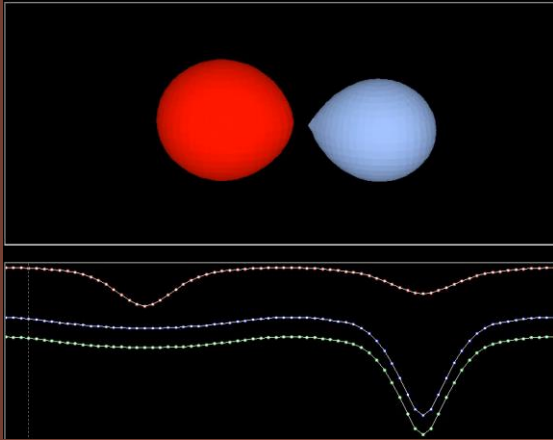


SPECTROSCOPIEDAG

STERRENWACHT TIVOLI OUDENBOSCH 18 Nov. 2017

THEMA:

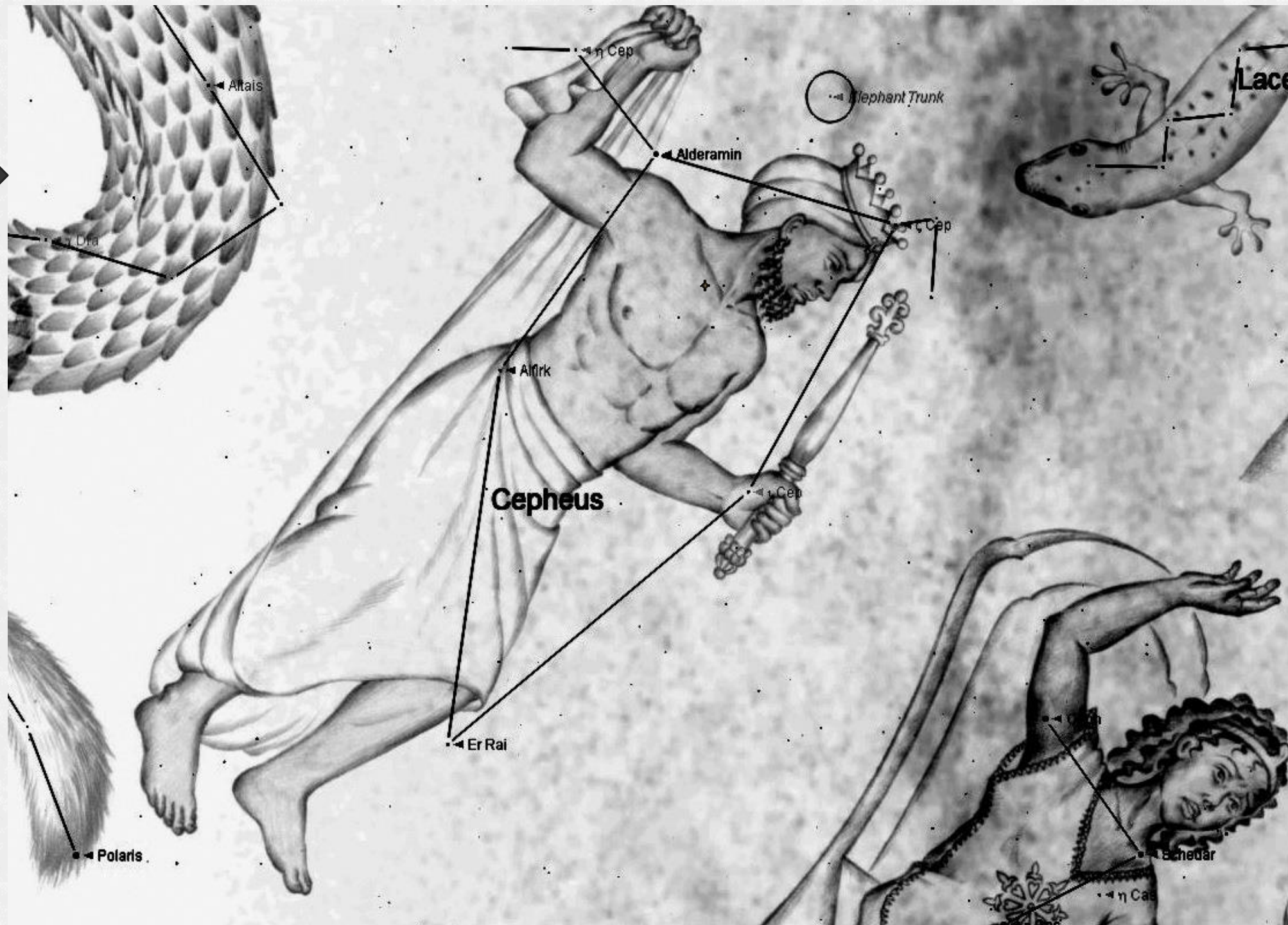


ECLIPSERENDE
DUBBELSTERREN

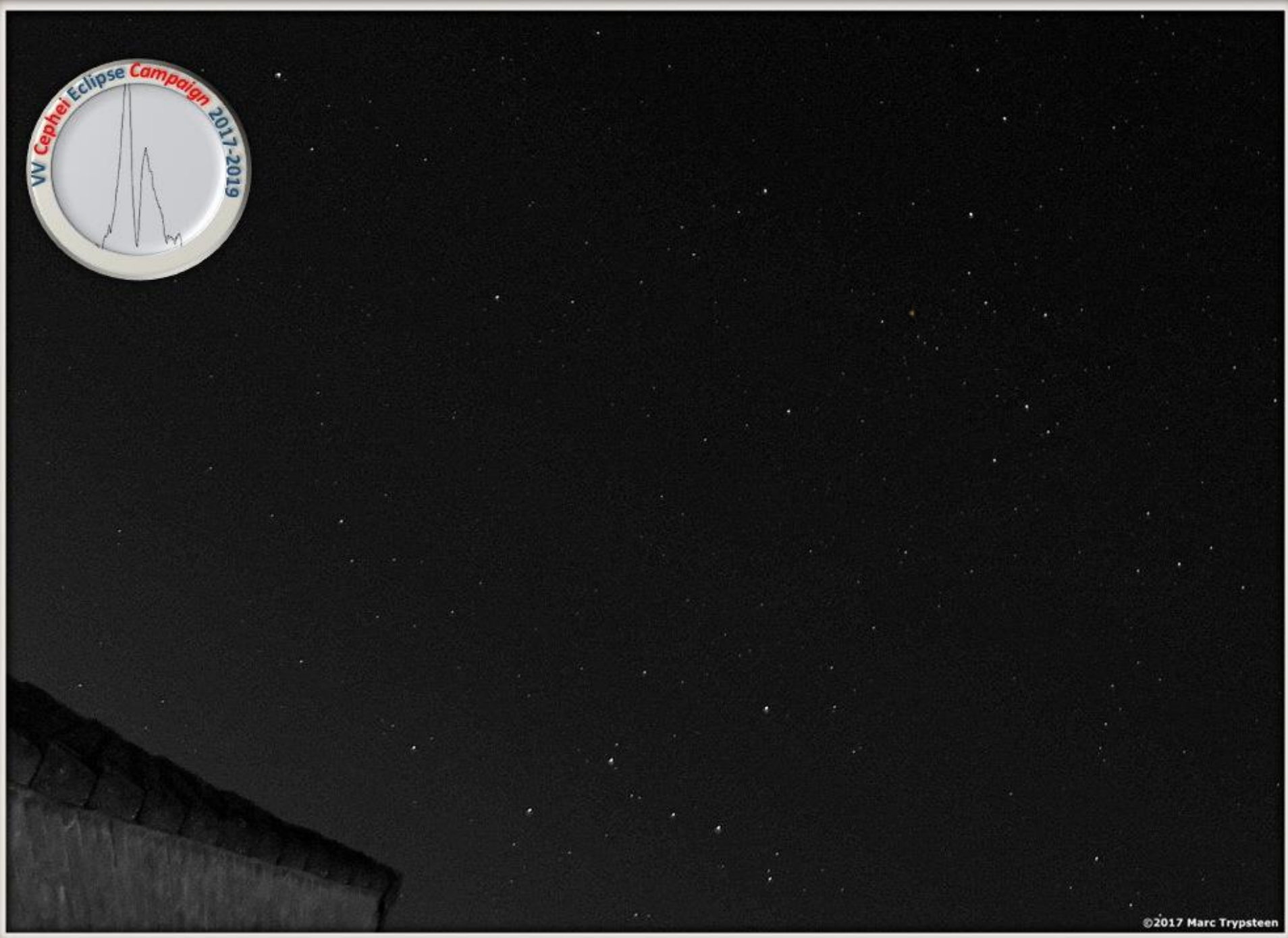


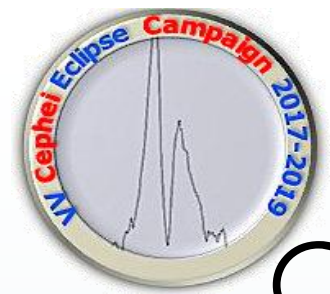
VV CEPHEI ECLIPSCAMPAGNE 2017/19
DEEL 1: Marc Trypsteen Deel 2: Ernst Pollmann

Internationaal
Pro-Am
Astrospectroscopie
Project



VV Cephei
aan de
midzomer-
nachthemel





CEPHEUS

- *Onopvallend sterrenbeeld (Stellaire magnitudes > 2)*
- *Donkere stofwolken: " Cepheus Bubble "*
- *Grote donkere nevelgebieden : LDN (Large Dark Nebula)*
- *Interactie tussen massieve sterren en interstellair medium*

