The α Oph-Periastron-Passage

The Be-star researcher Anatoly Miroshnichenko (USA) asked at 6. April 2012 via eMail for spreading of following message:

Hello everybody,
yesterday I received information from a group of interferometrists that an eccentric binary Alpha Oph (visual magnitude about 2.0) is going to have a periastron passage very soon. The primary component is a rapidly rotating A5 star with a mass of about 2.3 solar mass and the secondary component has a mass of about 0.85 solar mass. The eccentricity is 0.92. The periastron time is expected for April 19, 2012, but it has a huge uncertainty of 53 days. This is similar to the situation for Delta Sco in 2000.

Although they contacted me pretty late and there is a chance that the periastron has already passed, ***it would be great if the amateur community take part in the monitoring*** *of this binary at least in April through June. This will allow to refine the periastron time.*

As the system does not have spectral lines in emission, the H-alpha region seems to be a good candidate for the monitoring. However as the primary rotates rapidly, the lines are broad. Therefore, echelle spectra would work better, as they contain more lines. I found a spectrum of Alpha Oph in the Elodie archive and normalized a few parts to the continuum for you to see what to expect (fig. 1 to fig. 3).

However, there is a challenge in detecting the radial velocity variations as the total amplitude of the primary's radial velocity is going to be only about 10 km/s (if I calculated it correctly). I used orbital elements from a recent paper by Hinkley et al. 2011; http://adsabs.harvard.edu/abs/2011ApJ...726..104H. My prediction for the radial velocity curve is attached (Fig. 4). It assumes a zero systemic velocity.

Could you please spread the word to other possible participants to this campaign (if you think it is feasible)? I think a spectrum with a high signal-to-noise ratio every clear night starting now would do the job. Please consider getting a radial velocity standard with each observations of the object. A bright star Beta Oph (V=2.8 mag, K2 III, RV = -12.3 km/s) or a fainter star BS 6349 (V=6.0 mag, F9 V, RV=-16.7 km/s) are good standards. Is it possible to set up a webpage for this campaign to deposit reduced spectra?

Thank you.
Best regards,
Dr. Anatoly Miroshnichenko
Assoc. Professor
University of North Carolina at Greensboro
Dept. of Physics and Astronomy
Phone: 336-334-5062
web: http://www.uncg.edu/~a_mirosh

