Eruptive stars monitoring and the ARAS database

Observing techniques, instrumentation and science for metre-class telescopes

Tatranská Lomnica, Slovakia

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Patricia Leclerc, Oil painting (in progress), 2018

Eruptive stars monitoring: the aim of the project

- Eruptive stars spectroscopic monitoring as a part of ARAS (Astronomical Ring for Access to Spectroscopy) program, an initiative to promote Amateur spectroscopy, firstly oriented Be: BESS data base (e.g. Neimer & al., 2011)
- Program initiated in 2008 and developped from 2013 Pisa meeting (multiwalenghts observation of bright novae, I. Generao de Aquilo & S. Shore) and Nova Del 2013
- Monitoring of Symbiotic stars, Novae, Dwarf novae … by amateurs using very small telescopes (20 to 40 cm, exceptionnaly 50-60 cm) and spectrographes with resolution from 500 to 15000 (exc. 50000)

Eruptive stars monitoring: the aim of the project

❑ Amateur program

- Long term monitoring of > 50 bright **Symbiotic Stars** (orbital variations, outburts, ...)
- Monitoring of **novae outbursts** (33 at the date)
- Spectroscopic identification of « new » stars
- → Spectra gathered in an open data base

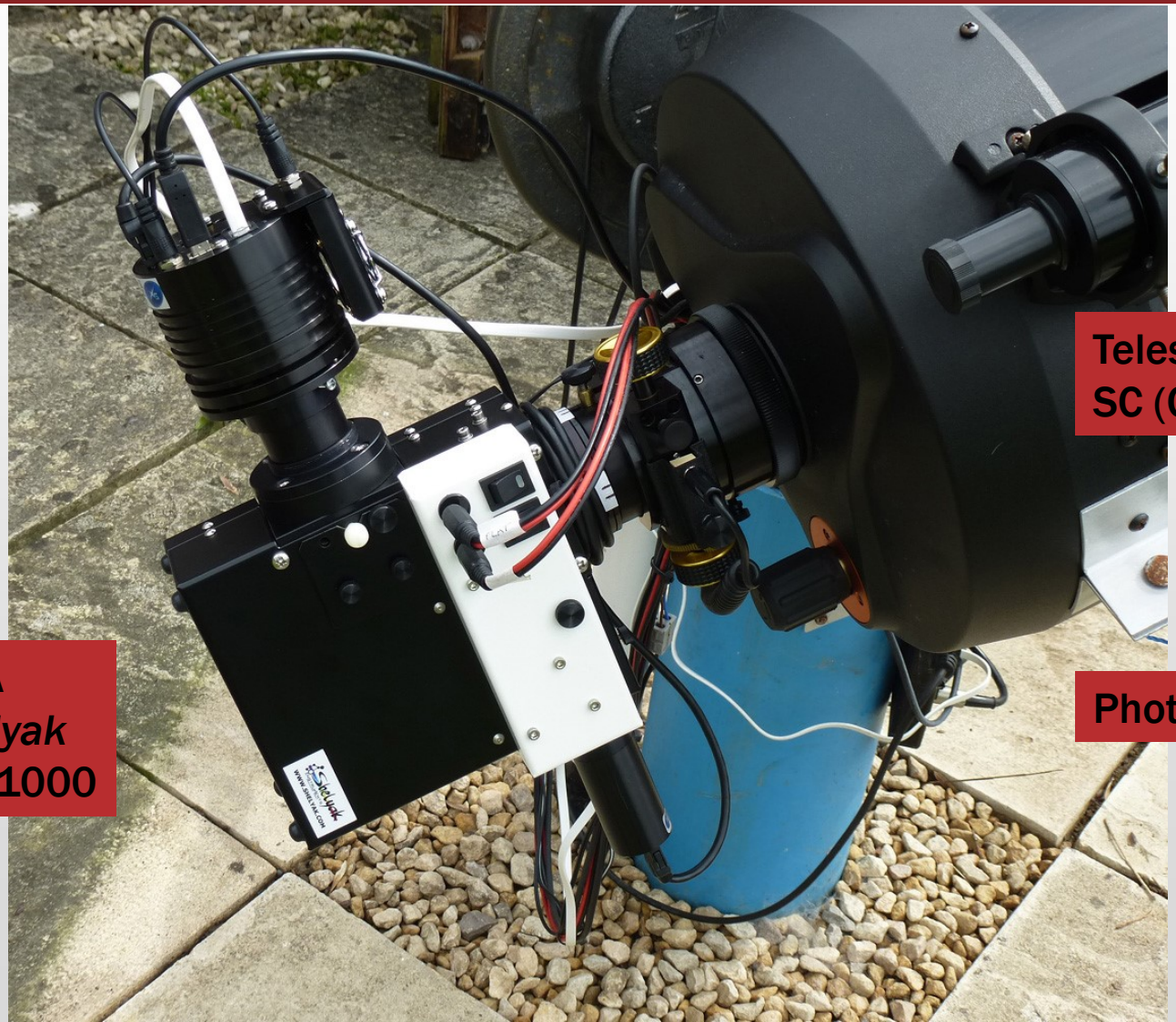
❑ Collaborations with professionnal teams

- Use of the database (e.g. AG Peg outburst, T CrB active state, EG And ...)
- Specific requests (e.g. CH Cygni, BF Cygni, R Aqr, SU Lyn ...)

Setups

David Boyd
UK

Flux calibrated spectra



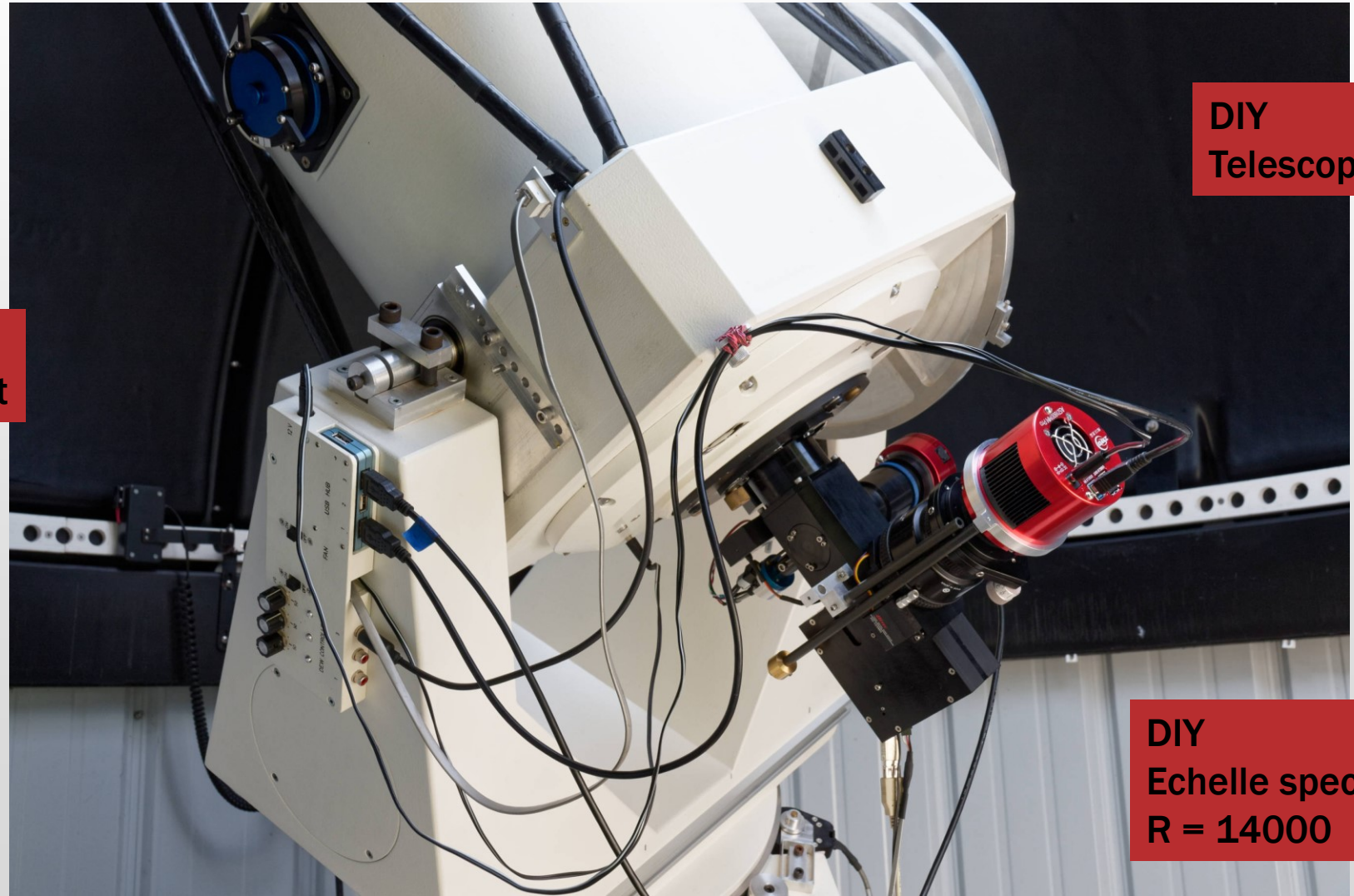
Telescope 280 mm
SC (Celestron)

LISA
Shelyak
R = 1000

Photometry BVR

Setups

Tim Lester
Ontario-CA



DIY
Mount

DIY
Telescope 310 mm

DIY
Echelle spectroscope
R = 14000

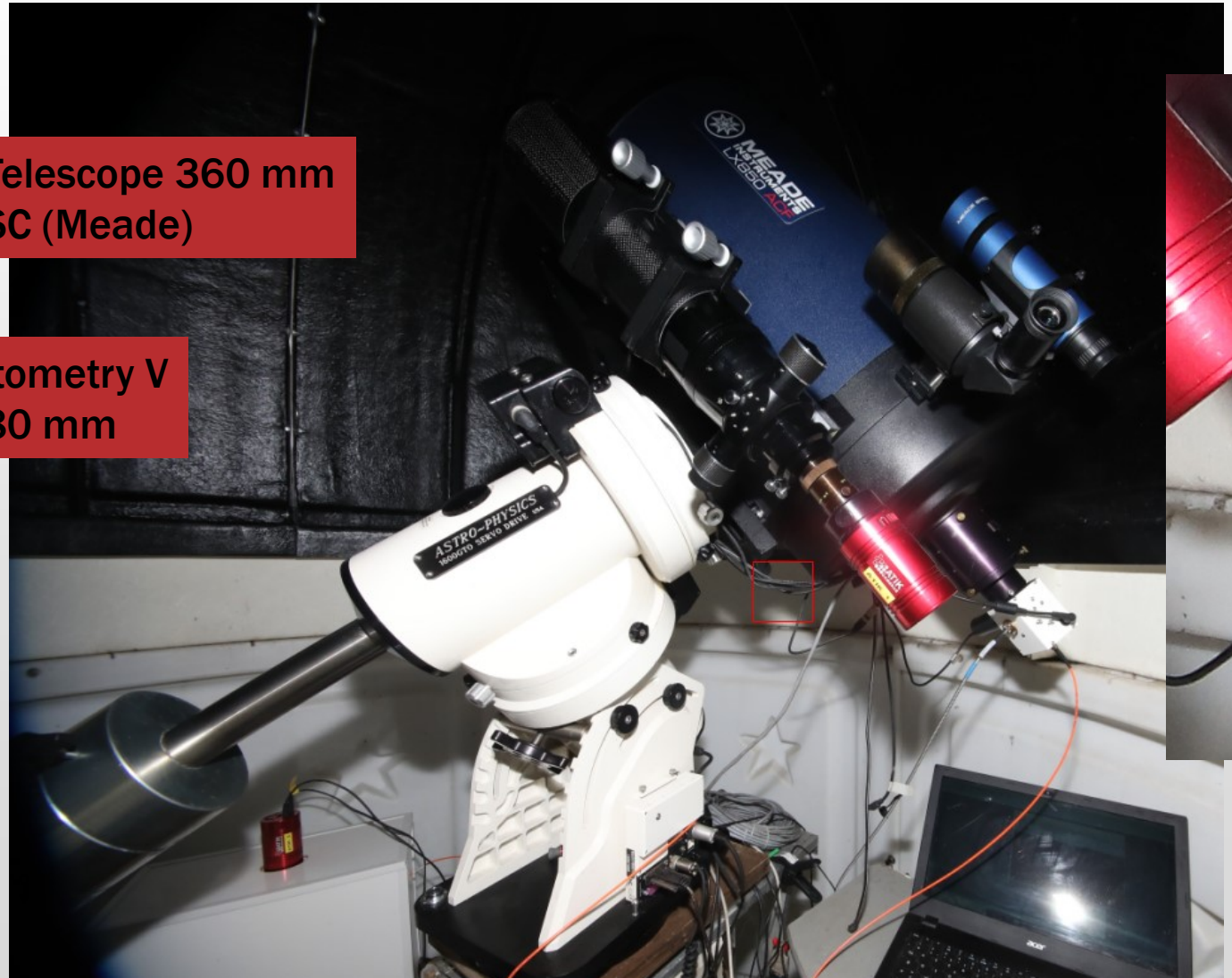
Setups

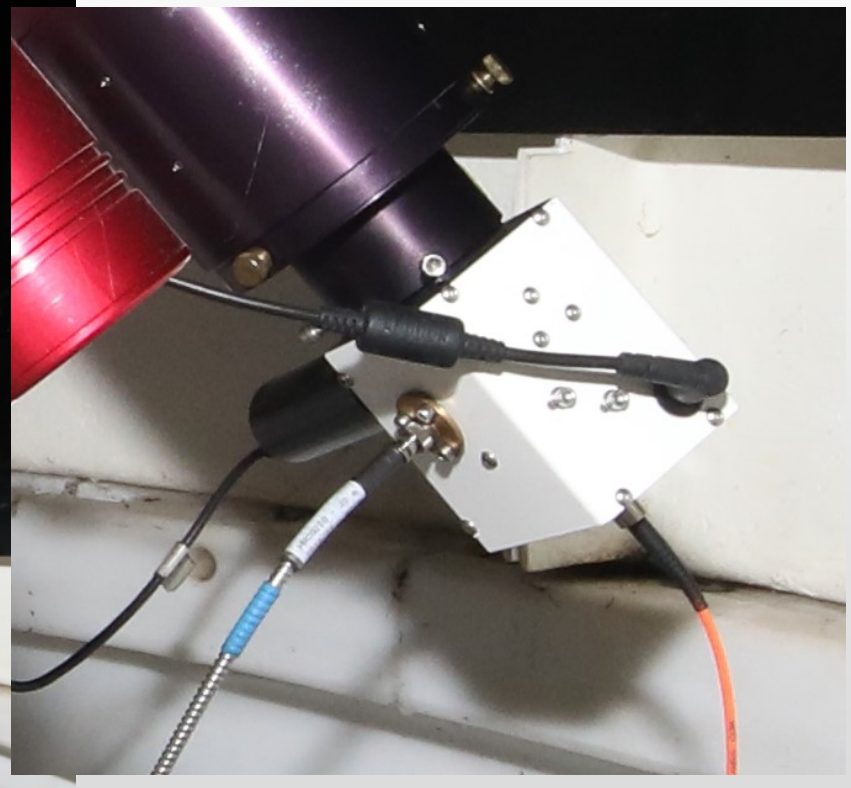
François Teyssier
FR

Telescope 360 mm
SC (Meade)

