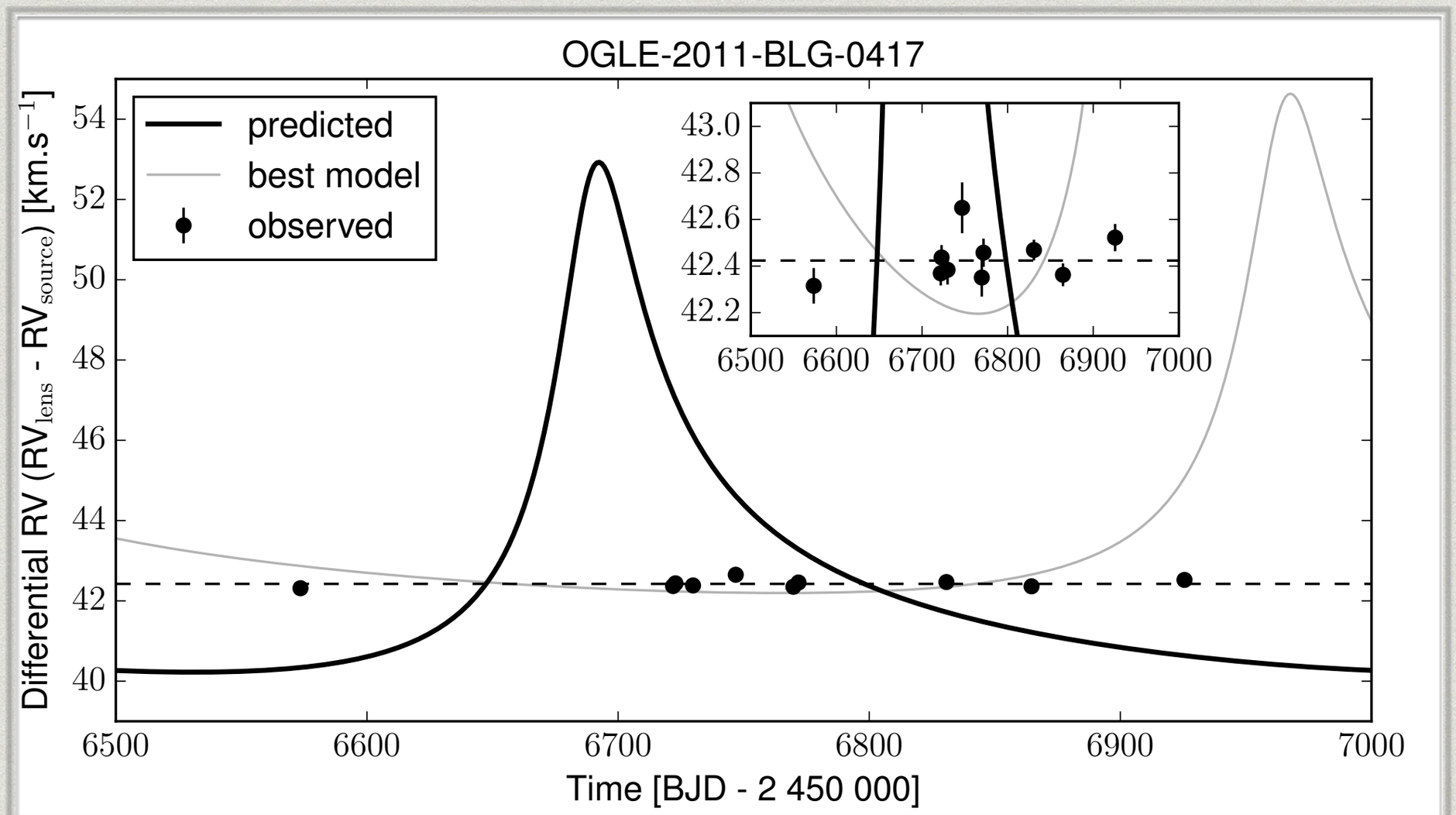
Results



- RMS = 94 m/s
- PASTIS validation tool

  Diaz et al. 2014

Results



- RMS = 94 m/s
- PASTIS validation tool → Probability < 2 10^{-7}

Diaz et al. 2014

Conclusion

We don’t confirm the Gould et al. prediction

Conclusion

We don’t confirm the Gould et al. prediction

- Bright component is most probably not the light from the lens

Conclusion

We don’t confirm the Gould et al. prediction

- Bright component is most probably not the light from the lens

→ The lens is not detectable

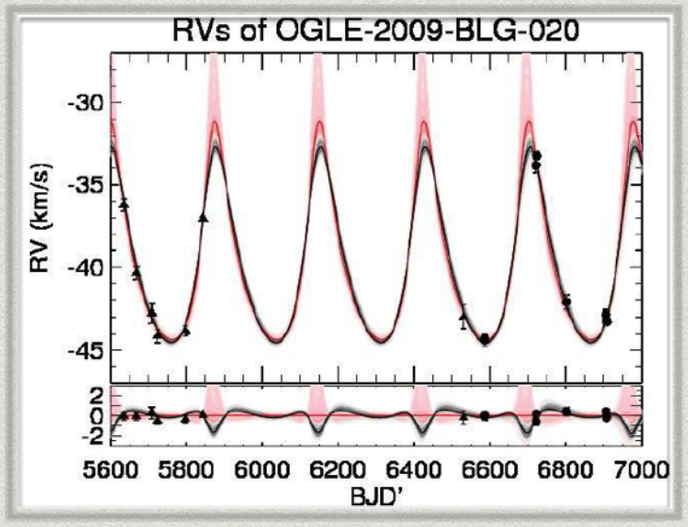
Conclusion

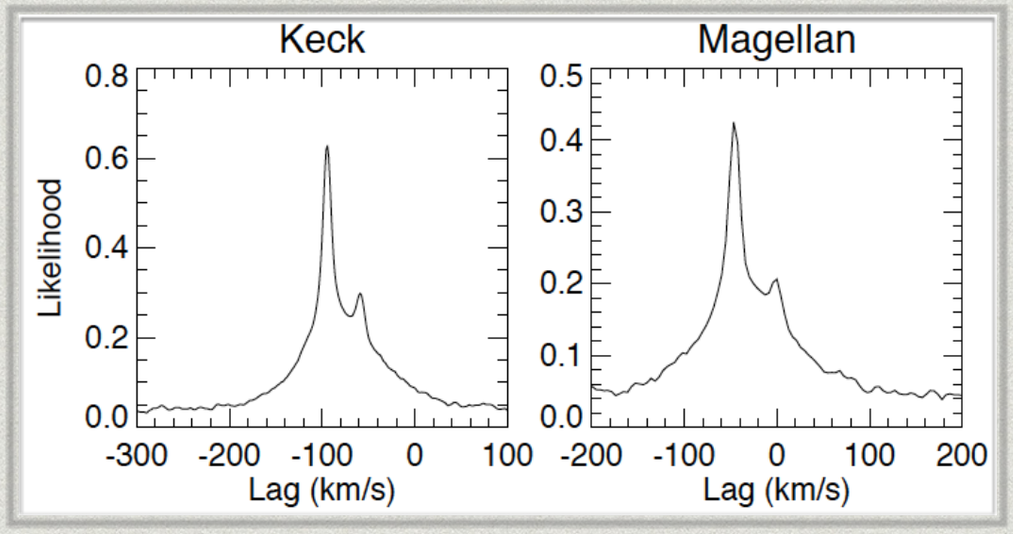