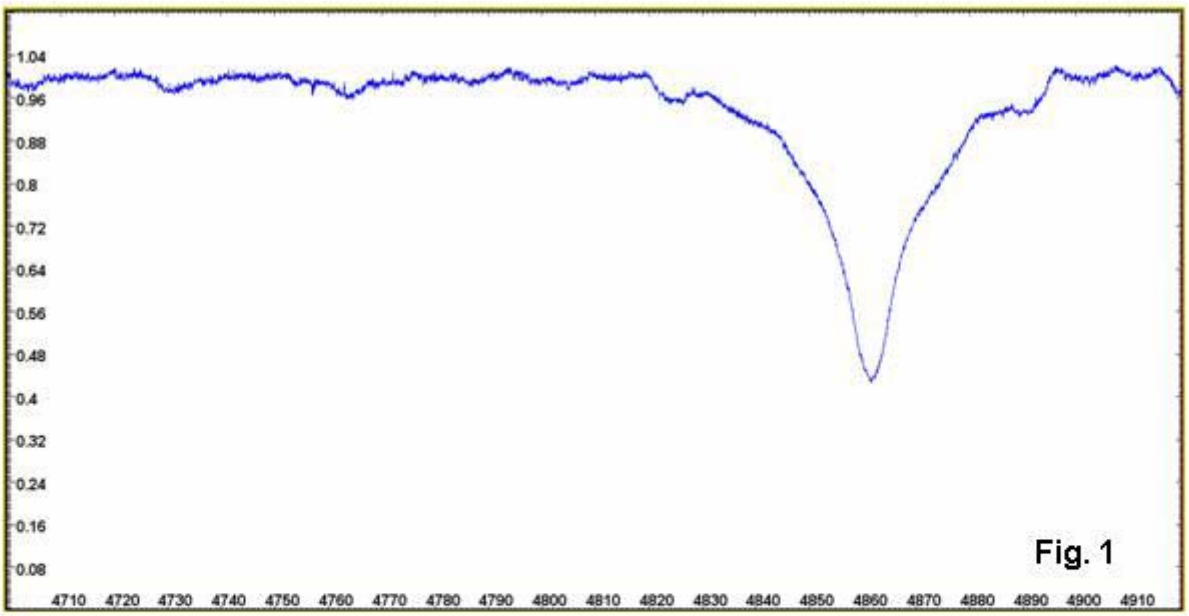


Fig. 1

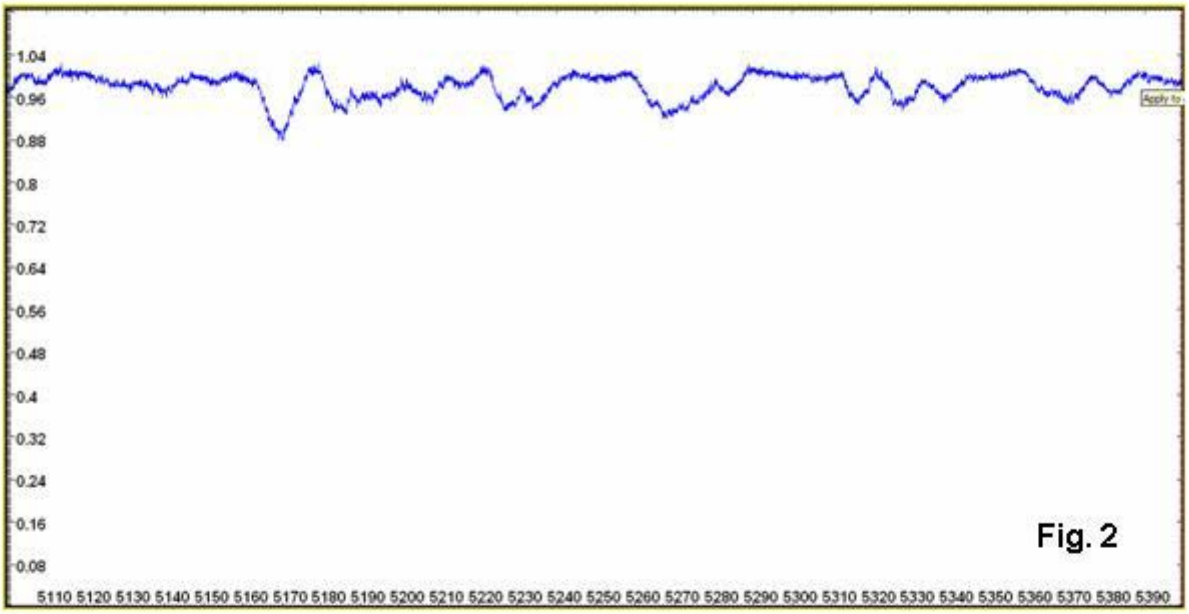