Photometry V
ED 80 mm

eShel
Shelyak
R = 11000

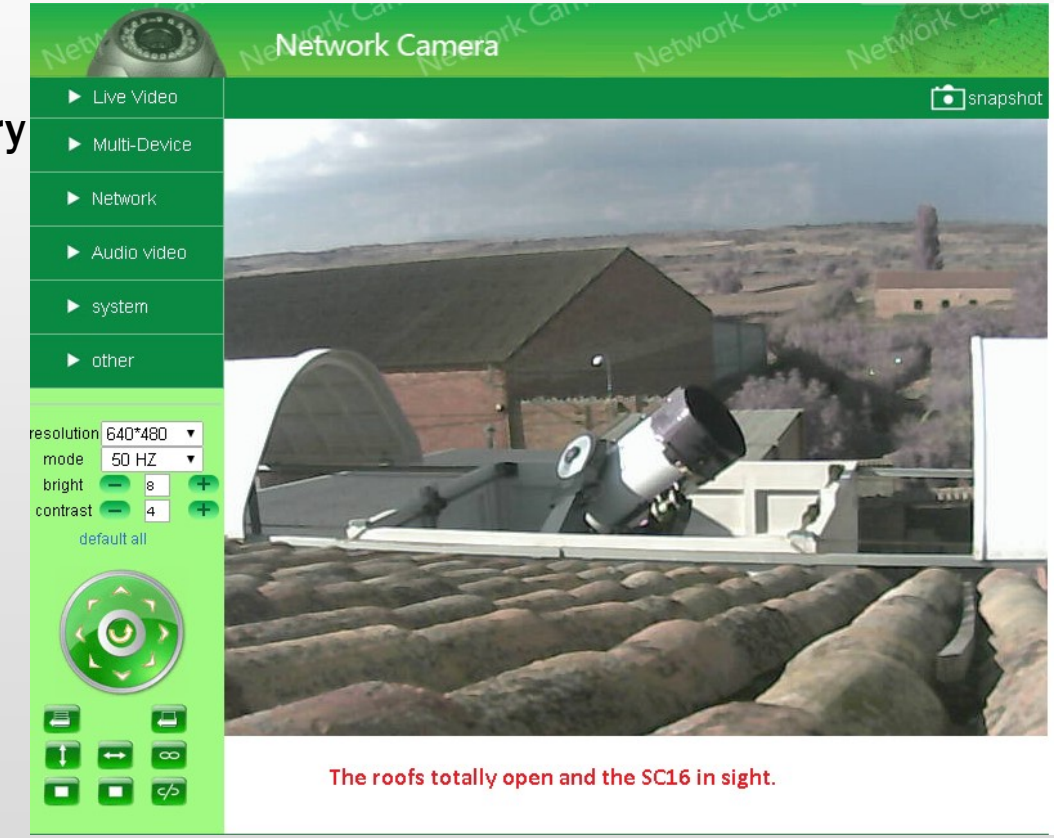




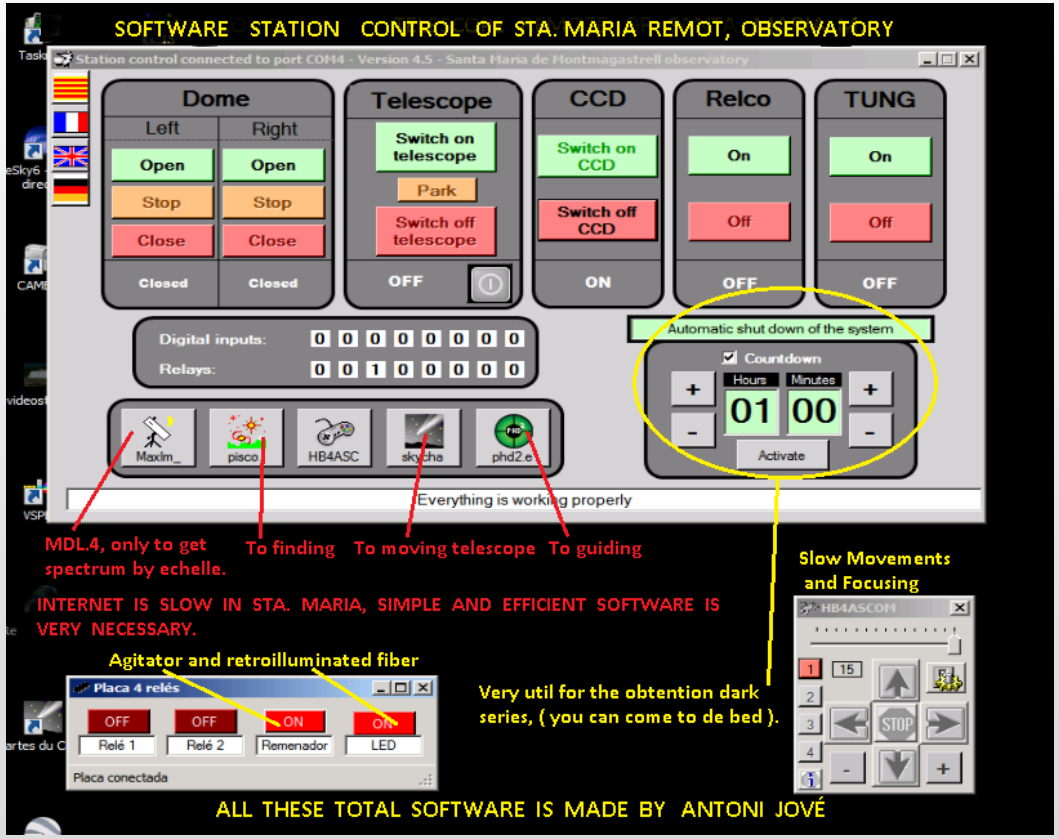
Autoguiding module

Setups

Joan Guarro Flò
SP
Remote observatory
With home-made
Echelle (R = 9000)



The roofs totally open and the SC16 in sight.



Acquisition and reduction

Acquisition

Fine tuning: collimation,focus, autoguiding → max of photons!
Common reference star (as often as possible)

Reduction

Offset and dark substraction, flat (Tu) division
Atmospheric and instrumental correction
Most of the spectra are processed using ISIS software (C. Buil : http://www.astrosurf.com/buil/isis-software.html)

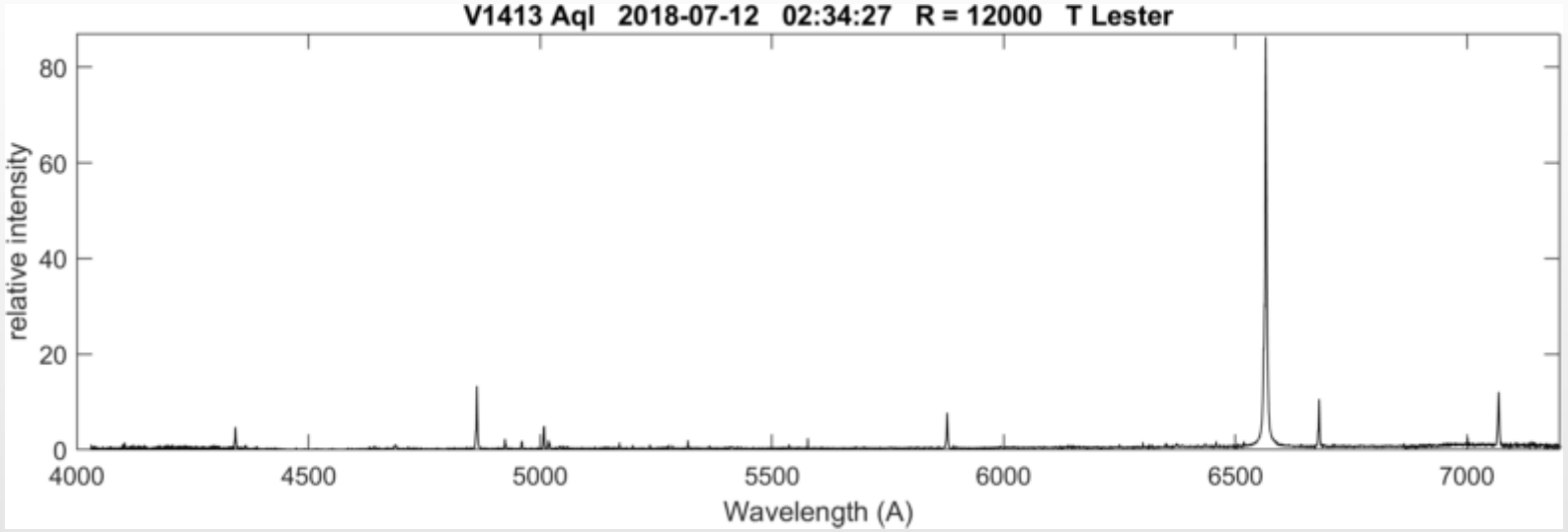
Fit header

Conform to BESS standart

How far?

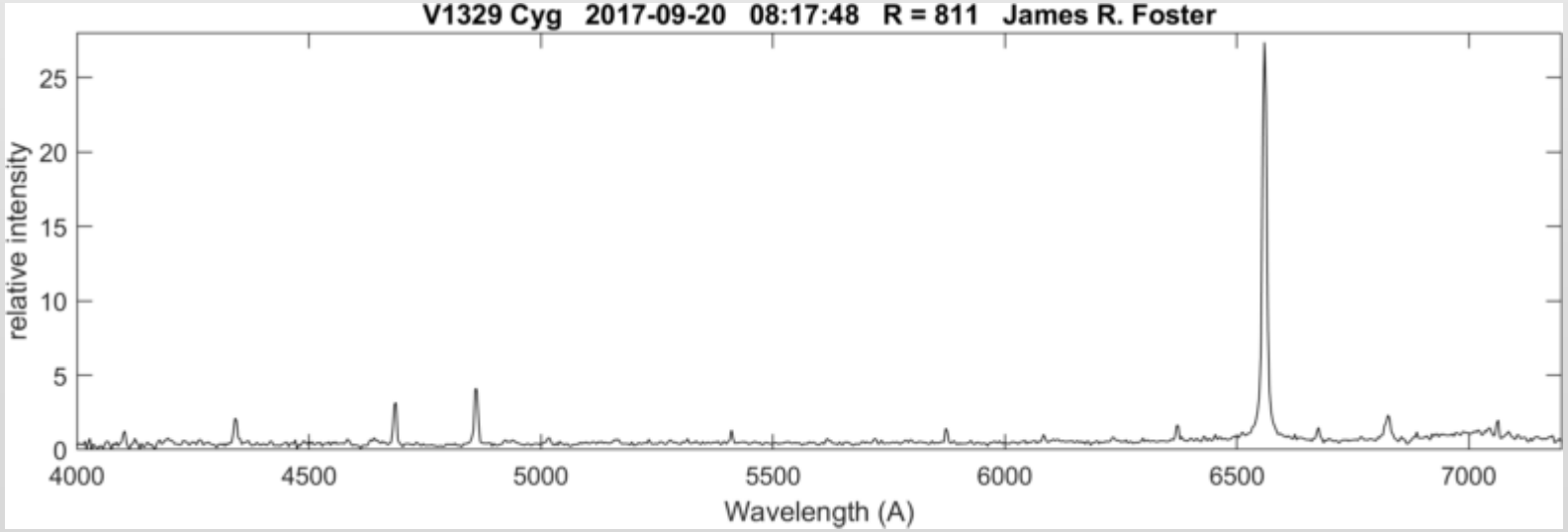
V1413 Aql

Tim Lester
Echelle (DIY)
8 x 1200 sec.
R = 12000
V mag = 13.3



V1329 Cyg

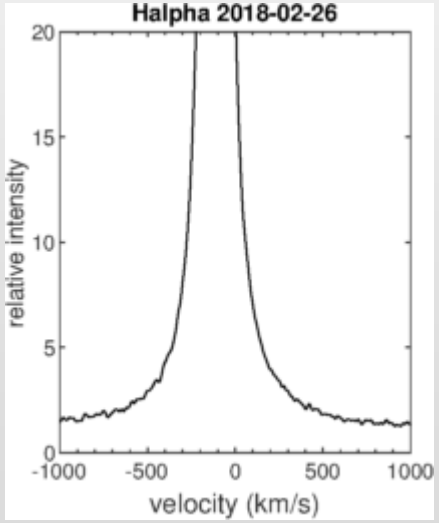
James R. Foster
LISA (Shelyak)
7 x 300 sec.
R = 1000
V mag = 13.9



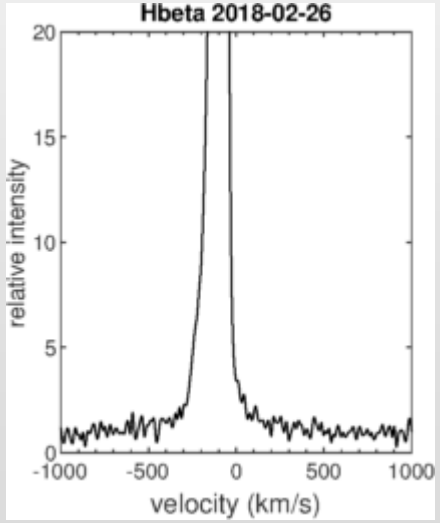
SNR evaluation

AX Per mag V ~ 11.2

T. Lester
Dall-Kirkham 310 mm
Echelle R = 13000
8 x 1200 = 8600 sec

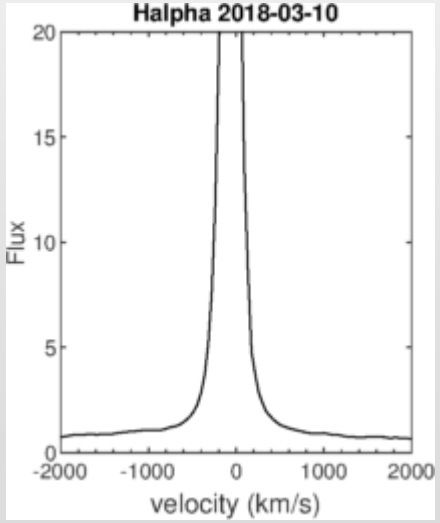


SNR = 80

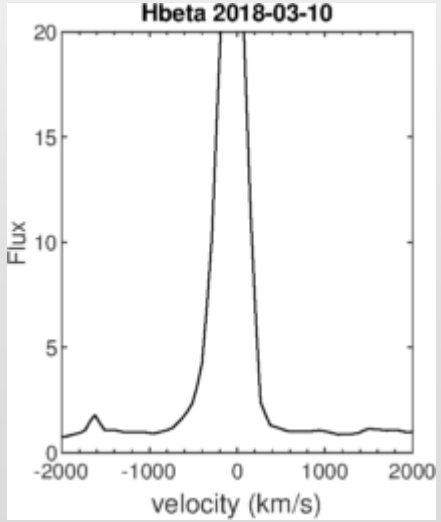


SNR = 15

D. Boyd
SC 280 mm
LISA R = 1000
14 x 300 = 4200 sec



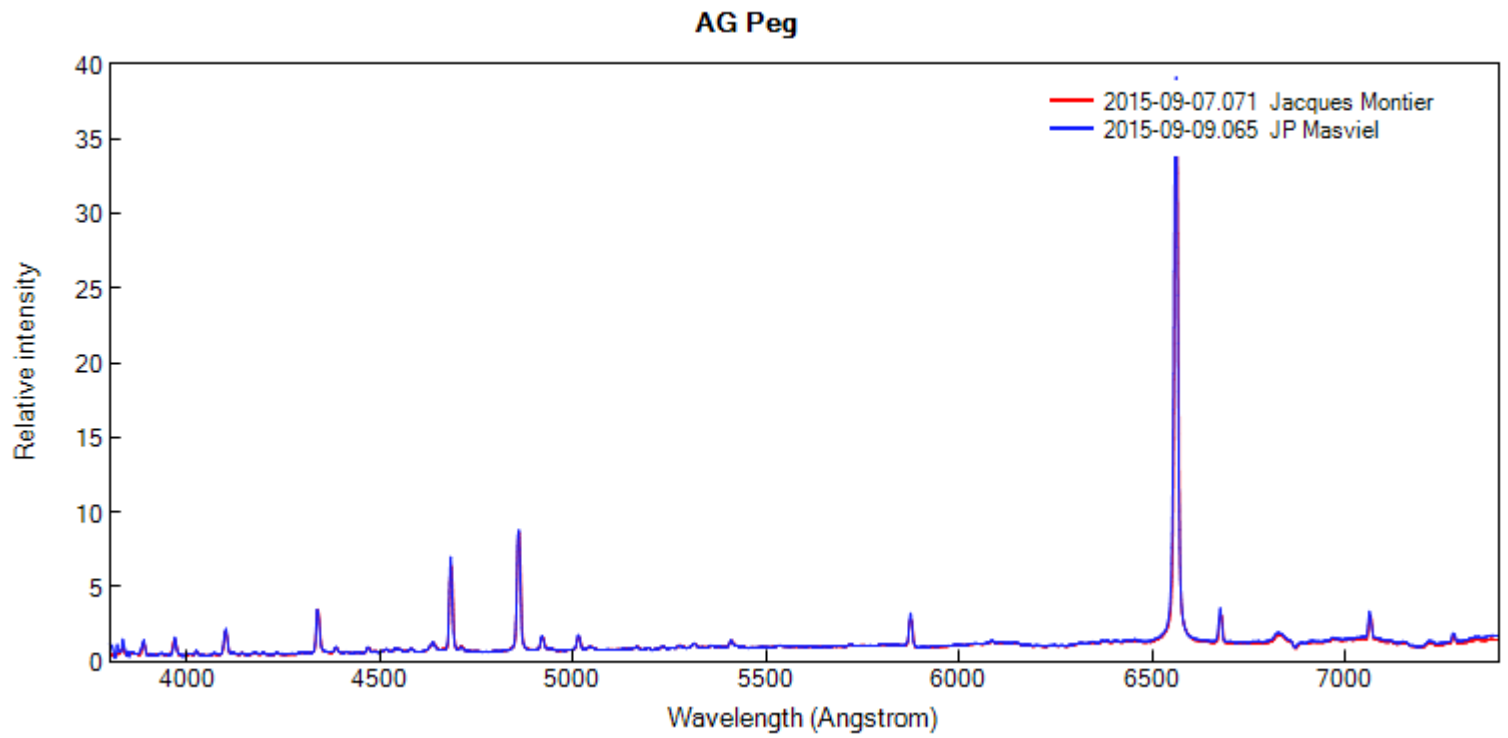
SNR = 120



SNR = 40

Atmospheric response

Our target level:



Spectra obtained and reduced independantly by Jacques Montier and J.P. Masviel
Alpy600 (Shelyak) R = 600

Same spectrograph
Same reference star
Low difference of altitude
between target and reference
Complete reduction with bias, dark, flat
Processed with ISIS

But, continually embarassing ...