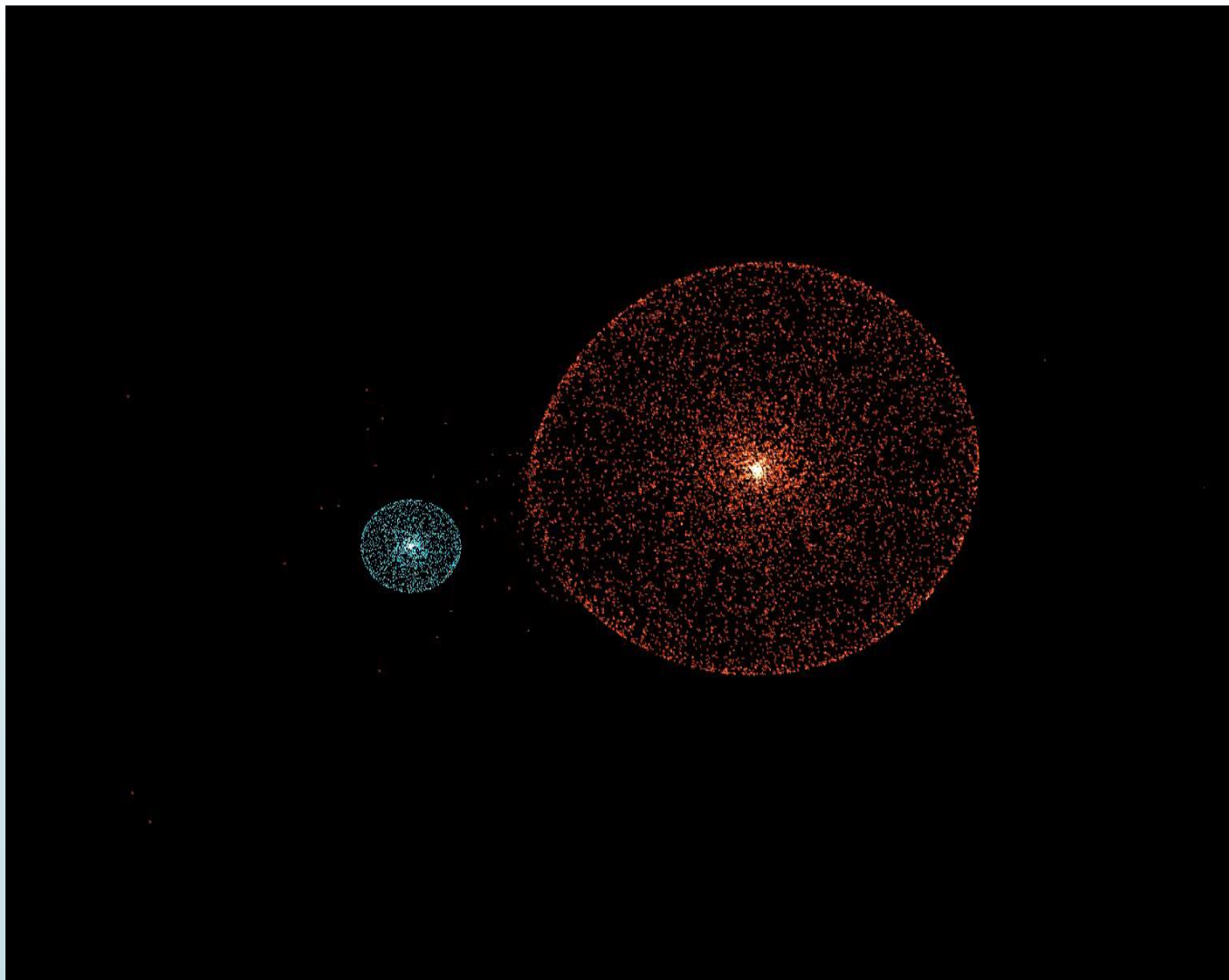
Jean-Marc Nattier (1685-1766)
Mus. V. Sch. Kunsten Tours (Fr.)
Bron: The Bridgeman Art Gal.
Wikimedia
Phineus versteend door Perseus



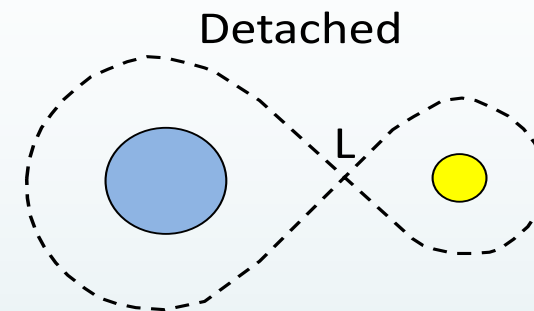


ECLIPSERENDE DUBBELSTERREN

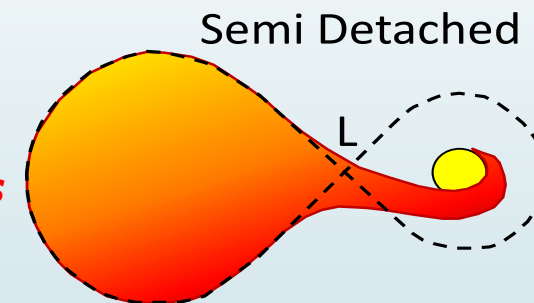
ROCHE LOBES



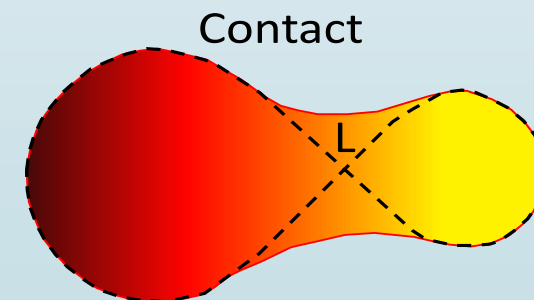
- **NIET GEVULD**



- **GEVULD:**
→ $e = 0.346$
→ **overvloei tijdens periastron = accretieschijf (VV Cephei)**



- **OVERGEVULD = EXPANSIE**





LAGE en HOGE Resolutie Spectroscopie

$$V_R = \frac{C}{R} \text{ met } V_R \text{ de radiale snelheid, } R \text{ de Spectrale Resolutie (Resolving Power) en } C \text{ de lichtsnelheid}$$

LAGE RESOLUTIE ($R < 10000$)