Fig. 2

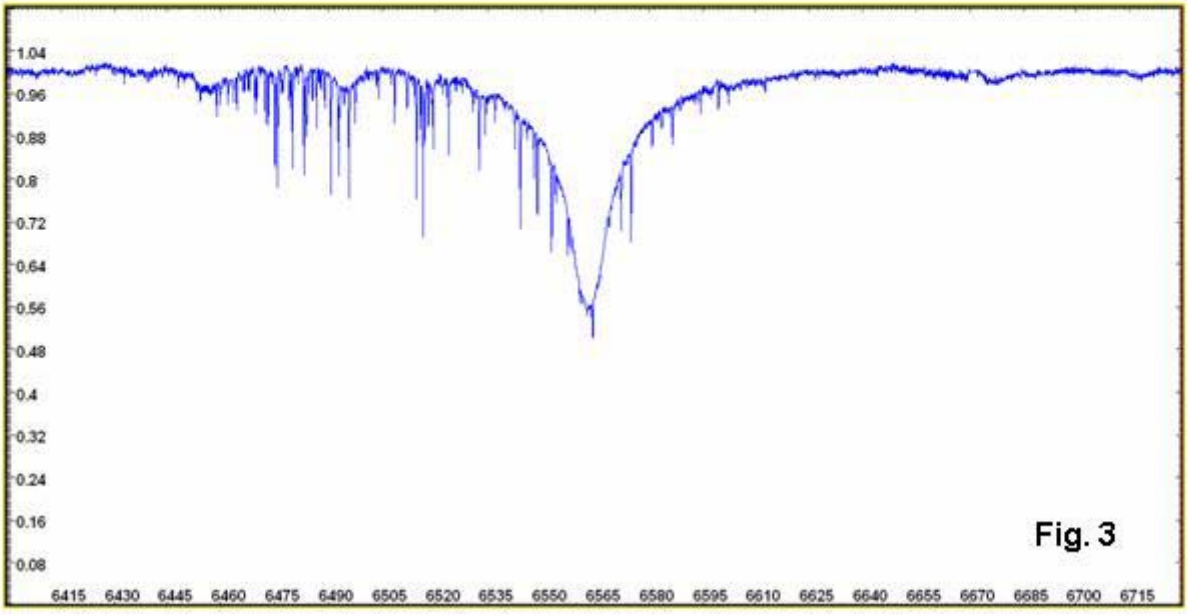
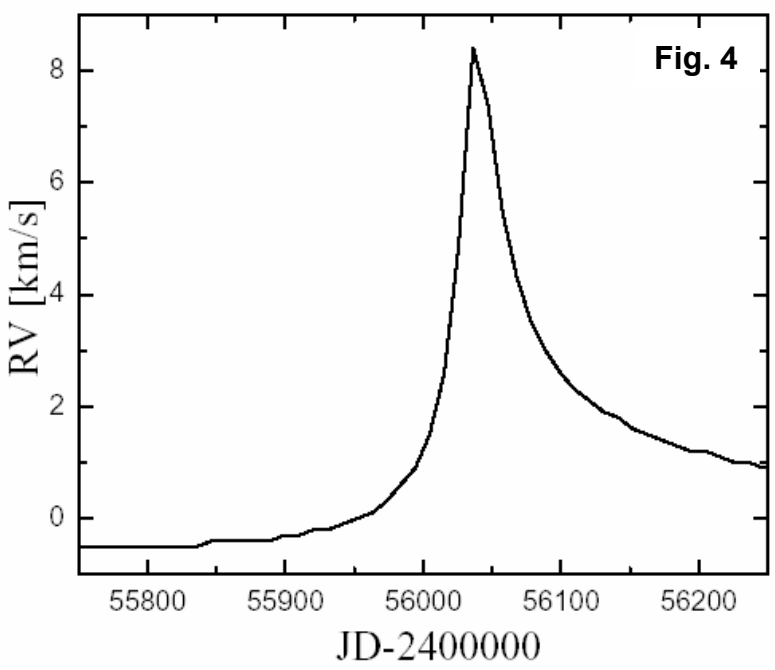