Campaigns as a school for newbies and improvments for experimented observers

Symbiotic stars

Symbiotic stars:

Wide interacting binary systems

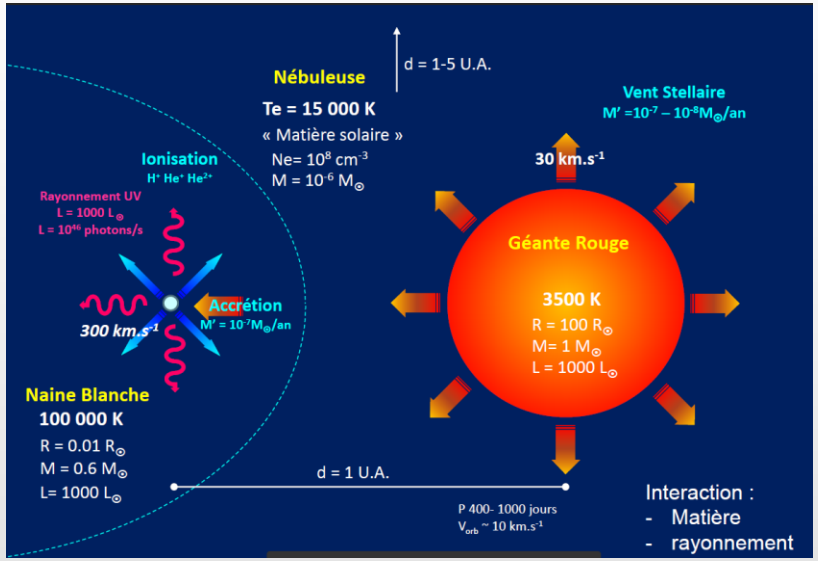
- **cool giant (K – M) : donor star**
- **hot compact star, white dwarf**

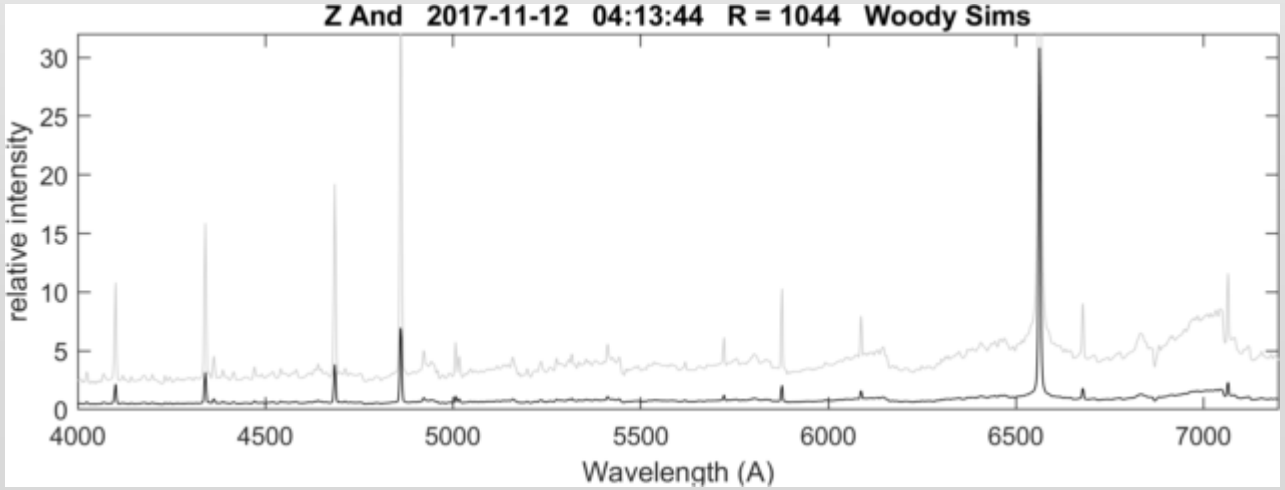
accreting from the giant's wind

source of UV radiation

ionization of the wind from the giant

→ nebular emission





Symbiotic stars, strongly variables:

- Orbital variations
- Hot and cool component Activity
- Symbiotic outbursts
- Symbiotic nova outburts

Symbiotic stars as laboratories:

- Accretion on compact objects
- Eruptive processes on compact objects
- Red giant wind
- Disks, jets …

Symbiotic stars:

- Continually embarrasing

> Persistent observations, both spectroscopic and photometric, for 5 or 10 years of the brighter symbiotic stars would surely help us understand their mysterious behaviour and might develop ideas of considerable general interest.

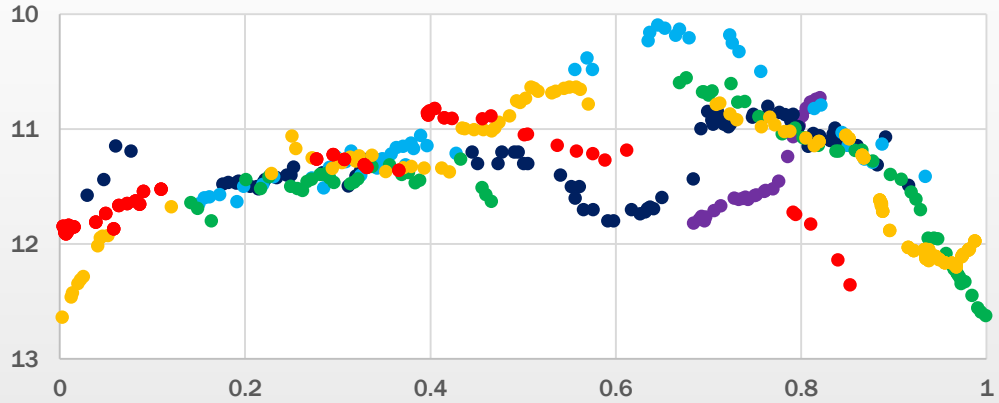
Merrill, 1957

Results: AX Per orbital and outbursts variations

AX Per: classical symbiotic
Long term monitoring at low resolution by David Boyd (UK)

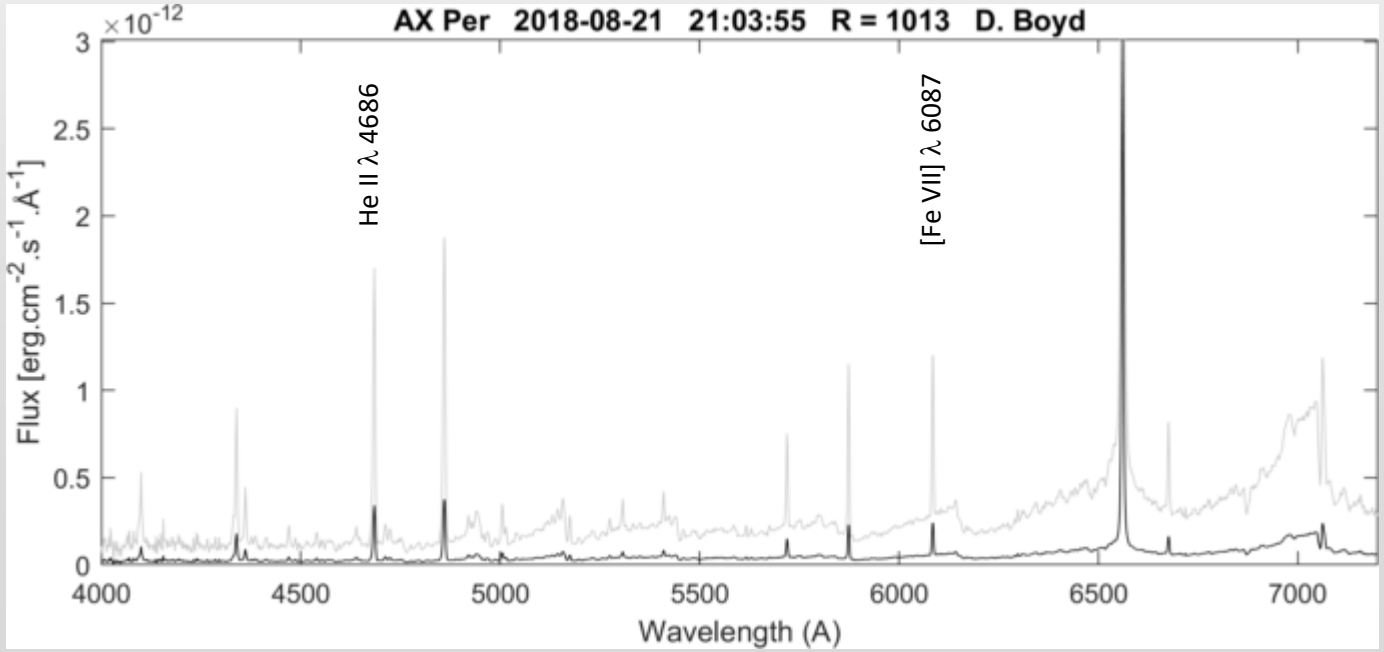
Ephemeris
P = 680.83 d
JD0 = 2447551.26
Mikolajewska & Kenyon, 1992

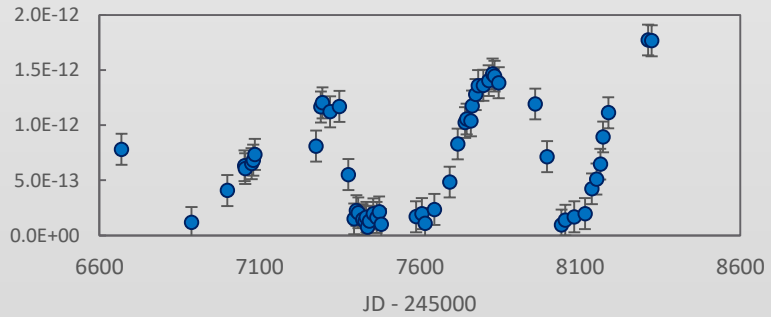
Cycle	Color
26	
27	
28	
29	
30	
31	



AAVSO V band light curve
With respect to phase

Typical spectrum of AX Per
Obtained by David Boyd with LISA (R = 1000)

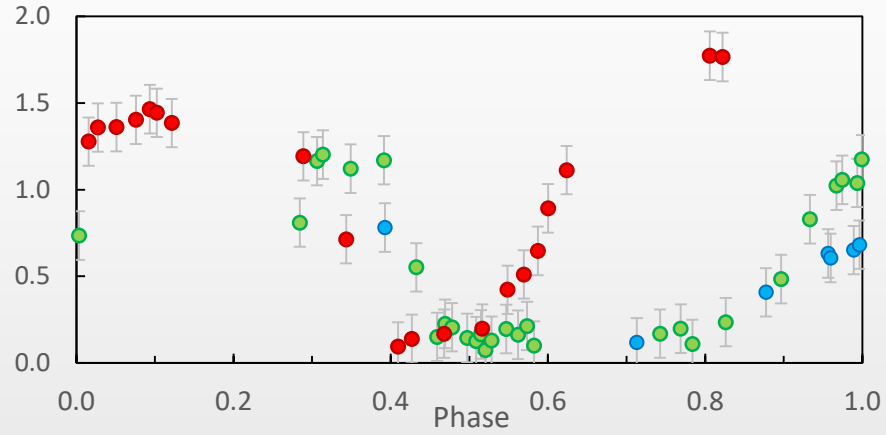




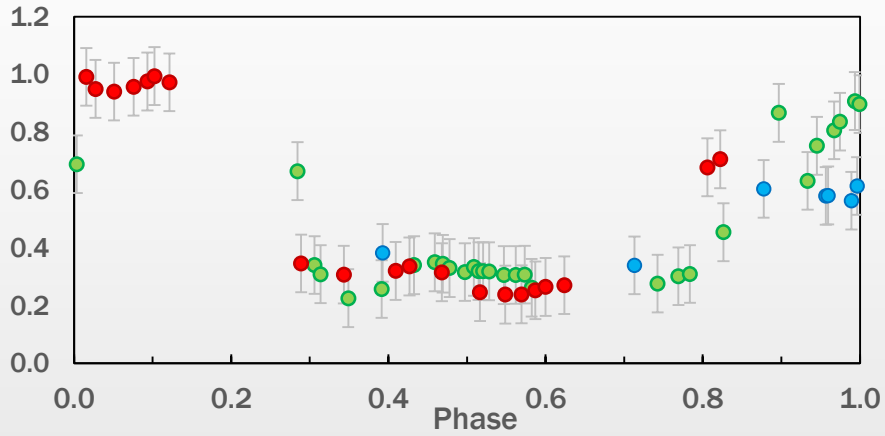
[Fe VII] 6087 flux (erg.s^{-1}.cm^{-2})
Since 2014, orbital cycles 29 to 31 (current)

Flux measurements: D. Boyd

Results: AX Per orbital and outburst variations
Diagnostics from lines

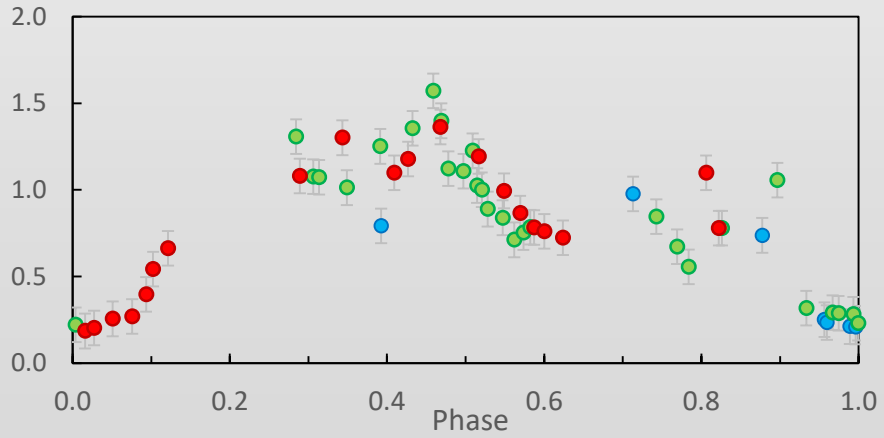


[Fe VII] flux in units of 10^{-12} erg.cm^{-2}.s^{-1}

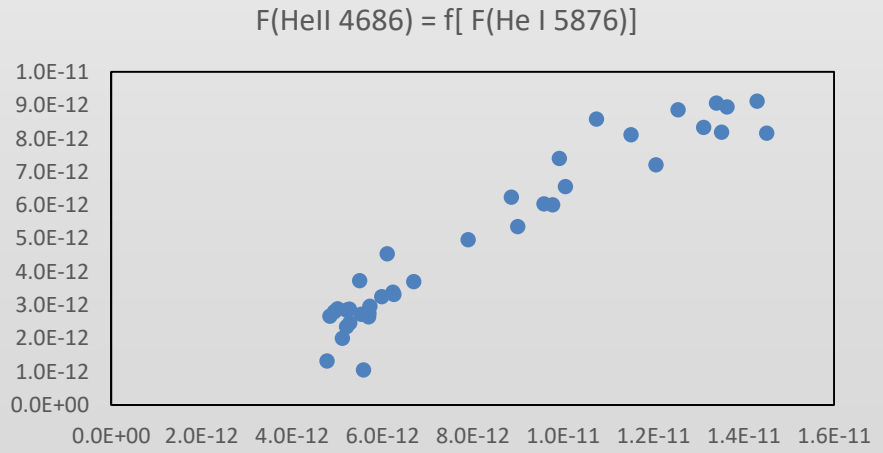


He II 4686 / (Hβ) flux

Cycle 29
Cycle 30
Cycle 31

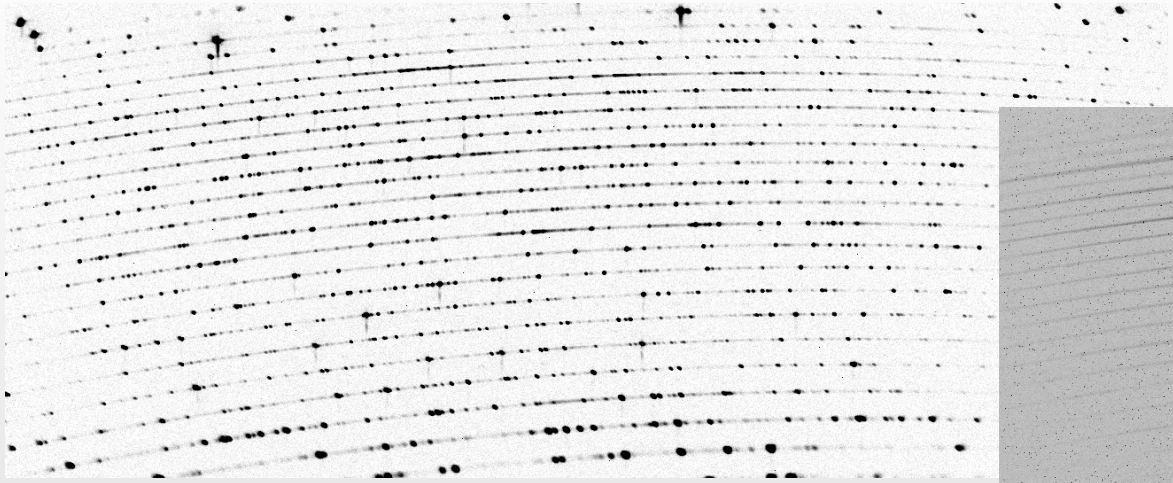


HeI 6678 / HeI 5876 ratio as evaluation of electronic density



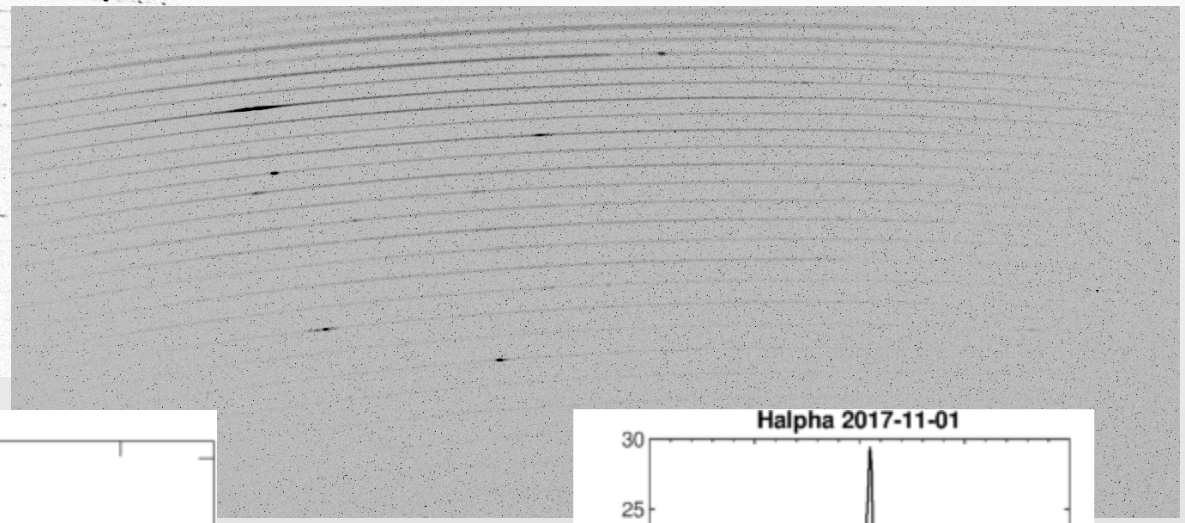
Flux (erg.cm^{-2}.s^{-1}) He II 4686 with respect to He I 5876