- Monitoring van het SPECTRAAL VERLOOP over een ruim golflengtegebied
- SPECTROFOTOMETRIE

HOGE RESOLUTIE ($R > 10000$)

- PIEKHOOGTE en EQUIVALENTE BREEDTE als maat voor astrofysische parameters
- R_v bepaling via :
 - Kruiscorrelatie methode: t.o.v. standaard
 - Lijnprofielfitting : Gauss/Lorentz/Voigt
 - Oscilloscopische- of spiegelmethode

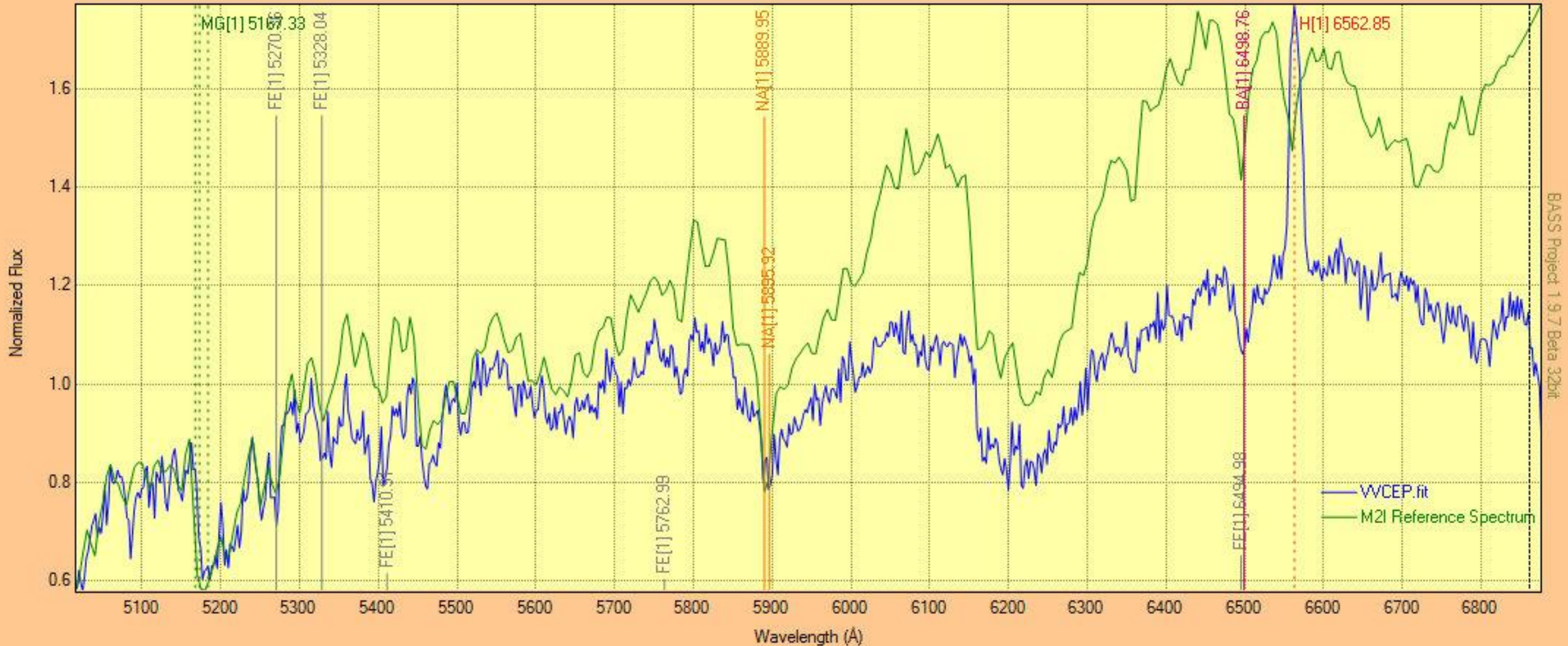


VV CEPHEI LAGE RESOLUTIE SPECTROSCOPIE

01

01

VV Cephei - Eclipsing Binary Star (M2 lab + B0 2V) - Low Resolution spectrum - spectral range 5000 - 7000 Å - 14/05/2017 - 11:14* UT - Marc Trypsteen
C11 - Spectra L200 - 600 L/mm - Canon D500/Debayered - ISO 3200 - 60 s. - Disp. 2.34 Å/px * PM





VV Cephei : Omlooptijd: 20,4 jaar. Eclipsduur: 650 dagen

1^{ste} Contact: 4.08.2017

2^{de} Contact: 27.10.2017

Totaliteit: midden op 1.06.2018

3^{de} contact: 6.02.2019

4^{de} contact: 16.05.2019

VV Cephei A

- *Rode Hyperreus*
- *1600 Zonneradii*
- *Spectraal type: M2 Iab*
- *Roche-lobe gevuld rond periastron*

VV Cephei B

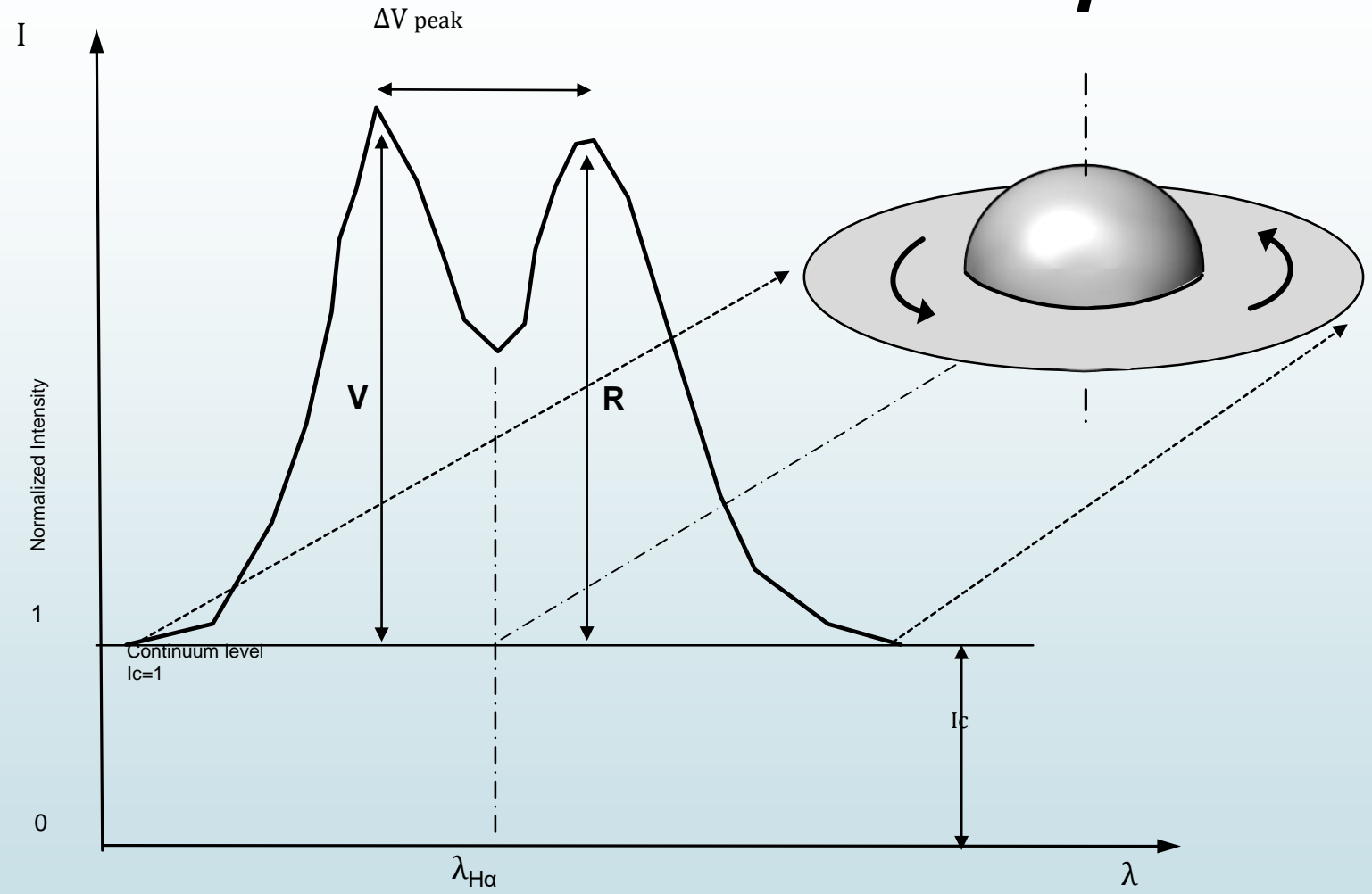
- *Blauw/witte hoofdreeksster*
- *13 Zonneradii*
- *Spectraal type (B0Ve)*
- *Accretieschijf*