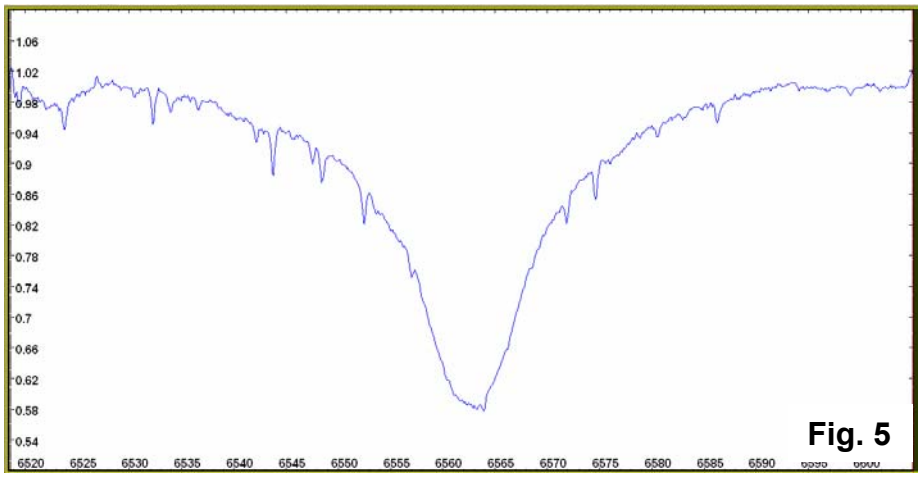
Fig. 3

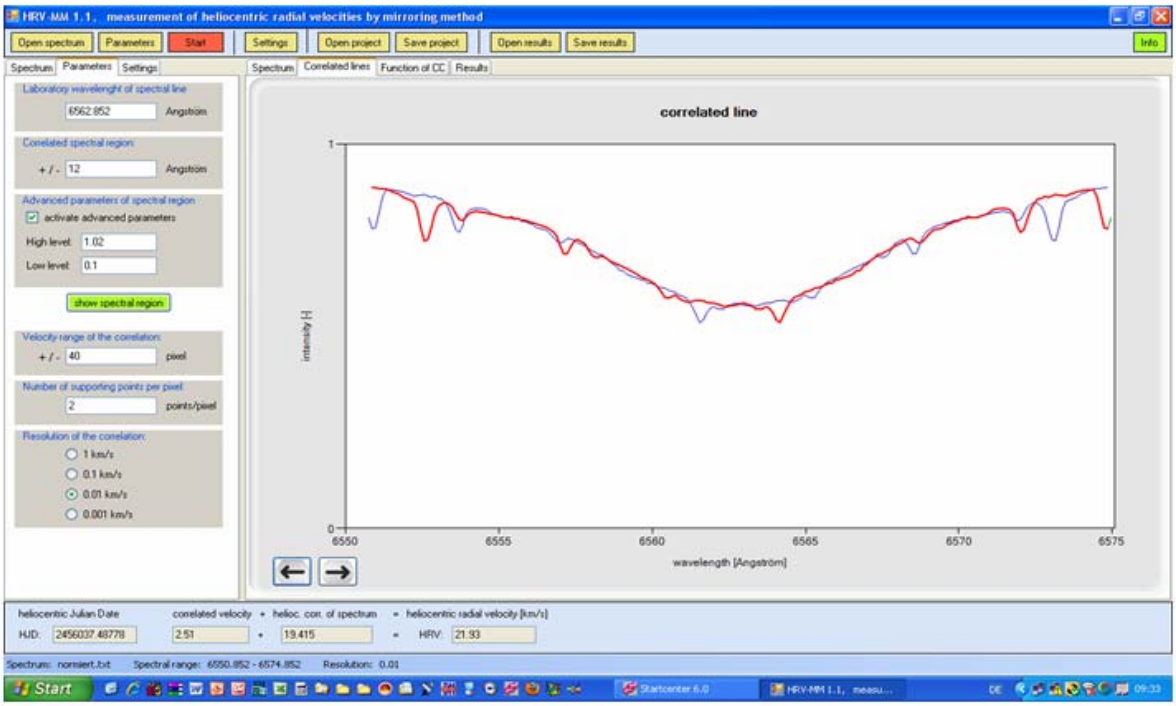


Meanwhile there are two amateur observations:

Christian Buil (Toulouse, France):
Spectrum taken with LISA-echelle spectrograph & C11
Date: JD 2456027.466
RV α Oph = 34 km/s (± 4 km/s)
Reference star β Oph
Evaluation of RV by using of the mirror method; implemented in ISIS, version 4.1.2

Ernst Pollmann (Leverkusen, Germany)
Spectrum taken with LHIRES III spectrograph & C14 (fig. 5)
Date: JD 2456034.576
RV α Oph = 24.4 km/s (± 0.5 km/s)
RV reference star α Ser = 2.63 km/s
Evaluation of RV by using of the mirror method,
developed by Roland Bücke (Germany, Hamburg); http://www.astro.buecke de