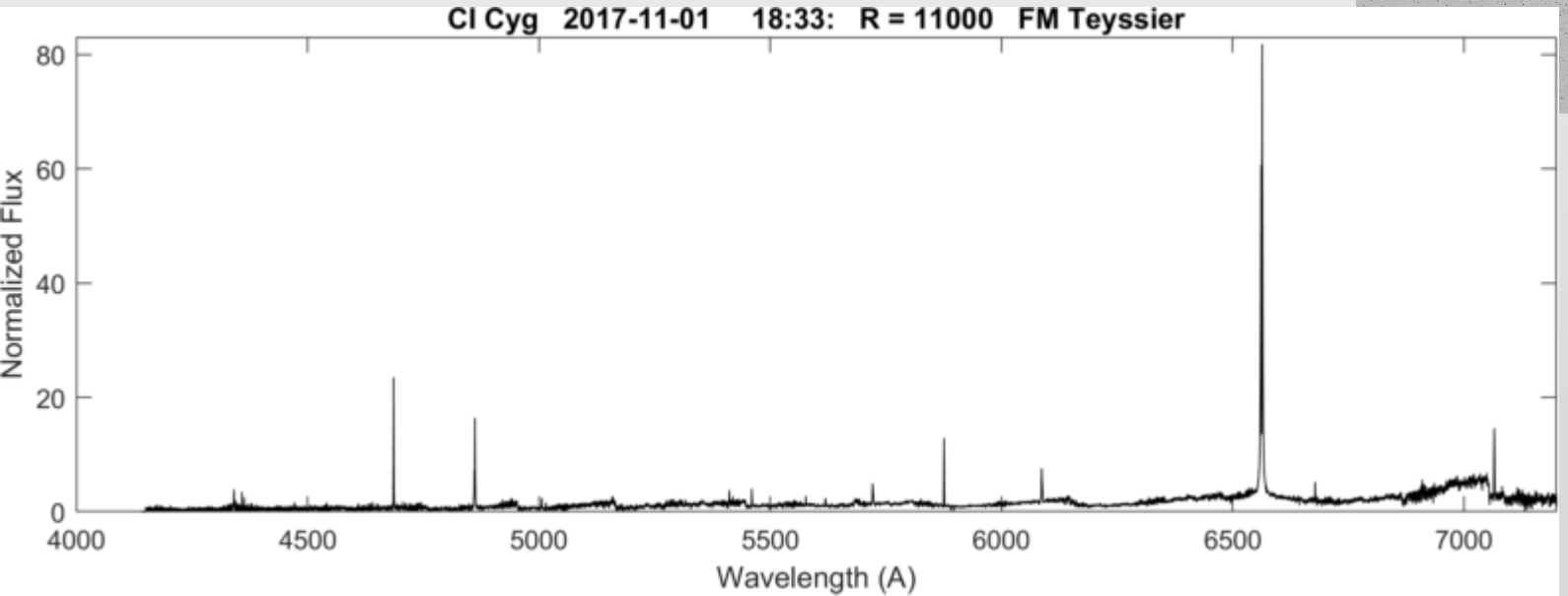
Results: CI Cygni orbital elements



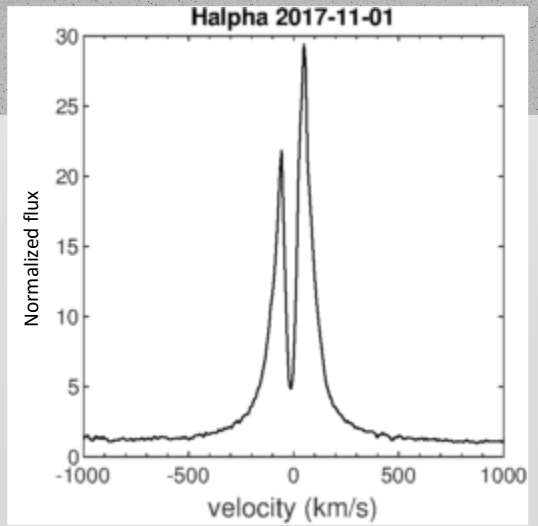
Thorium calibration

Raw image Exposure 600 sec.



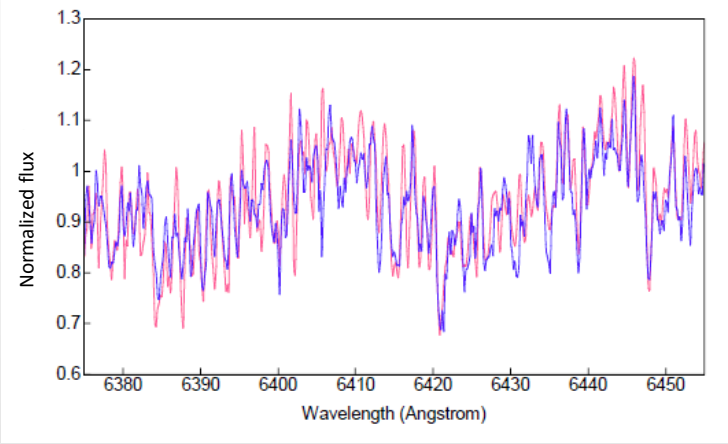


Merged Spectrum
From 8 x 600 sec exp.



Results: CI Cygni orbital elements

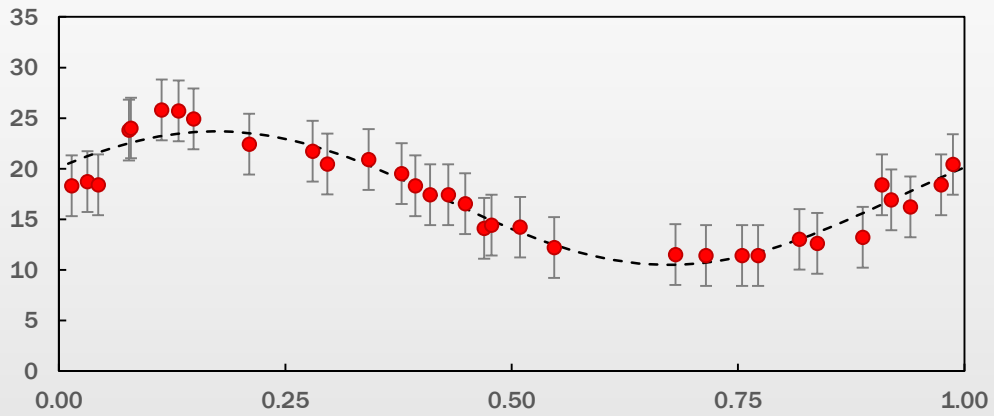
Cross correlation (ISIS)



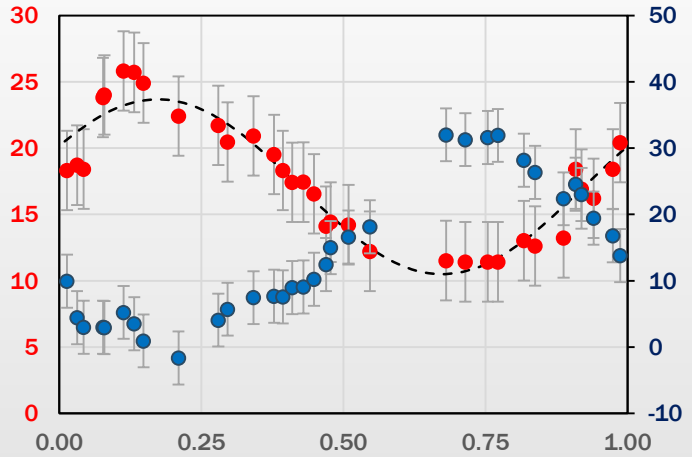
Range 6370-6460 Å
CI Cygni
13 Lyr M6 III Reference

Red giant orbit

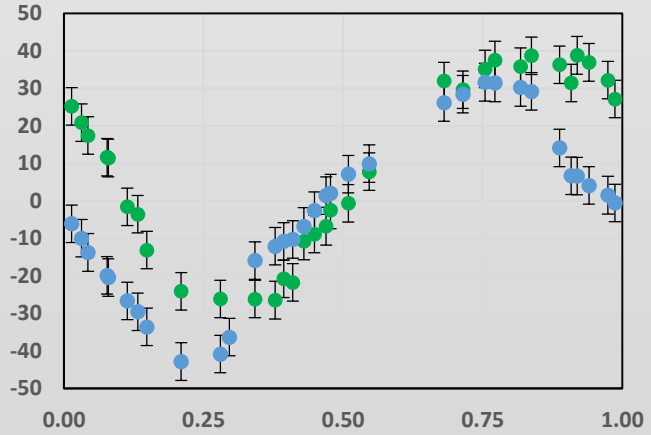
RVg [km.s^{-1}]



Kg He II [km.s^{-1}]



[Ca VII] 5618 [Fe VII] 6087 [km.s^{-1}]



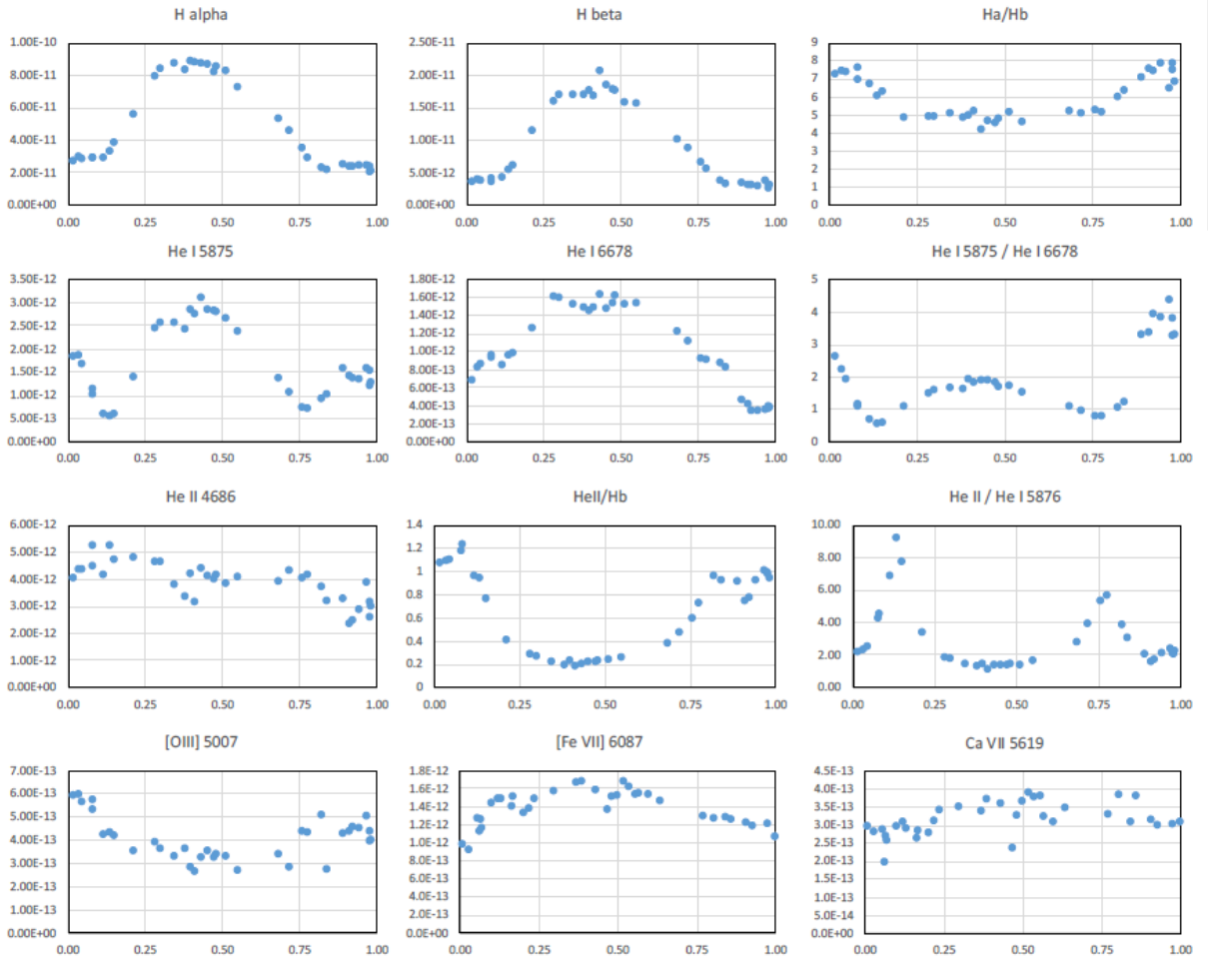
	Kenyon & al., 1991	Fekel & al., 2000	ARAS 2018
P days	855.25	853.8 +/-2.9	853.8 [1]
T HJD		2450426.4 +/-59.6	2456512.9+/-56.8
γ km.s^{-1}	18.4 +/- 0.4	14.96 +/ -0.23	15.33+/-0.24
K1 km.s^{-1}	**7.0+/-0.5**	**6.70+/-0.23**	**6.63+/-0.37**
e	0	0.109+/-0.048	0.126+/-0.058
ω		297.7+/-24.7	341.2+/-21.8
a sin i km	78.8 +/-9.4 10^6	78.2 +/-9.4 10^6	77.2+/-6.2 10^6
f (m)	0.027+/-0.010	0.0262+/-0.0035	0.0252 +/- 0.006

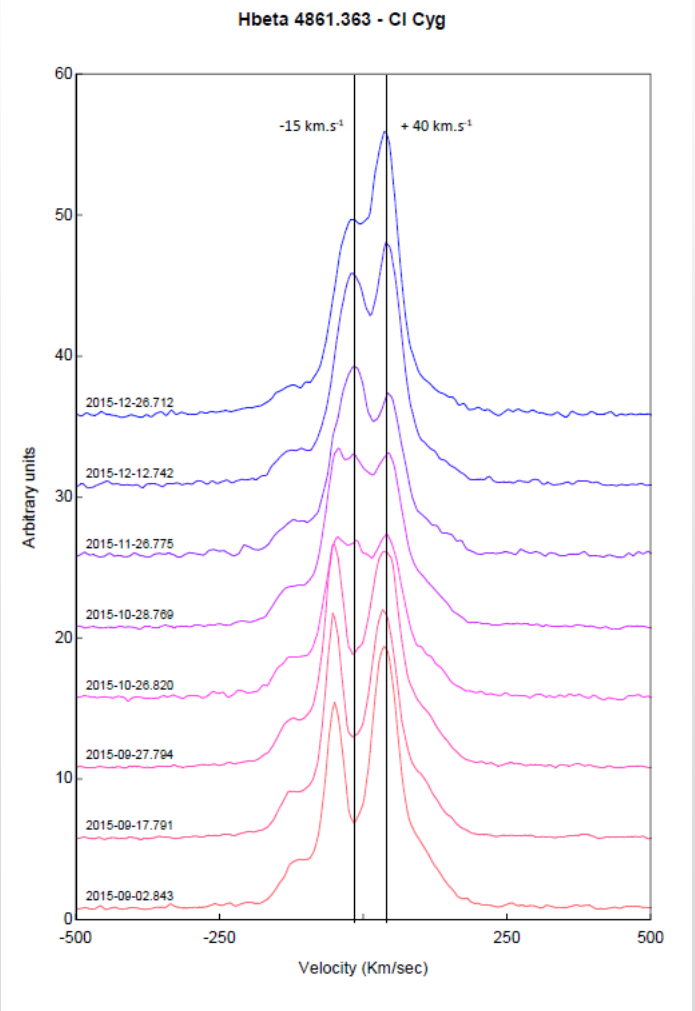
[1] adopted from Fekel & al. 2000

Echelle spectra (33)
R = 9000 to 13000
F. Teyssier (FR)
J. Guarro Flo (SP)
T. Lester (CA)