Dopplereffect en Spectroscopie bij decretion- en accretieschijven

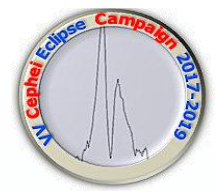
V en R componenten



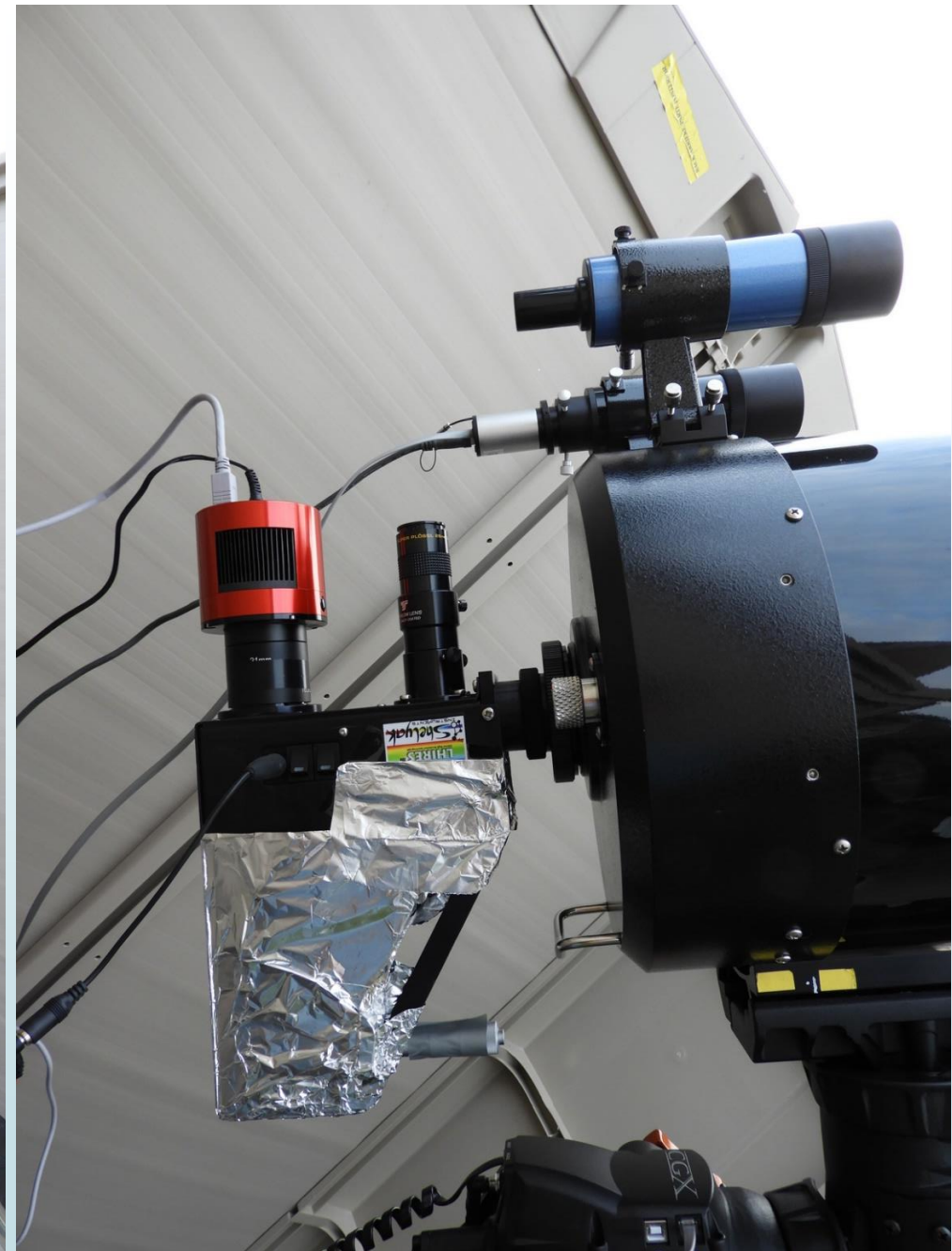


VV Cep Ha Internationaal team





C 11
CGX/SW AZ-EQ6
LHIRES_2400
ASI ZWO 174MMC
PHD2 guiding control
SHARP CAP 3.0
BASS/Vspec
HRV-MM





PHD2 Guiding Connections

Connect Equipment ✕

Equipment profile MARC1 Manage Profiles

Select your equipment below and click **Connect All** to connect, or click **Disconnect All** to disconnect. You can also connect or disconnect individual equipment items by clicking the button next to the item.

Camera	QHY 5L-II Color			
Mount	ASI ST4 Telescope Driver (ASC			
Aux Mount	None			

More Equipment ...