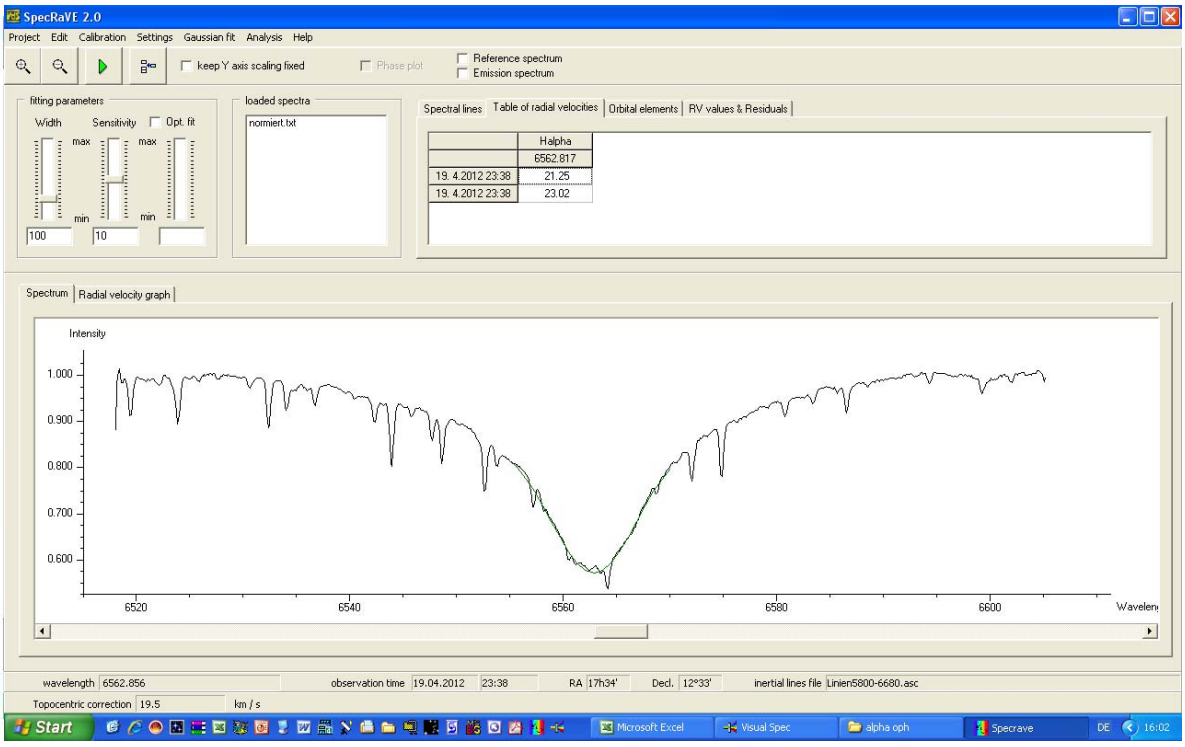




Continuation
Observation: Pollmann

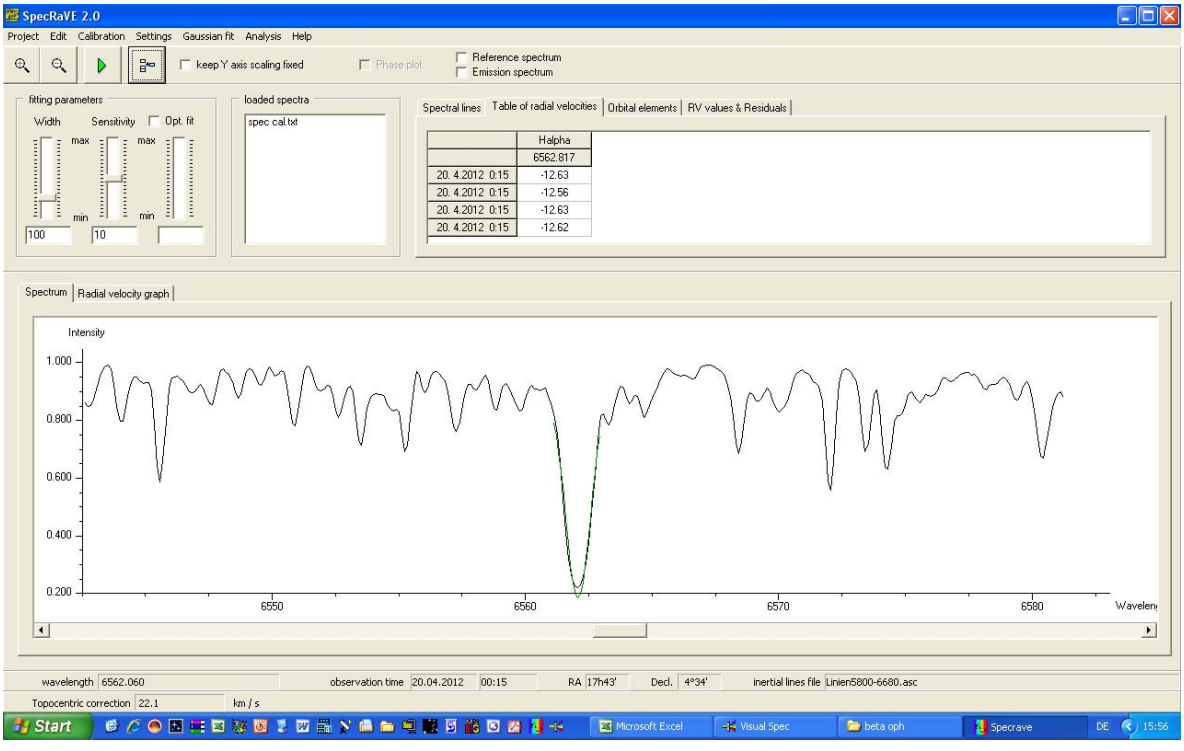