Orbital elements
Computed with SBS

Results: CI Cygni



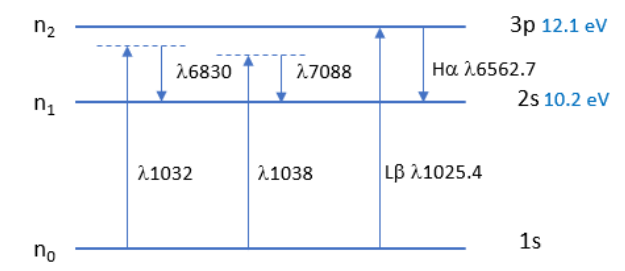


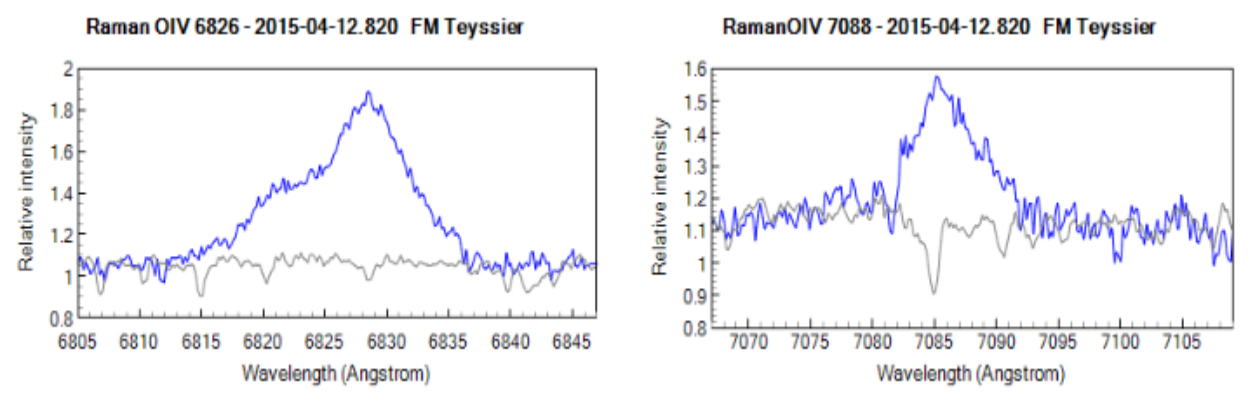
R.V. = 15 km.s^{-1}

Example
H beta profile
From phase 0 to 0.15

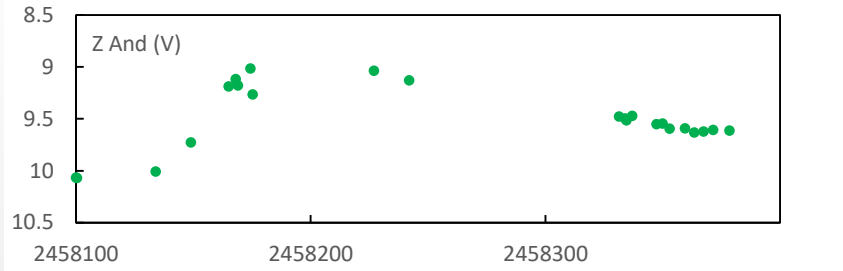
Results: Raman OVI λλ 6830, 7088 Å

Mysterious lines marked « ? » in number of publications
Identified as Raman scattering of OVI λλ 1032, 1036 by H^0
in 1990 by Schmid
Characteristic of Symbiotic Stars (Belckzinski & al., 2000)



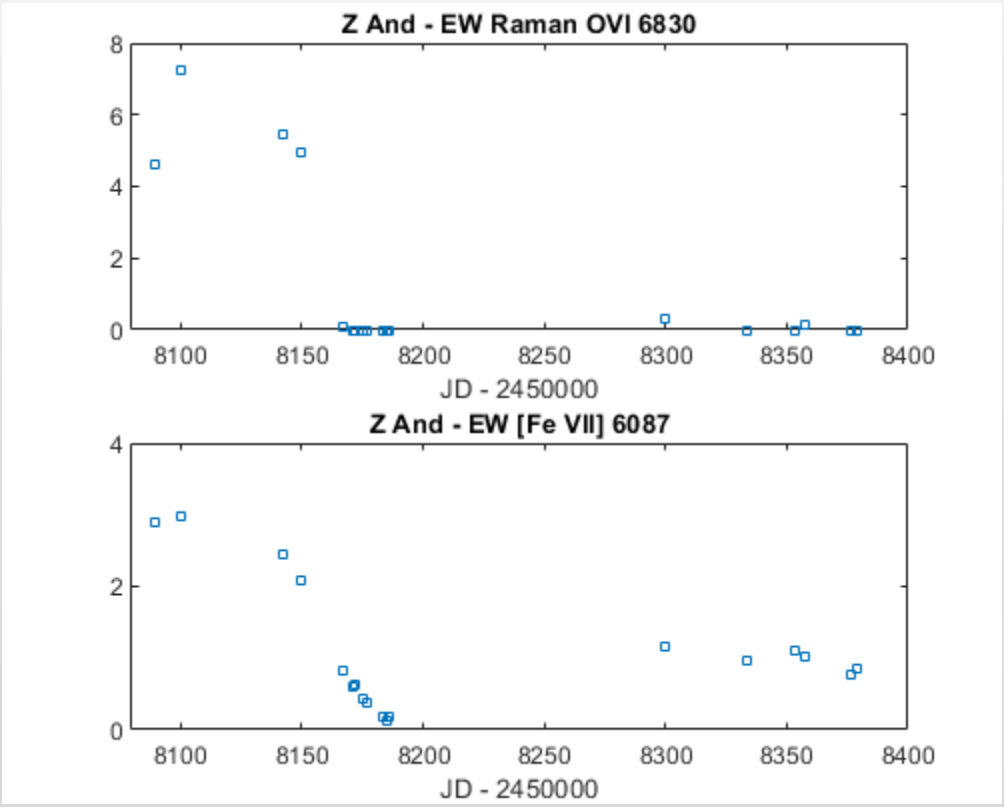


AG Dra Raman bands



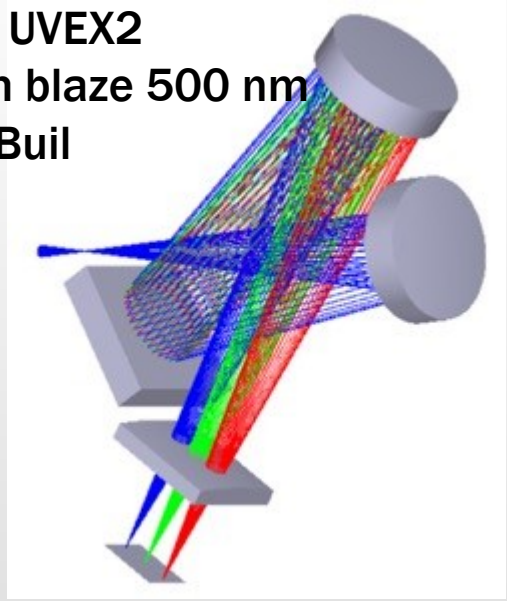
Z And 2018 outburst

Echelle spectra
Joan Guarro Flo
Tim Lester
François Teyssier

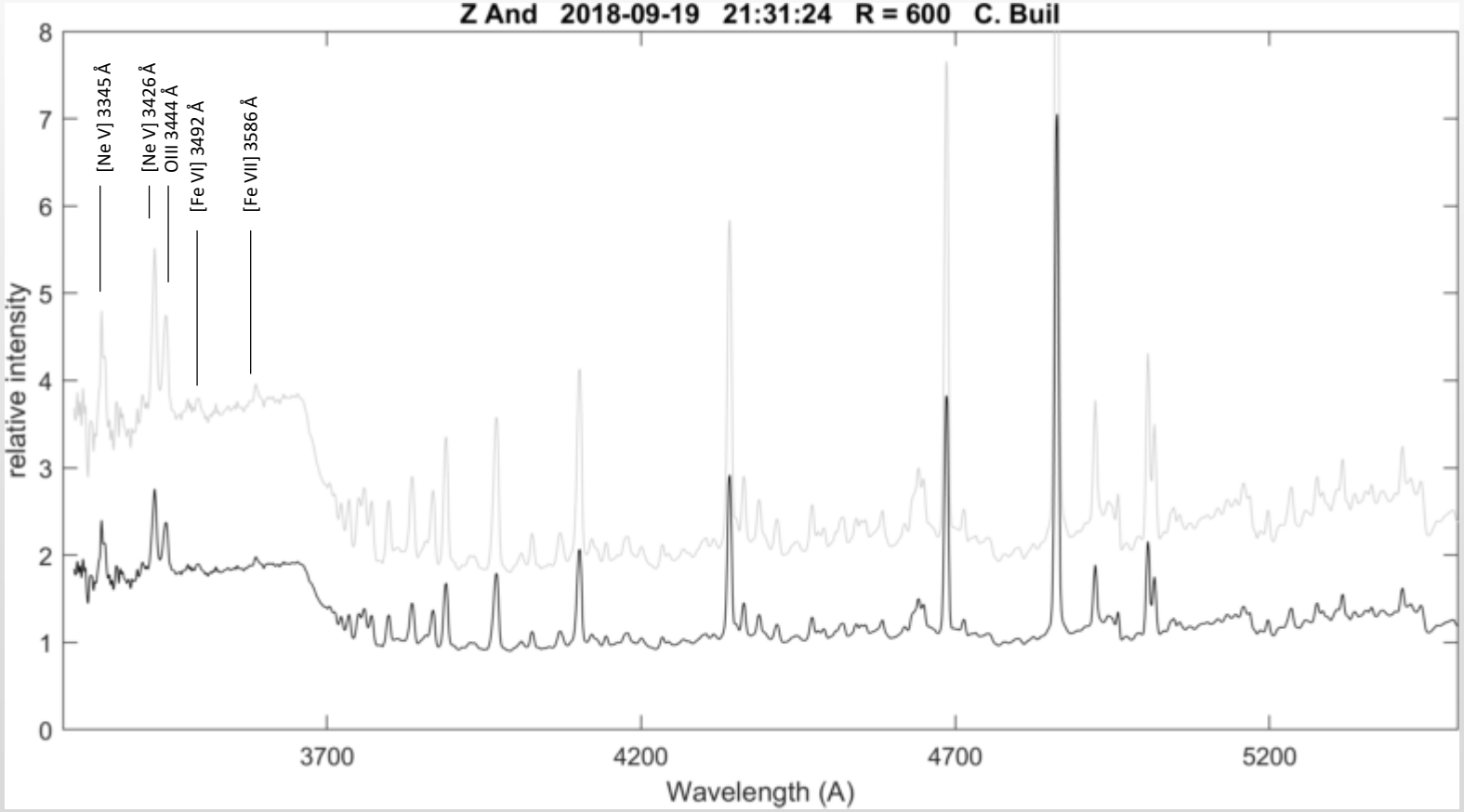


Ongoing: beyond visible frontiers – near UV

Near UV
Prototype UVEX2
300 l/mm blaze 500 nm
Christian Buil



Z And
Declining outburst V = 9.6
RC 25 cm - 13 x 900 sec

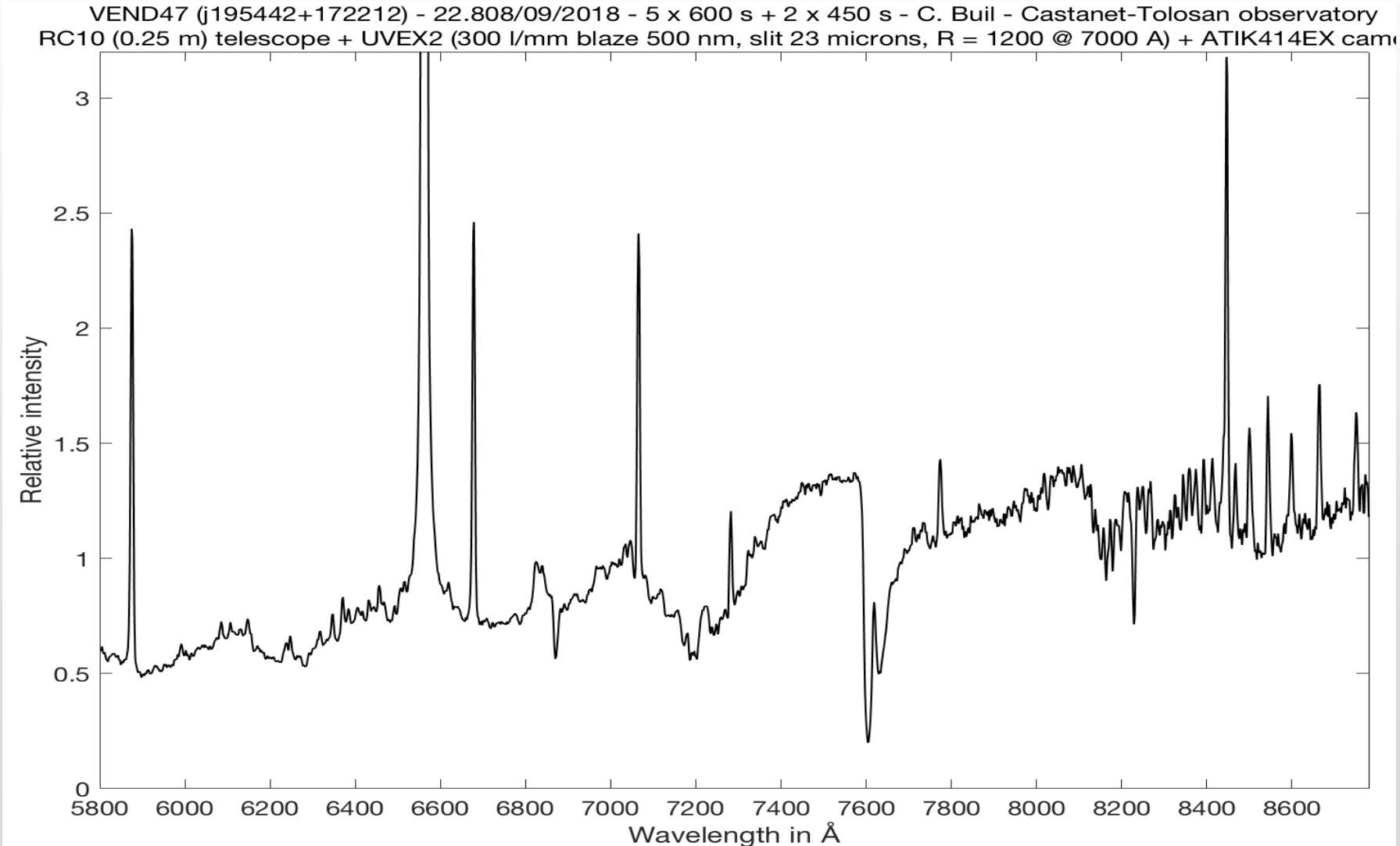


Line identification: C. Buil

Pb: response of amateur CCD in the UV

Ongoing: beyond visible frontiers – near IR

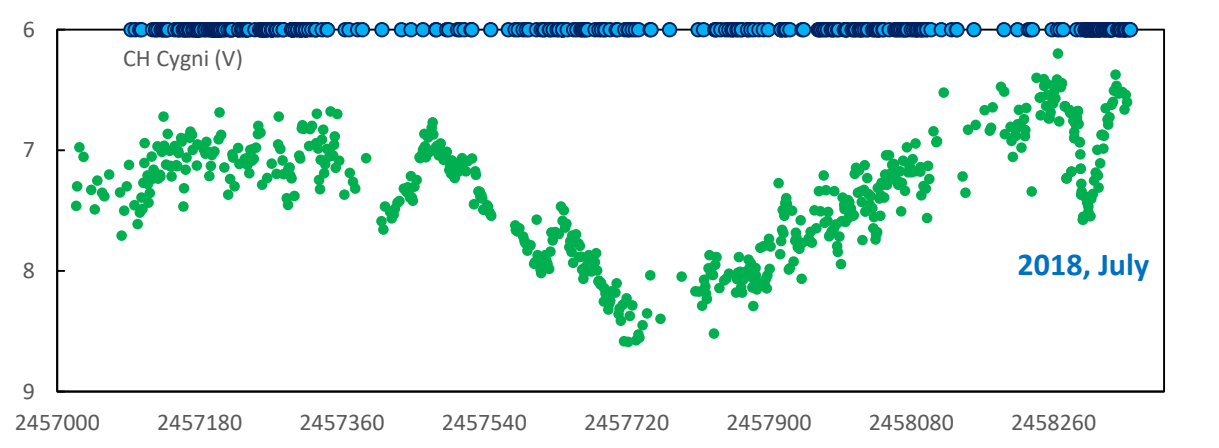
Near UV
Prototype UVEX2
300 l/mm blaze 500 nm
Christian Buil