Connect All Disconnect All Close

V- Component



R- Component

VV CEPHEI HOGE RESOLUTIE SPECTROSCOPIE

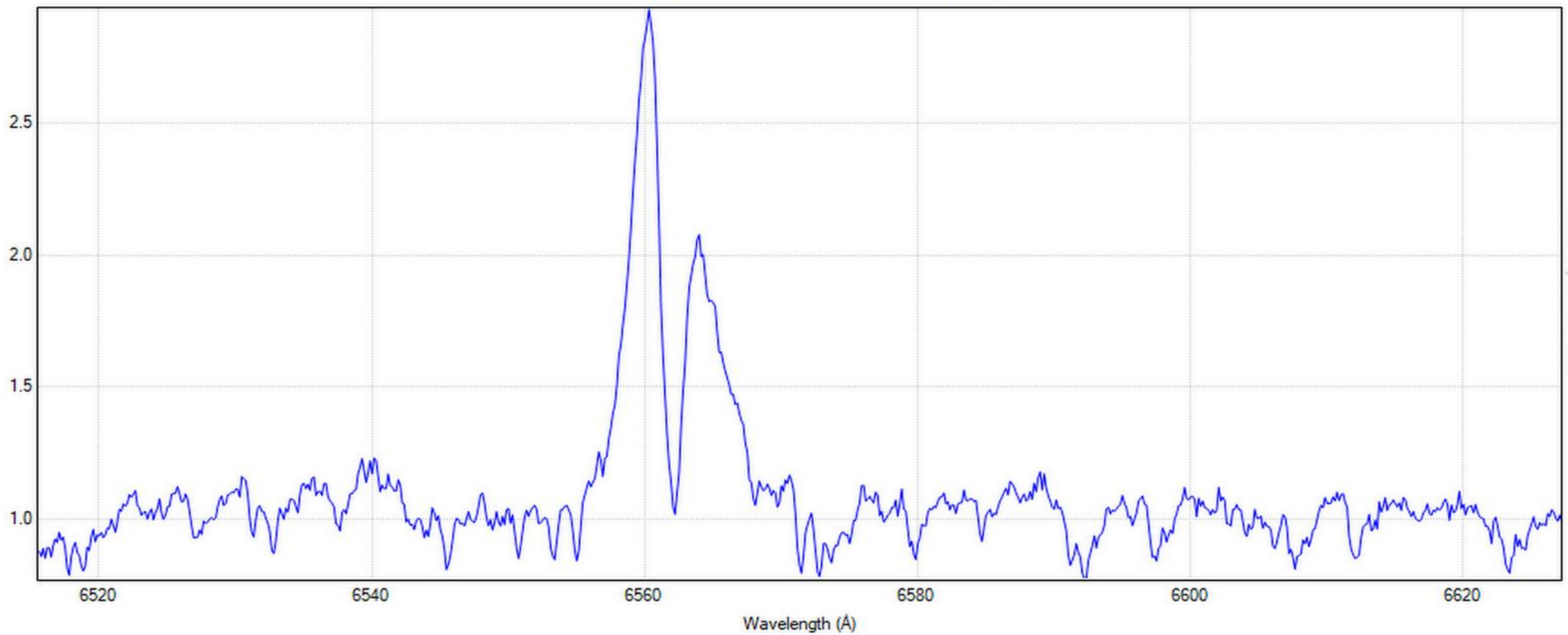


01

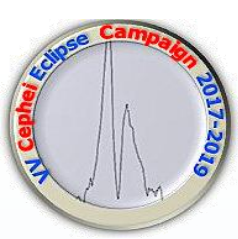
01

VV Cephei 21-07-2017 H-alpha region

C11-LHIRES III 2400 L/mm-35μm- Zwo ASI 174MM -120s - Marc Trypsteen



BASS Project 1.9.7 32bit



HRV-MM 2.1, measurement of heliocentric radial velocities by mirroring method

Open spectrum

Parameters

Start

Stop

Settings

Open project

Save project

Open results

Save results

Info

Spectrum Parameters Settings

Spectrum Correlated lines Function of CC Results

Laboratory wavelength of spectral line
6562.852 Angström

Correlated spectral region:
+ / - 7.80 Angström

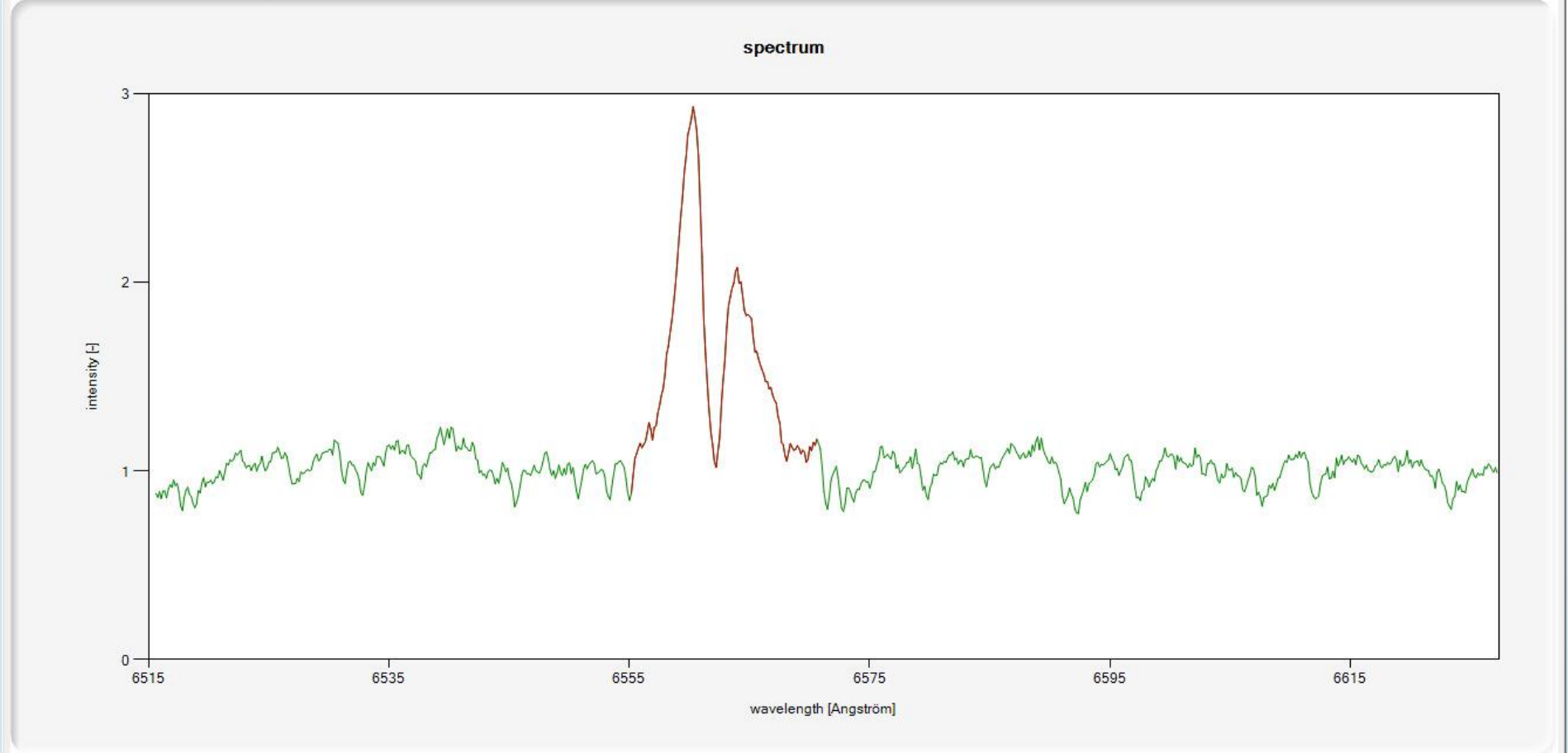
Advanced parameters of spectral region
 activate advanced parameters
High level: 3.8
Low level: 0

show spectral region

Velocity range of correlation:
+ / - 65 pixel

Number of supporting points per pixel:
8 points/pixel

Resolution of correlation:
 1 km/s
 0.1 km/s
 0.01 km/s
 0.001 km/s



save chart

heliocentric Julian Date correlated velocity + helioc. corr. of spectrum = heliocentric radial velocity [km/s]

HJD: 2457955.61589 -32.465 + 14.936 = HRV: -17.53

Spectrum: vccep_21072017.dat Spectral range: 6555.052 - 6570.652 Resolution: 0.01