α Oph
(Mirror Method)

JD 2456037.485
RV = 21.93 km/s



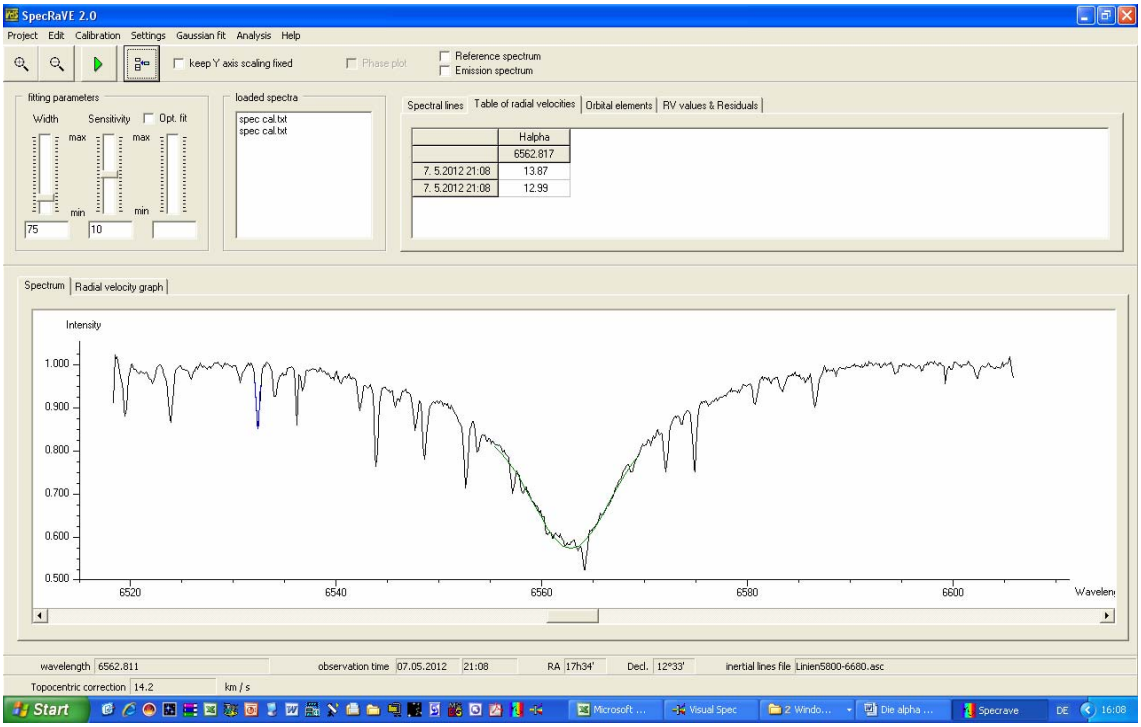
α Oph
(Gaussian Fitting)