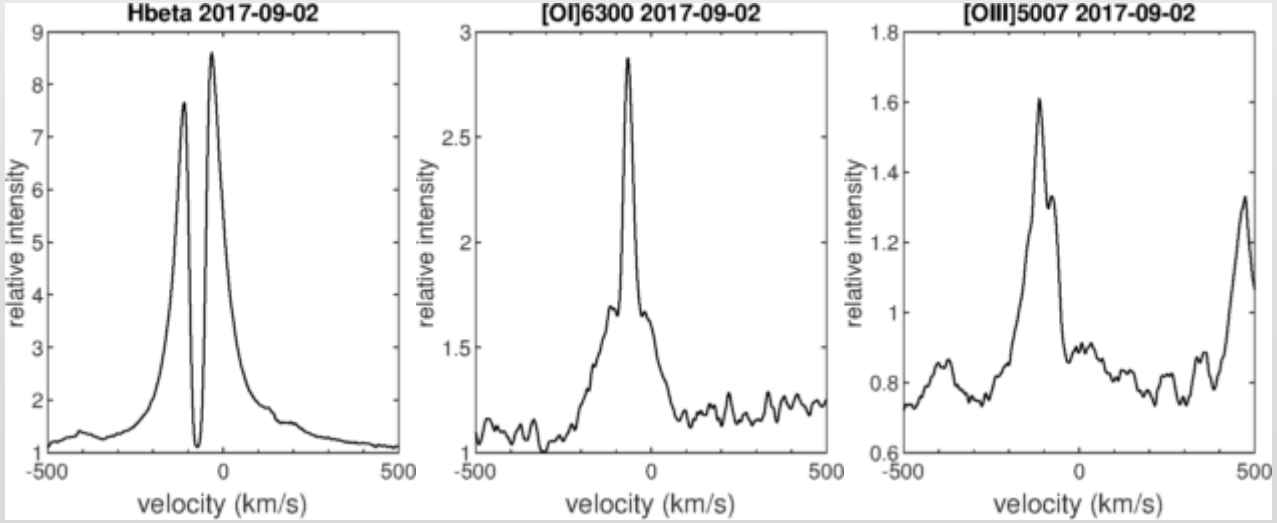
Results: CH Cyg
Long term monitoring

Complex star, MIII6 standart until 60'
Accretion powered (Lh ~ 50 $L_{\odot}$)
Strong flickering (++ 100 sec time scale)
Models: Accretion disk, magnetic rotator, jets

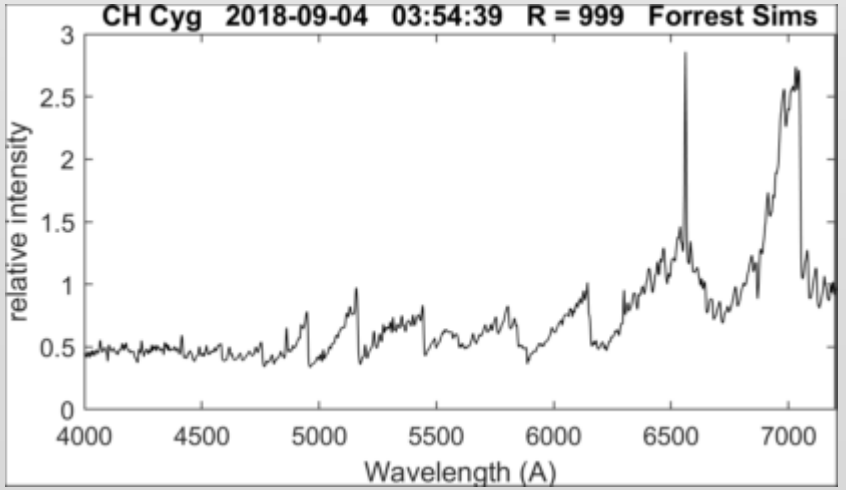
Requests from (independently):
Augustin Skopal
Margarita Karovska



Echelle spectra (R = 9000 to 13000): dots at y = 6
F. Teyssier (FR) J. Guarro Flo (SP) T. Lester (CA) O. Garde (FR), T. Lemoult (FR) S. Charbonnel (FR) C. Buil (FR)
AAVSO V lightcurve – Daily mean: **strong flickering** at certain periodes



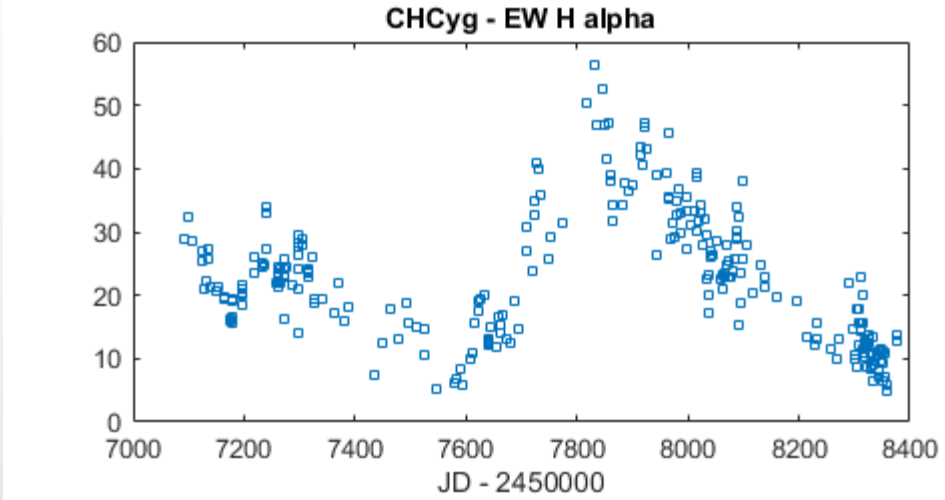
Selected lines - Joan Guarro – Echelle R = 1000

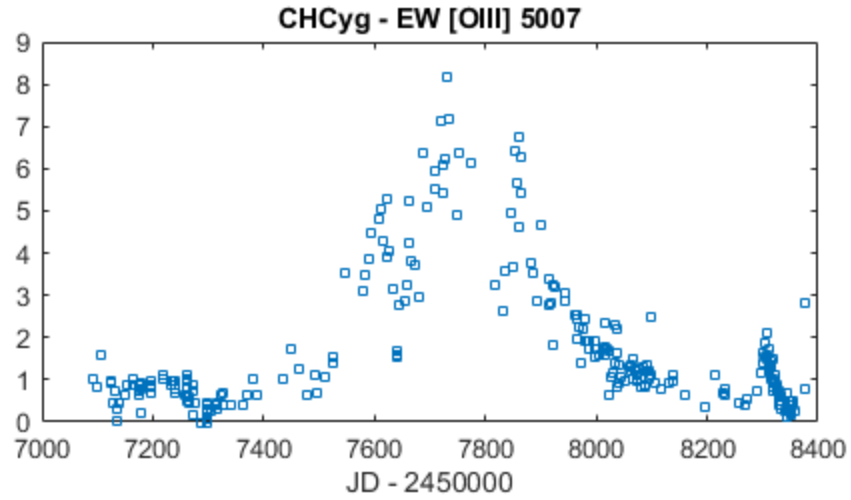


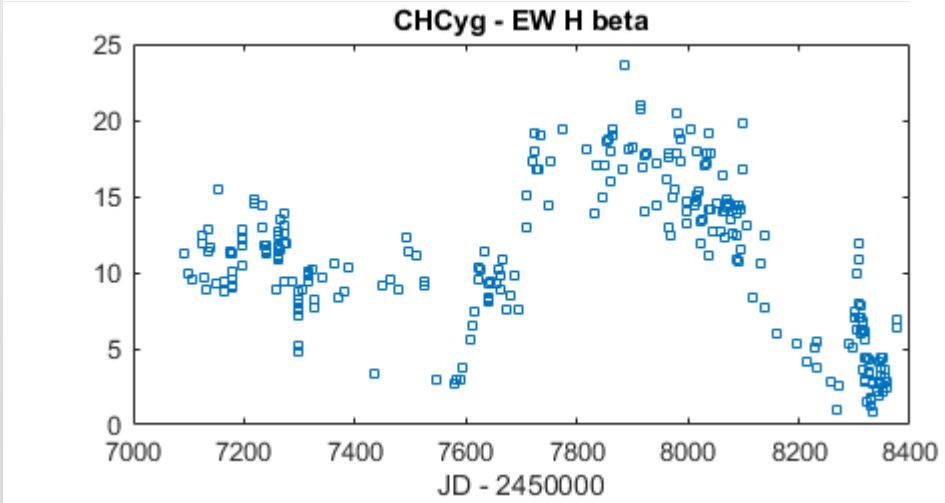
F. Sims (US)
LISA R = 1000

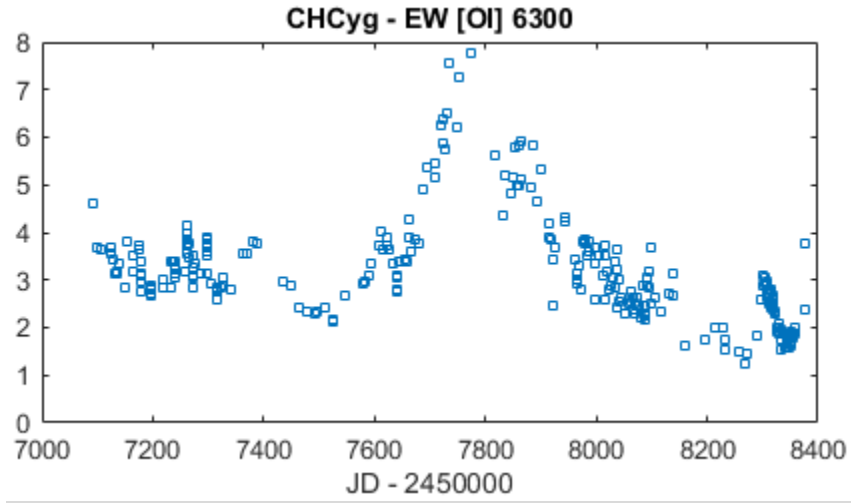
Results: CH Cyg
Long term monitoring

Since 2015
265 Echelle spectra



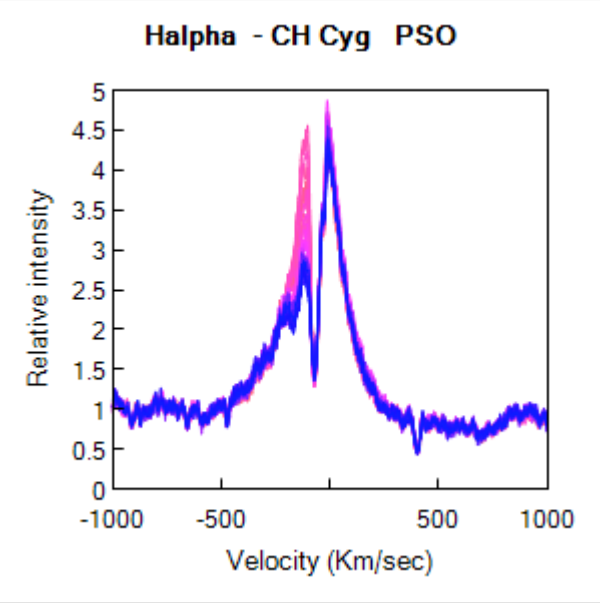




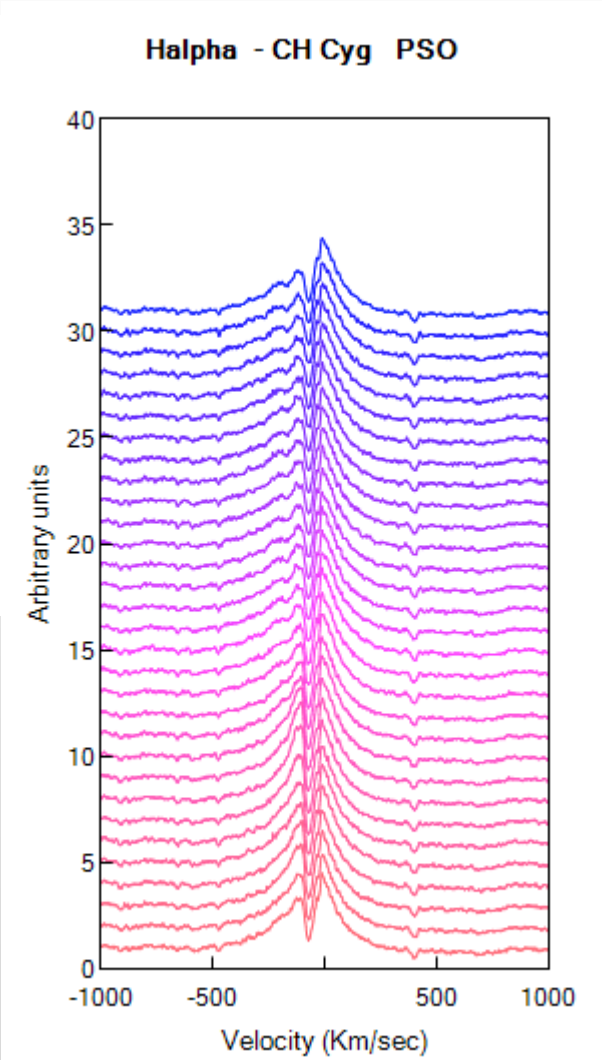


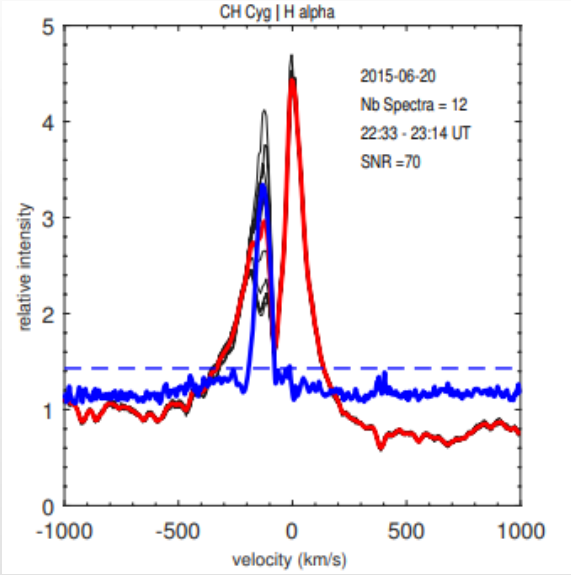
C. Buil
S. Charbonnel
O. Garde
J. Guarro
T. Lemoult
T Lester
F. Teyssier