We don't confirm the Gould et al. prediction

- Bright component is most probably not the light from the lens

→ The lens is not detectable

- Recently same method on a different target **Yee et al. arXiv:1506.01441**





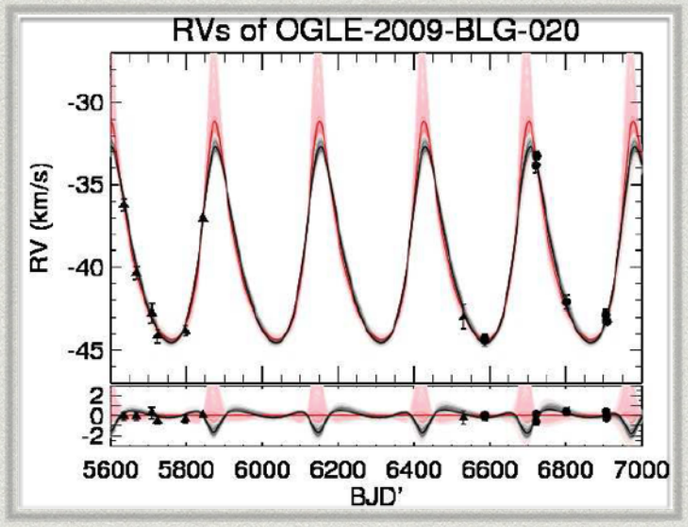
Conclusion

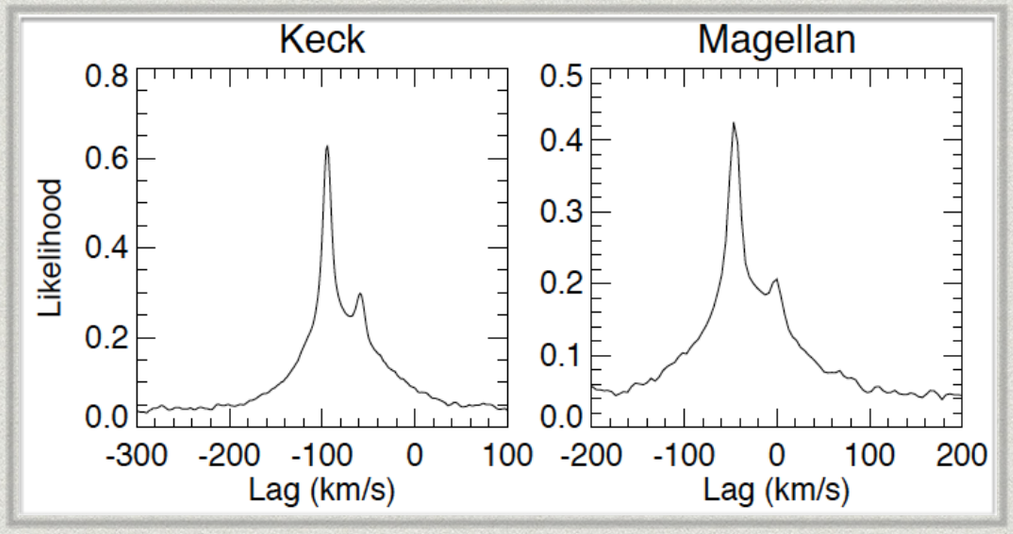
We don't confirm the Gould et al. prediction

- Bright component is most probably not the light from the lens

→ The lens is not detectable

- Recently same method on a different target **Yee et al. arXiv:1506.01441**





Spectroscopic follow-up observations of microlensing event is possible