JD 2456037.485
RV = 21.39 km/s



Reference star: β Oph
(Gaussian Fitting)

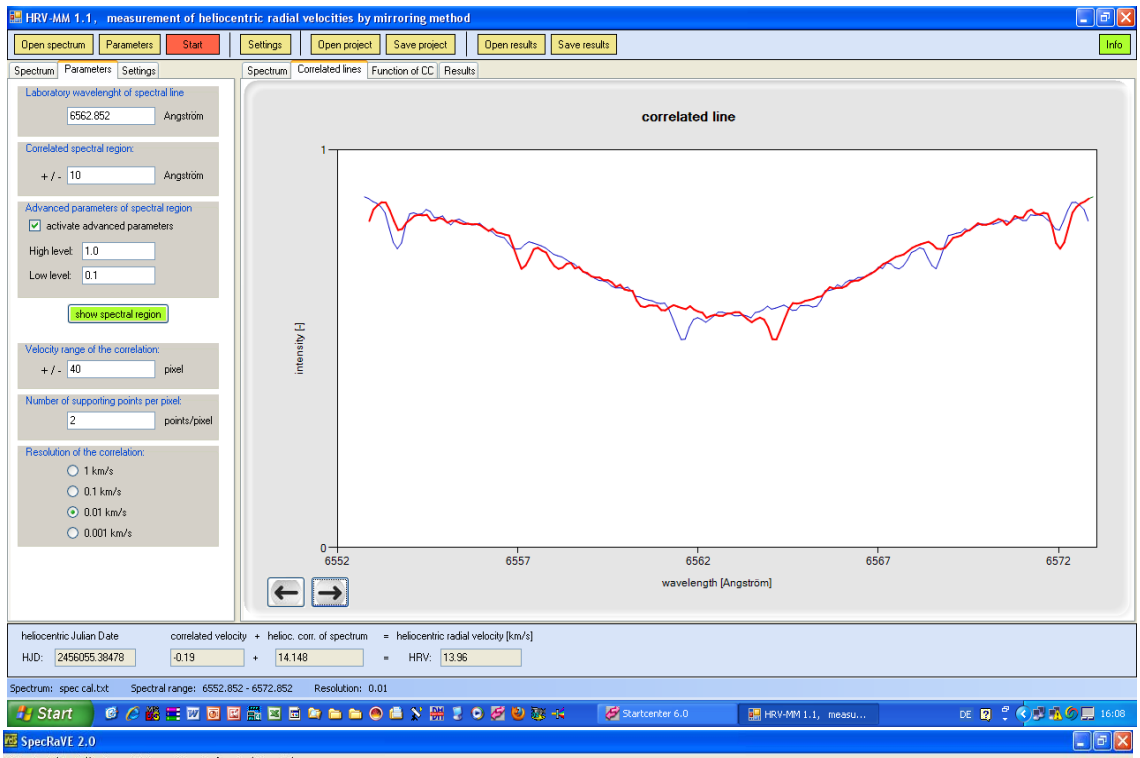
2456037.511
RV = -12.61 km/s



Continuation
Obs. Pollmann

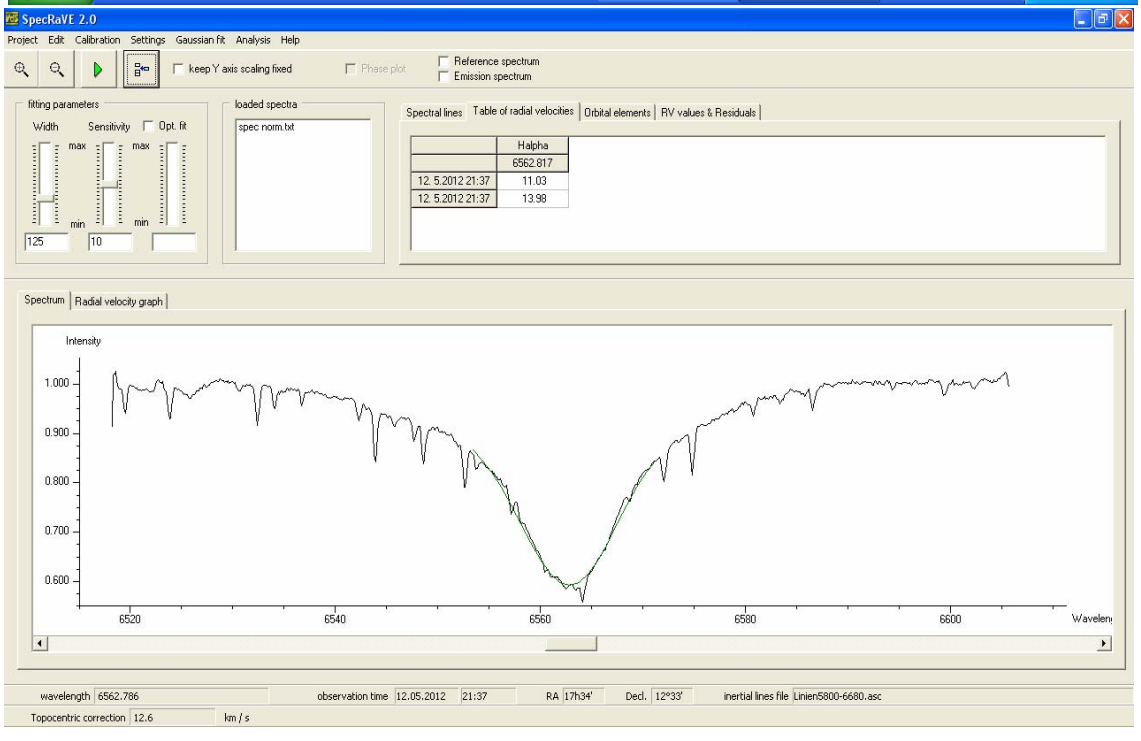
α Oph
(Gaussian Fitting)

JD 2456055.381
RV = 12.3 km/s



α Oph
(Mirror-Method)