Results: CH Cyg Flickering



P. Somogyi (HU)
Lhires III 2400 l/mm R = 15000
2015-09-20
31 spectra 300 sec.
From UT 19:50 to 21:50

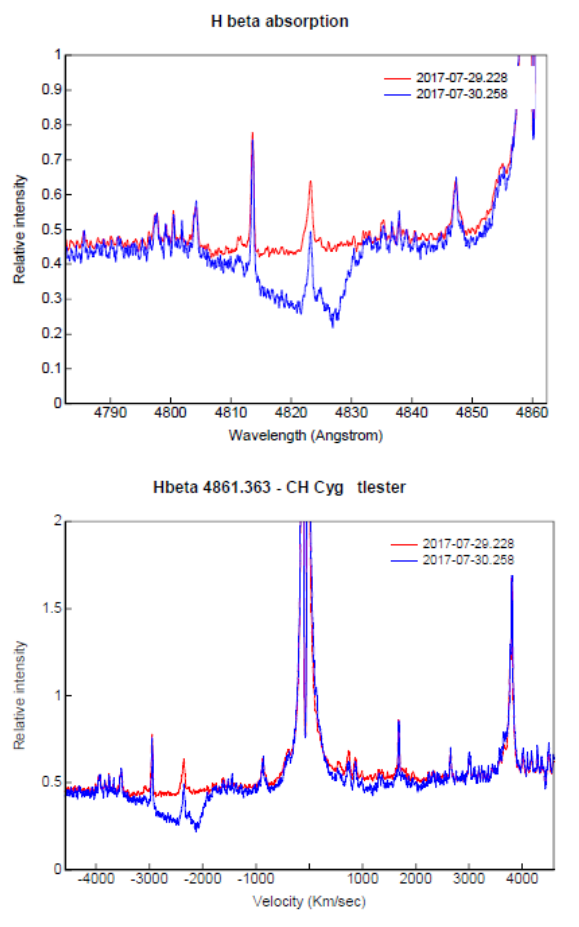




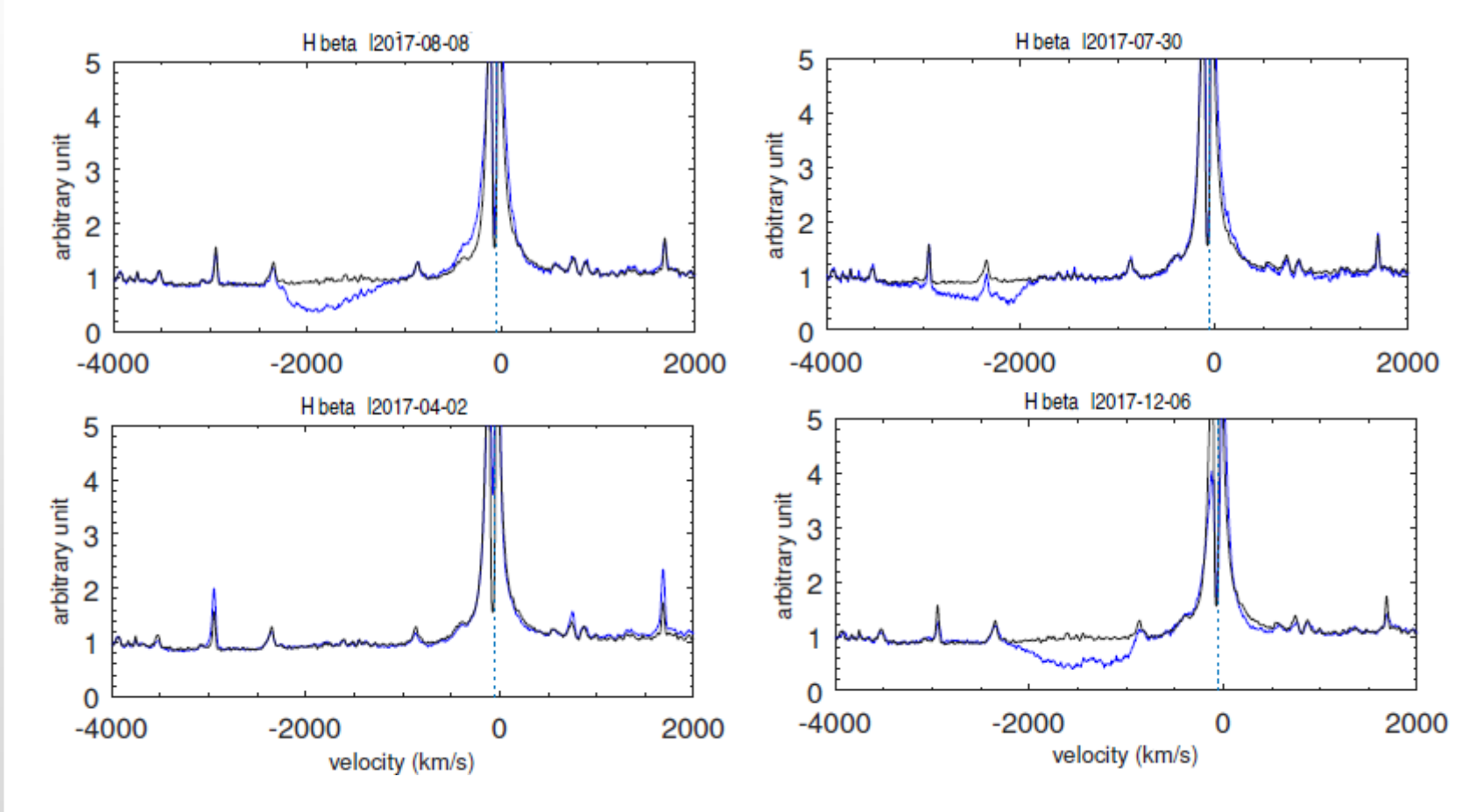
Hα
12 spectra (300 sec. Exp.)
Red: mean spectrum
Black: 12 spectra
Blue: variance (+ 1)
Dashed blue:
variance of the continuum + 3 sigmas
Spectres: Olivier Garde eShel R = 11000

Significant flickering on the range [-215, -75] km.sm-1

Results: CH Cyg
High velocity absorption in 2017

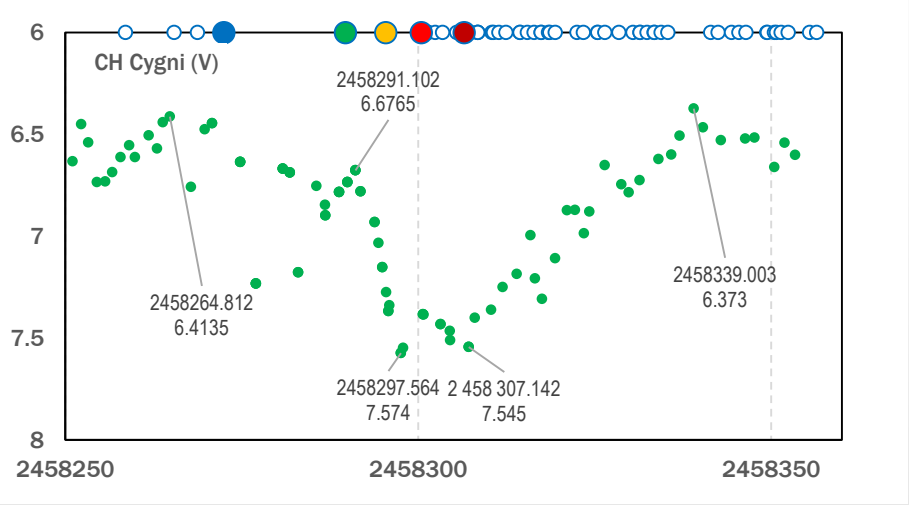


Absorption in Hβ at 1 day inter'val
Spectra: Tim Lester (R = 13000)

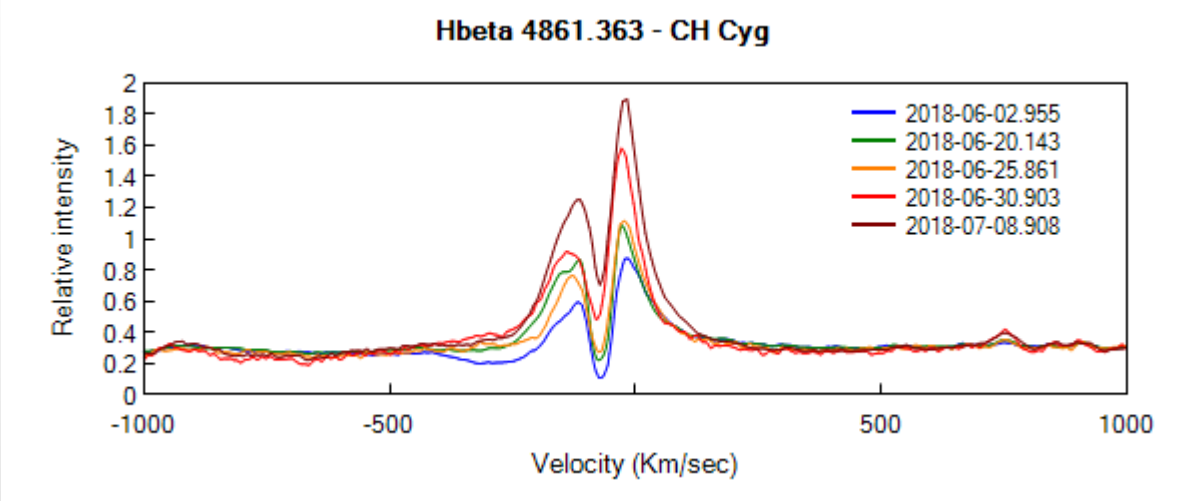


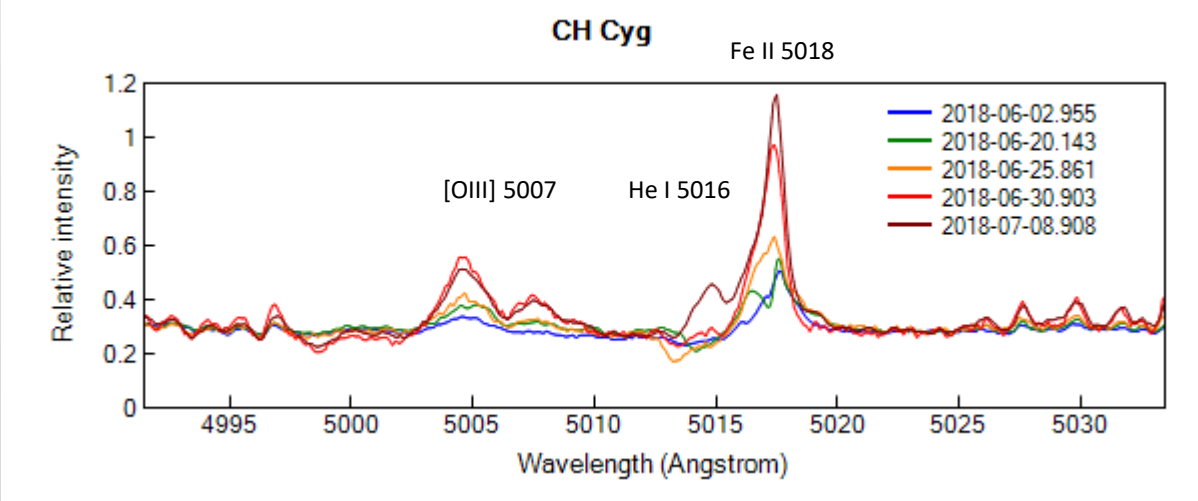
Various profiles of the absorption in Hβ
Spectra: Joan Guarro (R = 9000) – Tim Lester (R = 13000)
Grey: reference spectrum (2017-07-29)

Results: CH Cyg
Recent sudden drop of luminosity (July 2018)

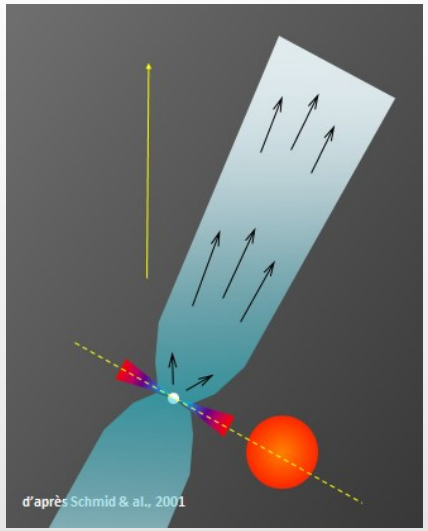


Echelle spectra (R = 9000 to 13000): dots at y = 6
F. Teyssier (FR)
J. Guarro Flo (SP)
T. Lester (CA)

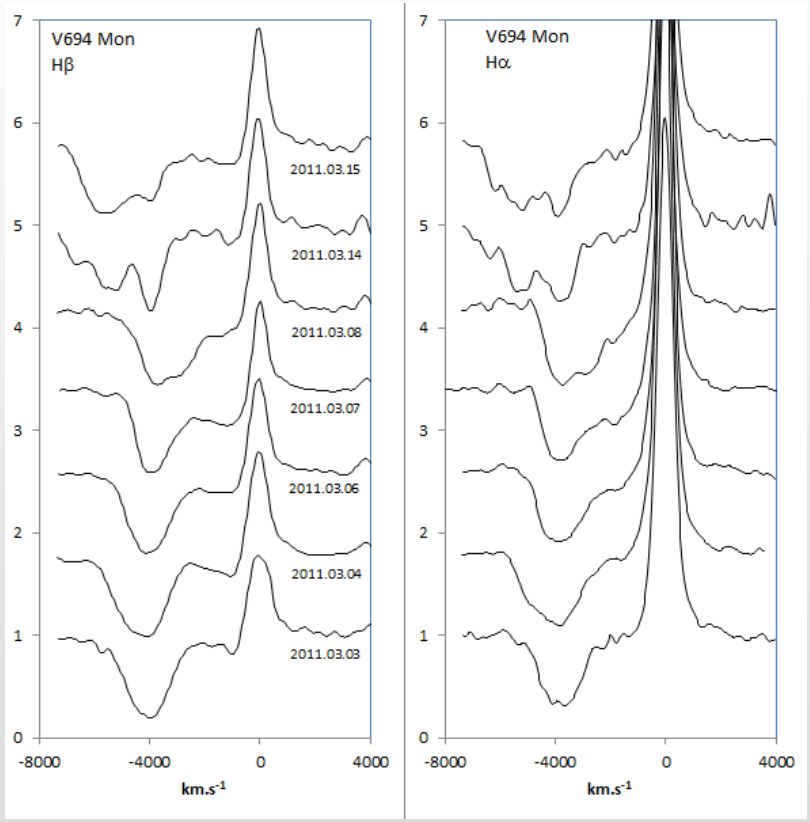




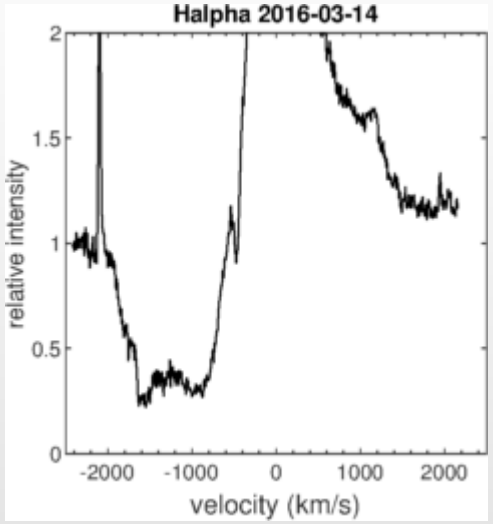
Results: V694 Mon = MWC 560

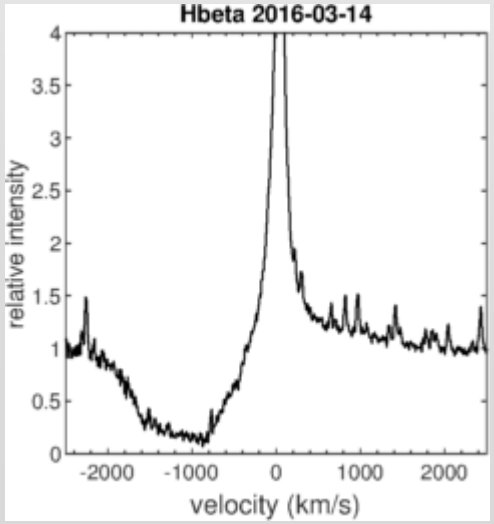


Highly collimated jets



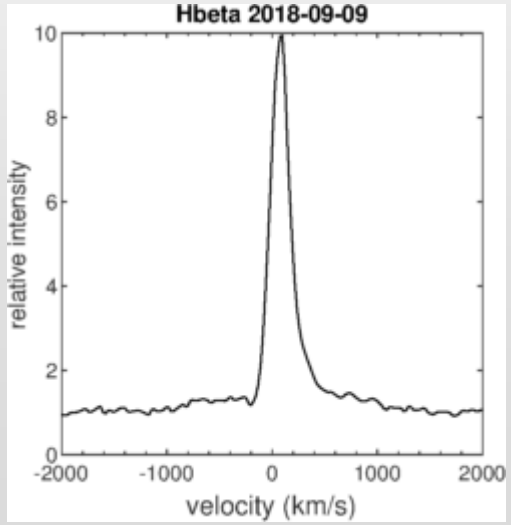
High state 2011
F. Teyssier LISA R = 1000