Laboratory wavelength of spectral line
 Angström

Correlated spectral region:
 + / - Angström

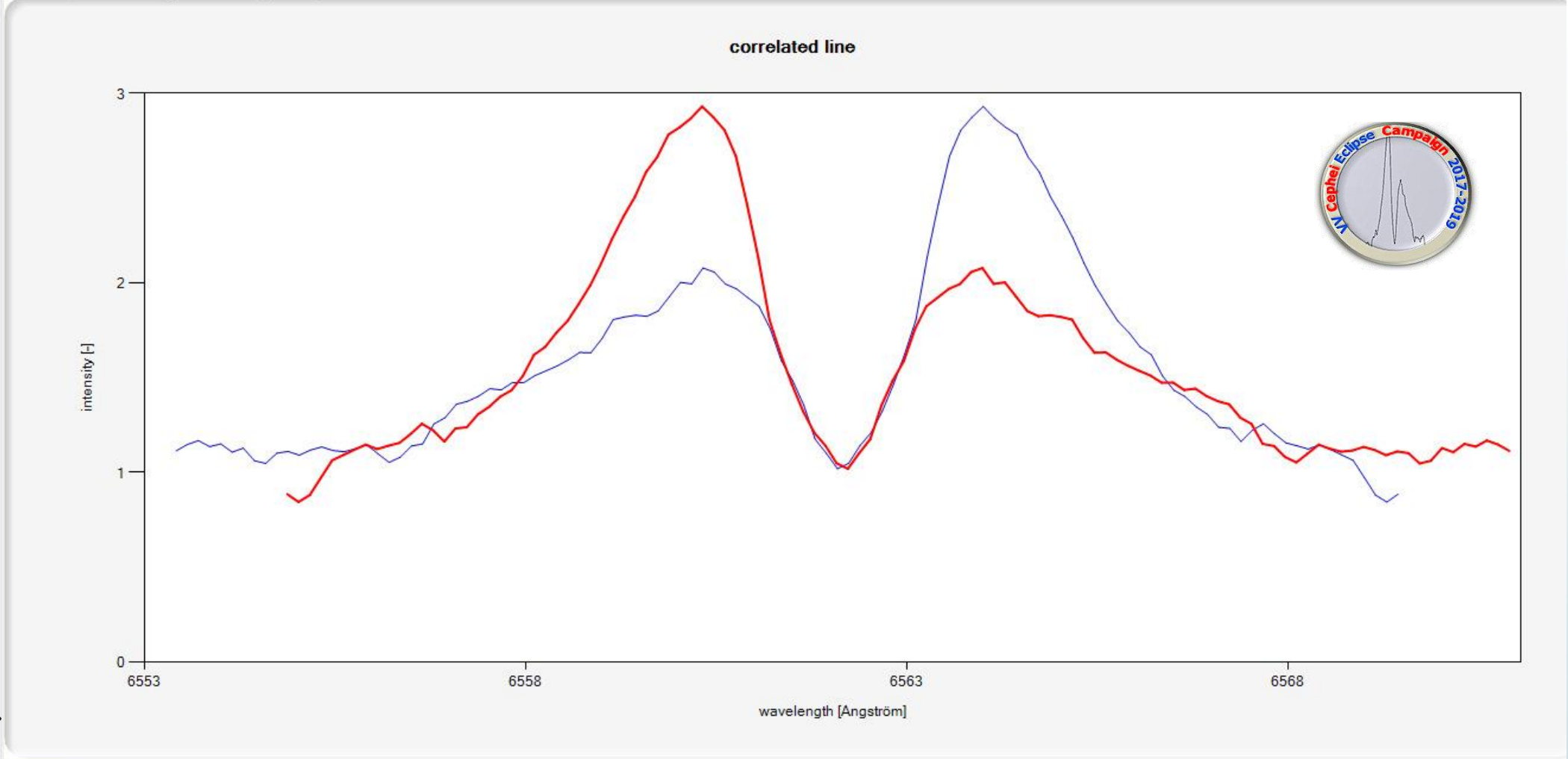
Advanced parameters of spectral region
 activate advanced parameters
 High level:
 Low level:

show spectral region

Velocity range of correlation:
 + / - pixel

Number of supporting points per pixel:
 points/pixel

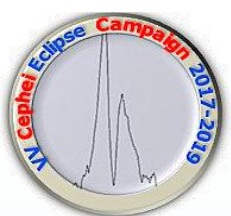
Resolution of correlation:
 1 km/s
 0.1 km/s
 0.01 km/s
 0.001 km/s



save chart ← →

**RV-bepaling
 "Mirroring"
 methode
 met HRV-MM 2.1
 (Roland Buecke)**

heliocentric Julian Date correlated velocity + helioc. corr. of spectrum = heliocentric radial velocity [km/s]
 HJD: + = HRV:



HRV-MM 2.1, measurement of heliocentric radial velocities by mirroring method

Open spectrum Parameters Start Stop Settings Open project Save project Open results Save results Info

Spectrum Parameters Settings

Laboratory wavelenght of spectral line
6562.852 Angström

Correlated spectral region:
+ / - 7.80 Angström

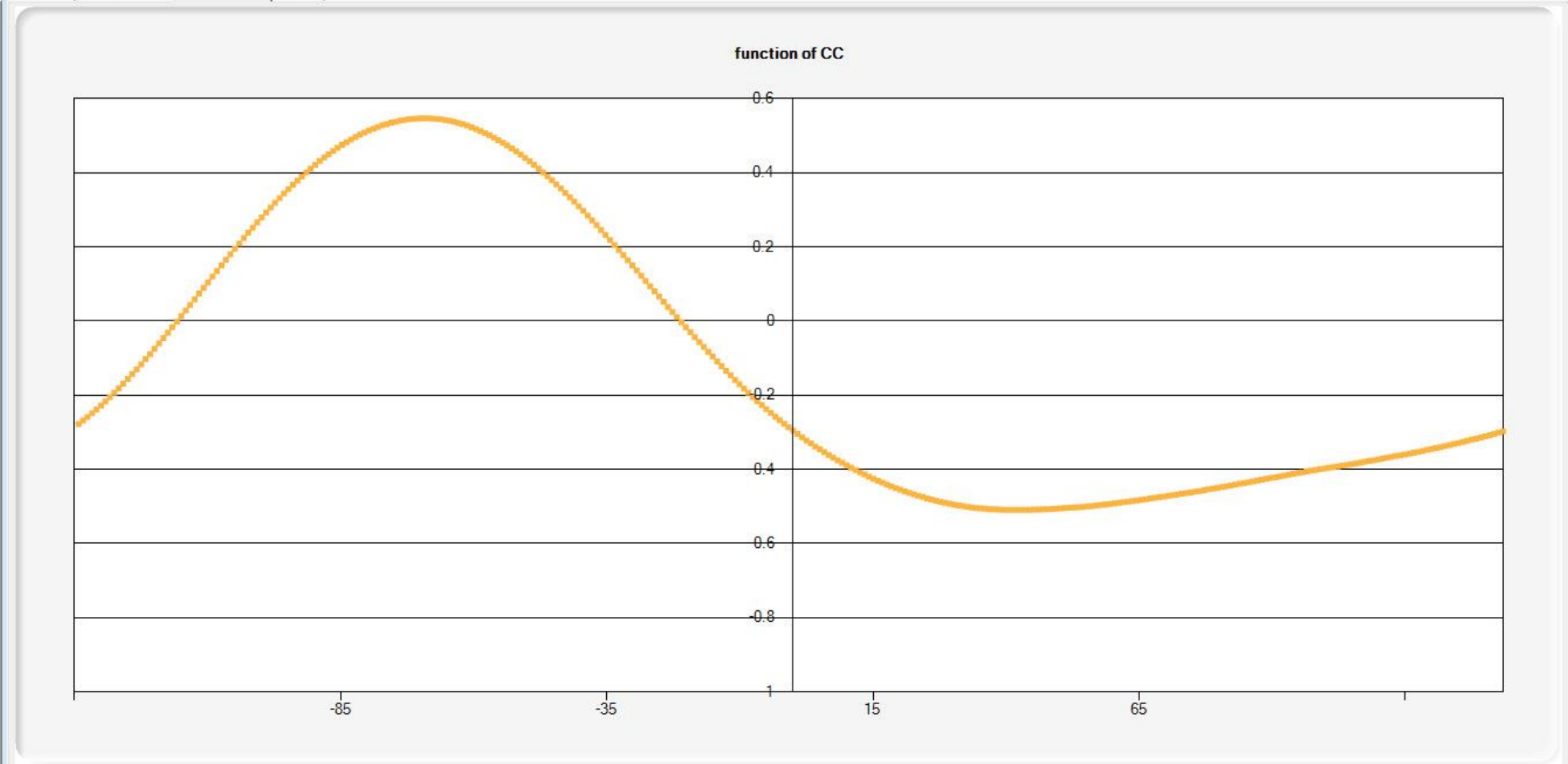
Advanced parameters of spectral region
 activate advanced parameters
High level: 3.8
Low level: 0
show spectral region