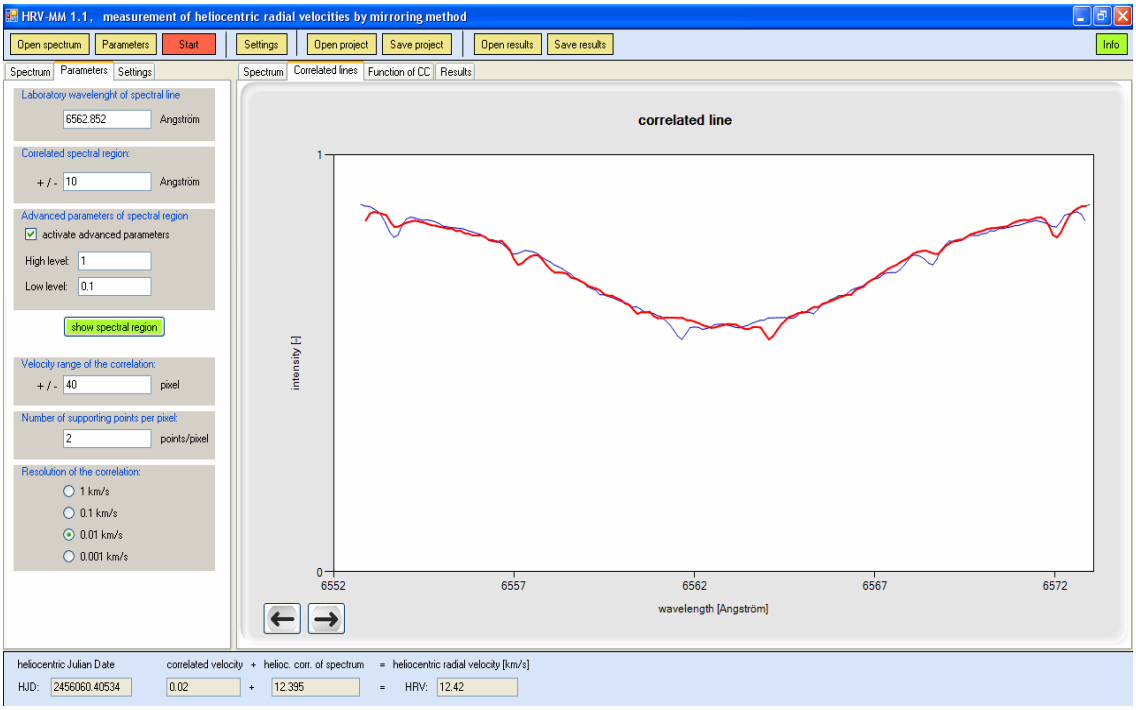
JD 2456055.381
RV = 13.9 km/s



Continuation
Obs. Pollmann

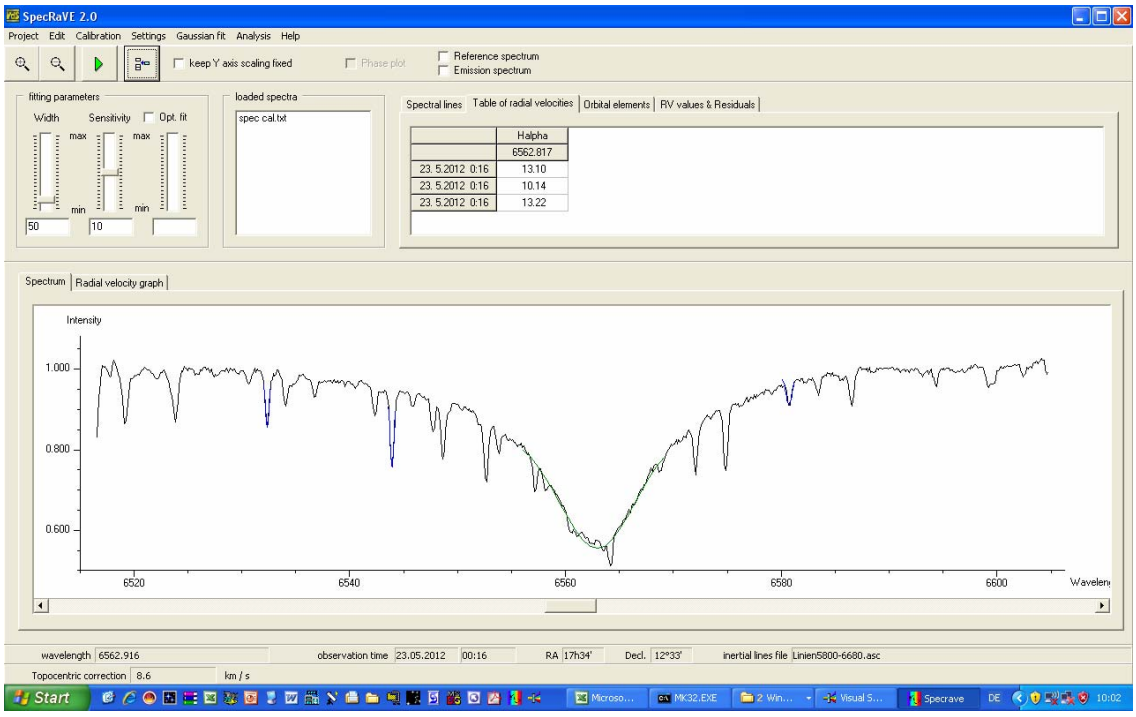
α Oph
(Gaussian Fitting)

JD 2456060.401
RV = 12.3 km/s



α Oph
(Mirror-Method)

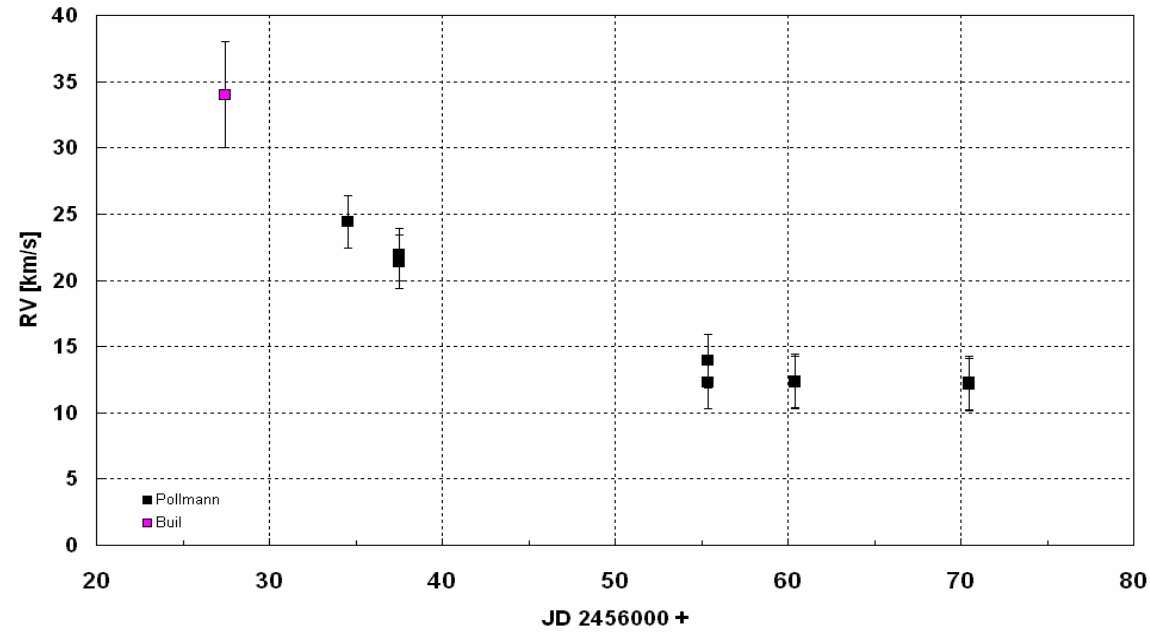
JD 2456060.401
RV = 12.4 km/s



Continuation
Obs. Pollmann

α Oph
(Gaussian Fitting)

JD 2456070.512
RV = 12.14 km/s



Process of the radial velocity

Process of the radial velocity
until July 2012