Velocity range of correlation:
+ / - 20 pixel

Number of supporting points per pixel:
8 points/pixel

Resolution of correlation:
 1 km/s
 0.1 km/s
 0.01 km/s
 0.001 km/s

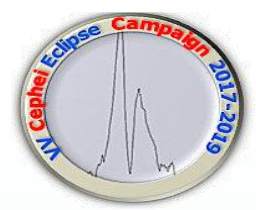
Spectrum Correlated lines Function of CC Results



save chart

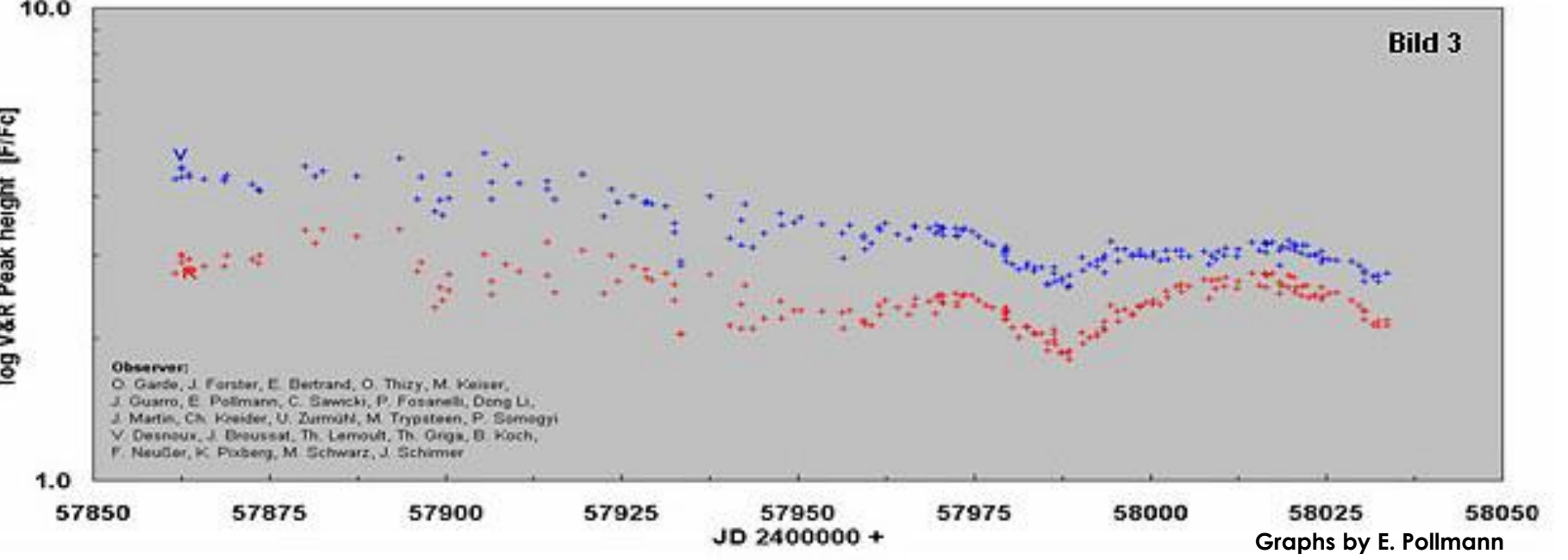
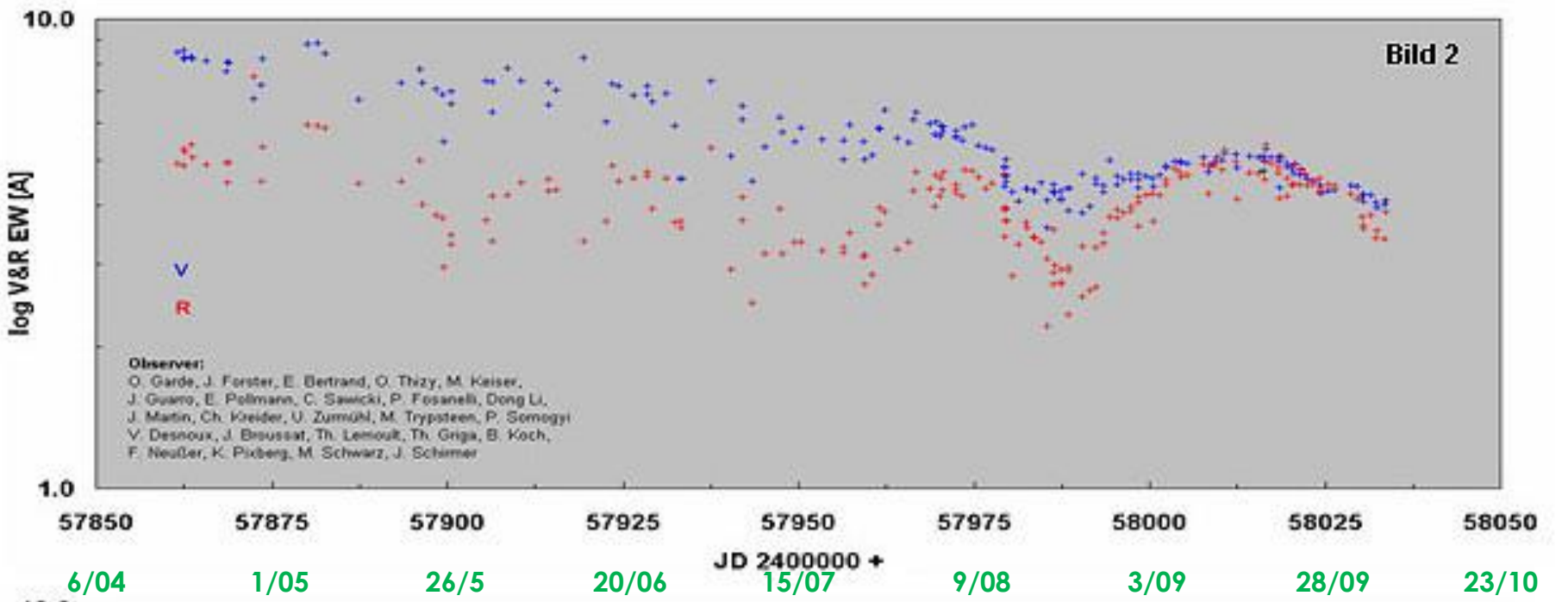
heliocentric Julian Date correlated velocity + helioc. corr. of spectrum = heliocentric radial velocity [km/s]
HJD: 2457955.61589 -34.575 + 14.936 = HRV: -19.64

Spectrum: vccep_21072017.dat Spectral range: 6555.052 - 6570.652 Resolution: 0.01

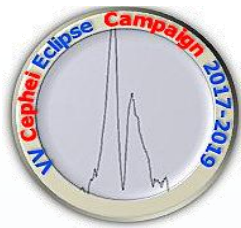


**Geobserveerde
Equivalente
breedtes
van de VV Cephei
Ha **V** and **R**
componenten**

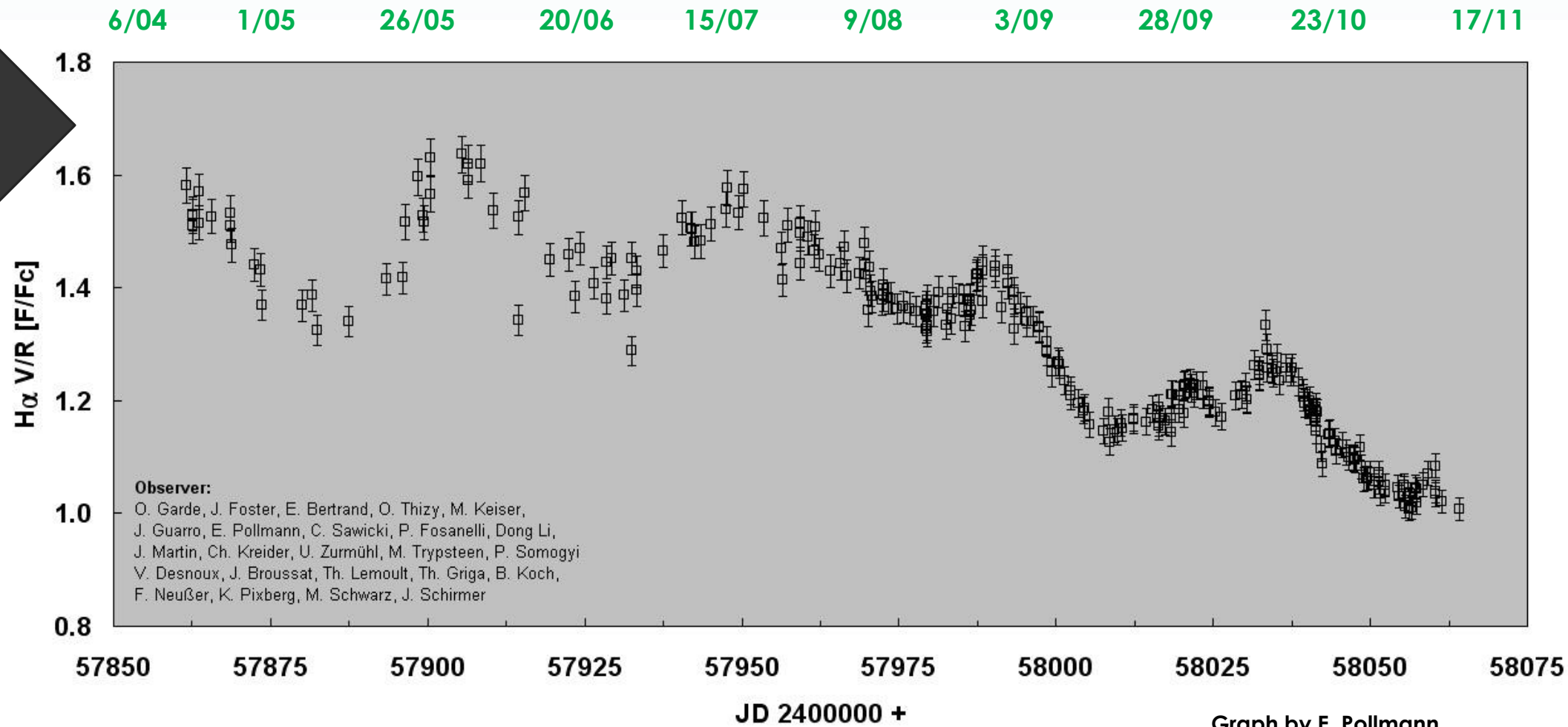
**Geobserveerde
piekhoogten
van de VV
Cephei Ha
V en **R**
componenten**

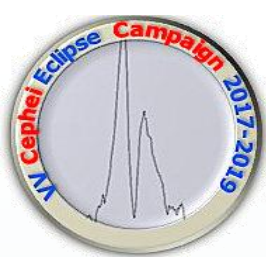


Graphs by E. Pollmann



Verloop van
VV Cephei Ha
V/R
verhouding

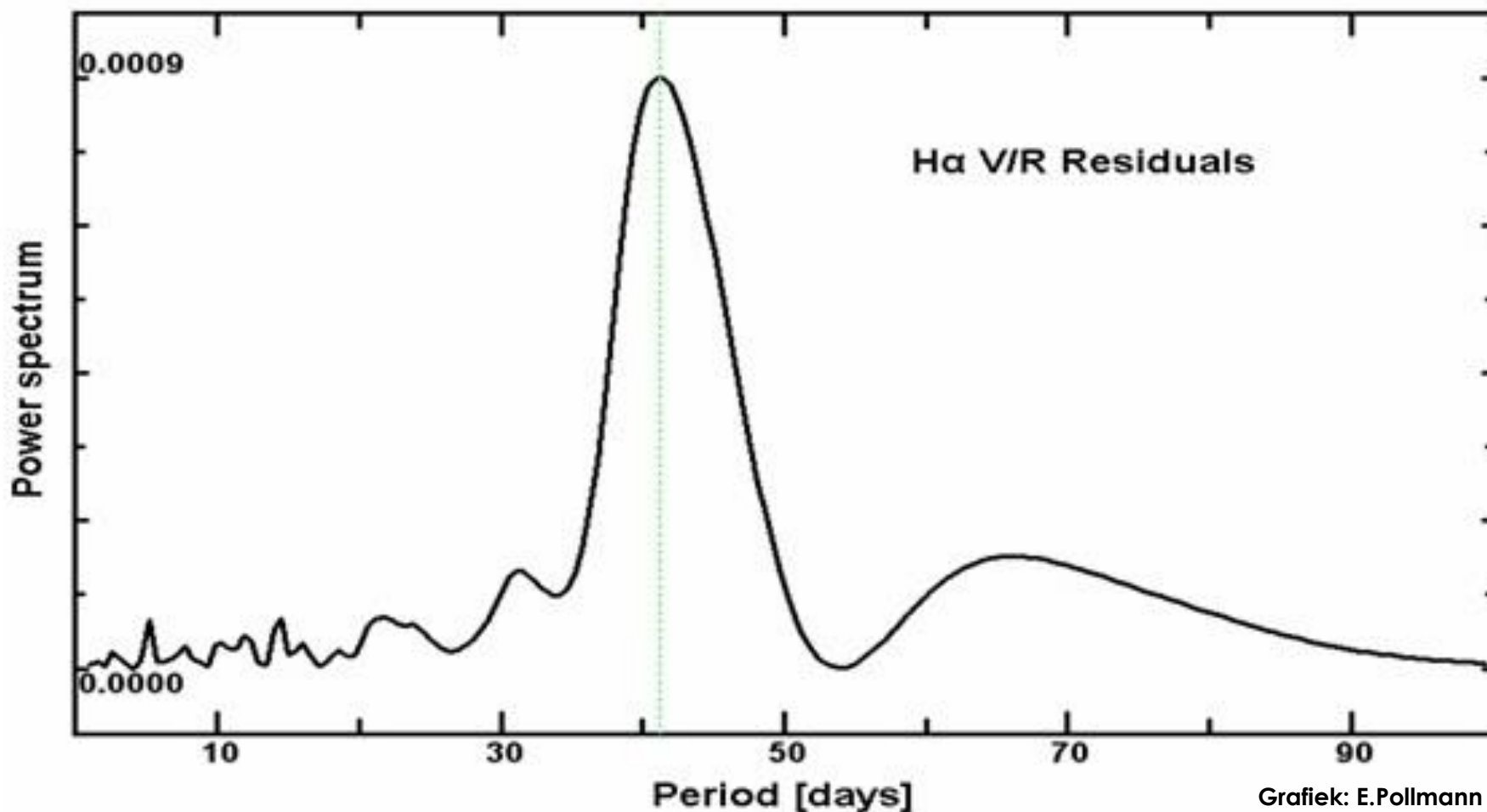


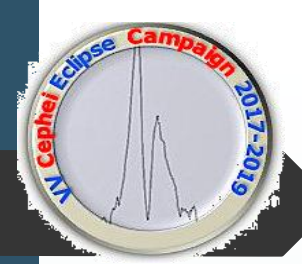


Analyse van de periodiciteit : Power Spectrum of Scargle periodogram

Data van de tijdserie
verminderd met de lange
termijn periode

Periode = ong. 42 dagen





SOFTWARE & LINKS

Radiale Snelheid:

Software programma HRV e.a.
door Roland Buecke

<https://astro.buecke.de>

Eclipserende Dubbelsterren Simulatie software:

Binary View / StarLight Pro

via: www.midnightkite.com

Kies : projects – Eclipsing Stars

phoebe-project.org

PHOEBE

ANALYSE van PERIODEN

AVE

astrogea.org/soft/ave/aveint.htm

Download zip bestand via : <https://www.aavso.org/content/software-resources>

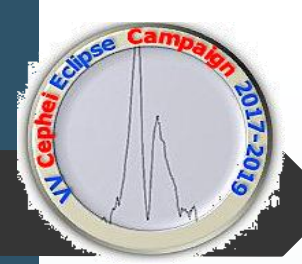
PERANSO

www.peranso.com

(betalend)

ESO Imbase workshop presentaties:

<http://www.eso.org/sci/meetings/2017/Imbase2017/program.html>



SOFTWARE & LINKS

ASCOM PLATFORM:

Platform voor sturing
van telescoop/camera/guiding: <https://ascom-standards.org>

Kies downloads voor installeren van:

- Ascom Platform, actueel versie 6.3
- Vervolgens Driver downloads voor uw Montering/Telescoop e.a.

Guiding Software:

PHD2

<https://openphdguiding.org>

Metaguide

www.astrogeeks.com/Bliss/MetaGuide/

SpecTrack Autoguiding

www.baader-planetarium.com/en/spectrack-autoguiding-software-for-spectroscopy.html

DANK U