Absorption profiles in low state
F. Teyssier eShel R = 11000

2018-09-09
Current status (rare):
No absorption



Peter Somogyi
Lhires III 600 l/mm R = 2500

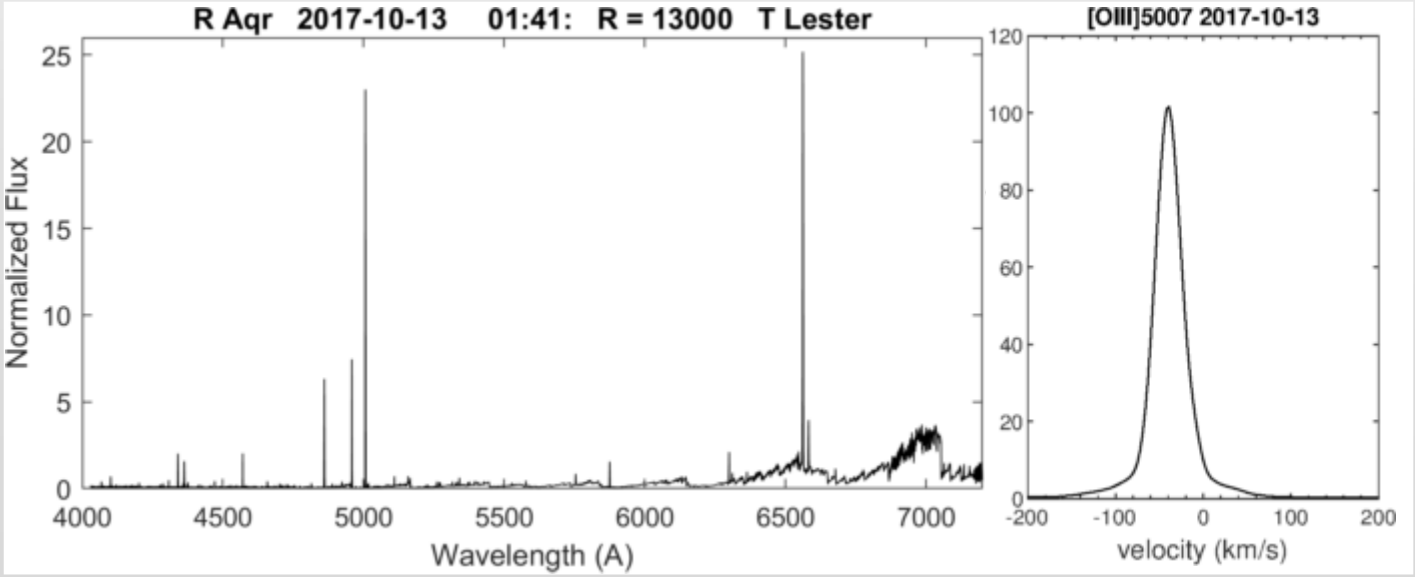
Results: R Aqr
Campaign on request of a professional team

In support to HST observations

The coverage was excellent!
The quality seems to be very good
Margarita Karovska

42 spectra acquired in 5 days by 13 observers (AU-SP-FR-CN-IT-US-CA) at resolution 500 to 15000

T. Rodda
P. Berardi
F. Campos
L. Franco
O. Garde
U. Sollecchia
C. Buil
J. Guarro Flo
B. Mauclaire
T. Bohlsen
T. Lester
J. Edlin
W. Sims
F. Teyssier



11/10/2017	12:04	2458038.006	TBO	ARM-AU	LHIRESC1135umsli	14372
11/10/2017	18:43	2458038.325	BER	BVO-IT	LHIRES31200C9SXV	4167
11/10/2017	20:22	2458038.37	FCA	PAG-SP	Newton200+Barlow	712
11/10/2017	20:23	2458038.371	FRA	BAL-IT	SC8+Alpy600	532
11/10/2017	20:27	2458038.44	OGA	OTO-FR	RC400Astrosib-Eshe	11000
11/10/2017	20:40	2458038.401	SOL	AQL-IT	JGF1C9.25ST-8300	8248
11/10/2017	21:15	2458038.422	BUI	CAS-FR	RC10eShel2ASI1600	11000
11/10/2017	21:29	2458038.416	JGF	SMM-SP	T16+Echelle+Atik460	9000
11/10/2017	21:52		BMA	OVA-FR	LHIRES3#151-2400-SC	13000
12/10/2017	07:08	2458038.806	FAS	DCO-US	CDK14+LISA+Atik414e	1067
12/10/2017	07:45	2458038.83	FAS	DCO-US	CDK14+LISA+Atik414e	1069
12/10/2017	11:17	2458038.981	TBO	ARM-AU	LHIRESC1135umsli	14146
12/10/2017	18:58	2458039.337	BER	BVO-IT	LHIRES31200C9SXV	4207
12/10/2017	19:47	2458039.359	SOL	AQL-IT	JGF1C9.25ST-8300	8740
12/10/2017	20:10	2458039.397	BUI	CAS-FR	RC10eShel2ASI1600	11000
12/10/2017	21:28	2458039.424	JGF	SMM-SP	T16+Echelle+Atik460	9000
13/10/2017	01:41	2458039.634	LES	MRO-CA	T11+Echelle	13000
13/10/2017	06:18	2458039.78	JRF	UHO-US	CDK17+Lhires2400	15463
13/10/2017	06:34	2458039.779	FAS	DCO-US	CDK14+LISA+Atik414e	1066
13/10/2017	06:50	2458039.789	FAS	DCO-US	CDK14+LISA+Atik414e	1066
13/10/2017	11:05	2458039.973	TBO	ARM-AU	LHIRESC1135umsli	13879
13/10/2017	11:57	2458040.04	DLI	JAD-CN	C11LHIRES3-1200_2x	5056
13/10/2017	19:19	2458040.345	BER	BVO-IT	LHIRES31200C9SXV	3954
13/10/2017	21:00	2458040.399	FRA	BAL-IT	SC8+Alpy600	540
13/10/2017	21:01	2458040.396	JGF	SMM-SP	T16+Echelle+Atik460	9000
13/10/2017	21:03	2458040.413	BUI	CAS-FR	RC10eShel2ASI1600	11000
13/10/2017	21:13	2458040.405	FMT	ROU-FR	SC14+eShel+Atik460ex	11000
13/10/2017	21:19	2458040.416	FCA	PAG-SP	Newton200+Barlow	927
13/10/2017	21:37	2458040.464	OGA	OTO-FR	RC400Astrosib-Eshe	11000
14/10/2017	06:45	2458040.81	JRF	UHO-US	CDK17+Lhires2400	15646
14/10/2017	06:49	2458040.793	FAS	DCO-US	CDK14+LISA+Atik414e	1054
14/10/2017	19:39	2458041.364	SOL	AQL-IT	JGF1C9.25ST-8300	8386
14/10/2017	20:31	2458041.386	FRA	BAL-IT	SC8+Alpy600	548
14/10/2017	21:45	2458041.424	JGF	SMM-SP	T16+Echelle+Atik460	9000
14/10/2017	22:22		BMA	OVA-FR	LHIRES3#151-2400-SC	13000
15/10/2017	03:06	2458041.64	FAS	DCO-US	CDK14+LISA+Atik414e	1047
15/10/2017	05:06	2458041.722	FAS	DCO-US	CDK14+LISA+Atik414e	1061
15/10/2017	18:25	2458042.324	BER	BVO-IT	LHIRES31200C9SXV	4138
15/10/2017	19:43		BMA	OVA-FR	LHIRES3#151-2400-SC	13000
15/10/2017	19:54	2458042.371	OGA	OTO-FR	RC400Astrosib-Eshe	11000
15/10/2017	20:07	2458042.356	FCA	PAG-SP	Newton200+Barlow	918
15/10/2017	20:20	2458042.392	SOL	AQL-IT	JGF1C9.25ST-8300	8320

Log of observations

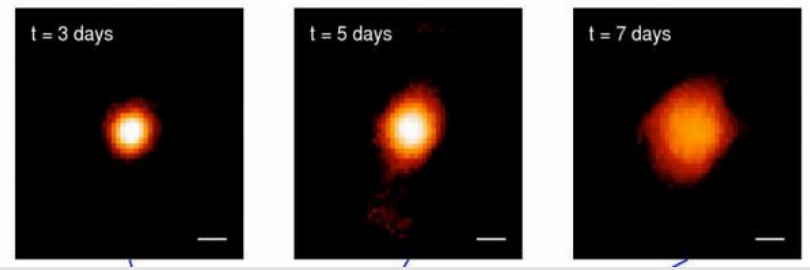
Results: Novae

35 novae
~ 2100 spectra

#	Name	Nb. Of spectra	First spectrum	Last spectrum
0	V838 Mon	4	24/03/2017	28/03/2018
1	V407 Cyg			
2	Nova Mon 2012	56	14/08/2012	06/05/2013
3	Nova Cep 2013	11	03/02/2013	15/02/2013
4	VVV-NOV-003	15	21/07/2013	11/06/2014
5	Nova Del 2013	1152	14/08/2013	15/09/2015
6	Nova Cen 2013	160	05/12/2013	31/03/2018
7	Nova Sgr 2014	2	02/03/2014	08/03/2014
8	Nova Cep 2014	15	10/03/2014	23/05/2014
9	Nova Cyg 2014	215	03/04/2014	27/06/2015
10	Nova Sco 2015	2	19/02/2015	28/02/2015
11	Nova Sgr 2015	1	28/02/2015	28/02/2015
12	Nova Sgr 2015b	80	16/03/2015	17/11/2015
13	Nova Oph 2015	32	07/04/2015	17/04/2016
14	Nova Sgr 2015c	12	29/09/2015	09/11/2015
15	Nova Aql 2015	8	07/10/2015	17/10/2015
16	Nova Sco 2016	7	13/06/2016	01/08/2016
17	Nova Sgr 2016b	12	12/08/2016	11/09/2016
18	Nova Sco 2016b	2	08/09/2016	08/09/2016
19	Nova Lup 2016	3	24/09/2016	11/10/2016
20	Nova Sgr 2016c	14	20/10/2016	27/06/2017
21	Nova Sgr 2016d	8	27/10/2016	18/11/2016
22	Nova Cen 2017	24	18/05/2017	24/08/2017
23	Nova Sct 2017	258	29/06/2017	17/07/2018
24	Nova Vel 2017	2	28/09/2017	08/10/2017
25	Nova Sco 2017b	4	18/10/2017	22/10/2017
26	Nova Oph 2017b	1	14/11/2017	14/11/2017
27	Nova Mus 2018	5	16/01/2018	07/02/2018
28	Nova Cir 2018	6	07/02/2018	06/05/2018
29	Nova Car 2018	25	21/03/2018	19/05/2018
30	Nova CMa 2018	13	27/03/2018	19/04/2018
31	Nova Per 2018	60	29/04/2018	06/06/2018
32	Nova Lup2018	7	29/06/2018	06/09/2018
33	Nova Sct 2018	13	30/06/2018	31/07/2018
34	Nova Oph 2018c	14	09/08/2018	08/09/2018

Results: Novae
An example: the classical Nova Del 2013

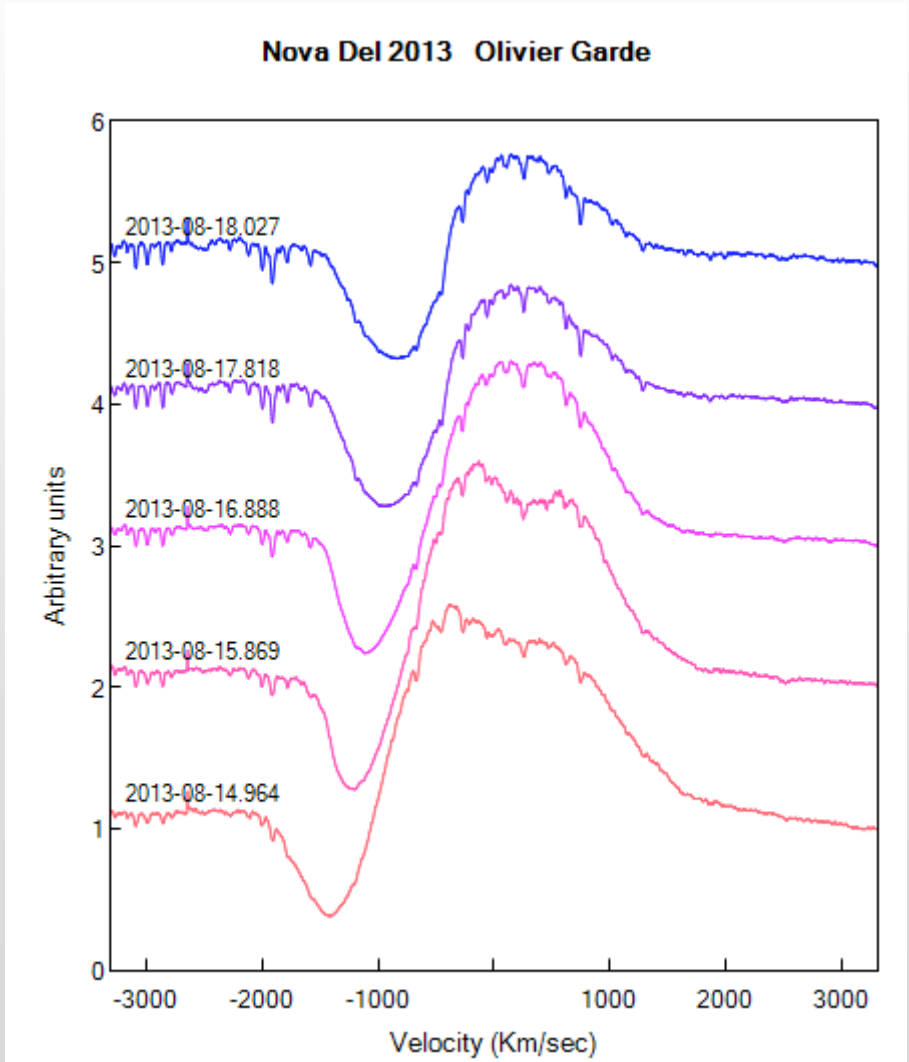
1252 spectra obtained by 46 observers
From 2013, August to 2015, Sept.



CHARRA Array

The expanding fire ball of Nova Delphini 2013
G.H. Schaefer & al.
Nature, 2014

From an analysis of spectra downloaded from the archive of the Astronomical Ring for Access to Spectroscopy, we estimated the outflow speed near the continuum-forming layer to be
*V*ejection= 613±79 km.s^{-1}

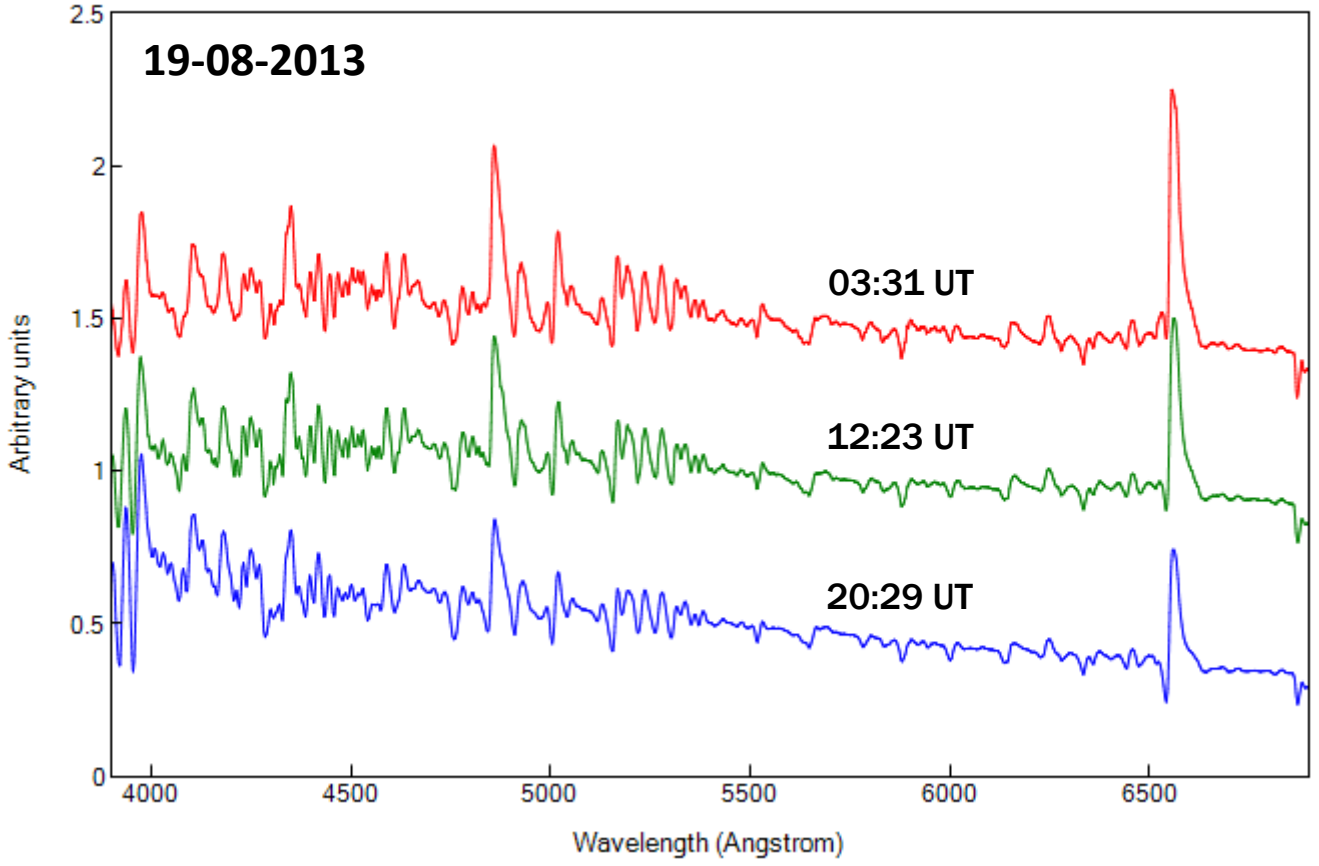


Hα profile near maximum
O. Garde
eShel (Shelyak)
R = 11000

Results: Novae
An example: the classical Nova Del 2013

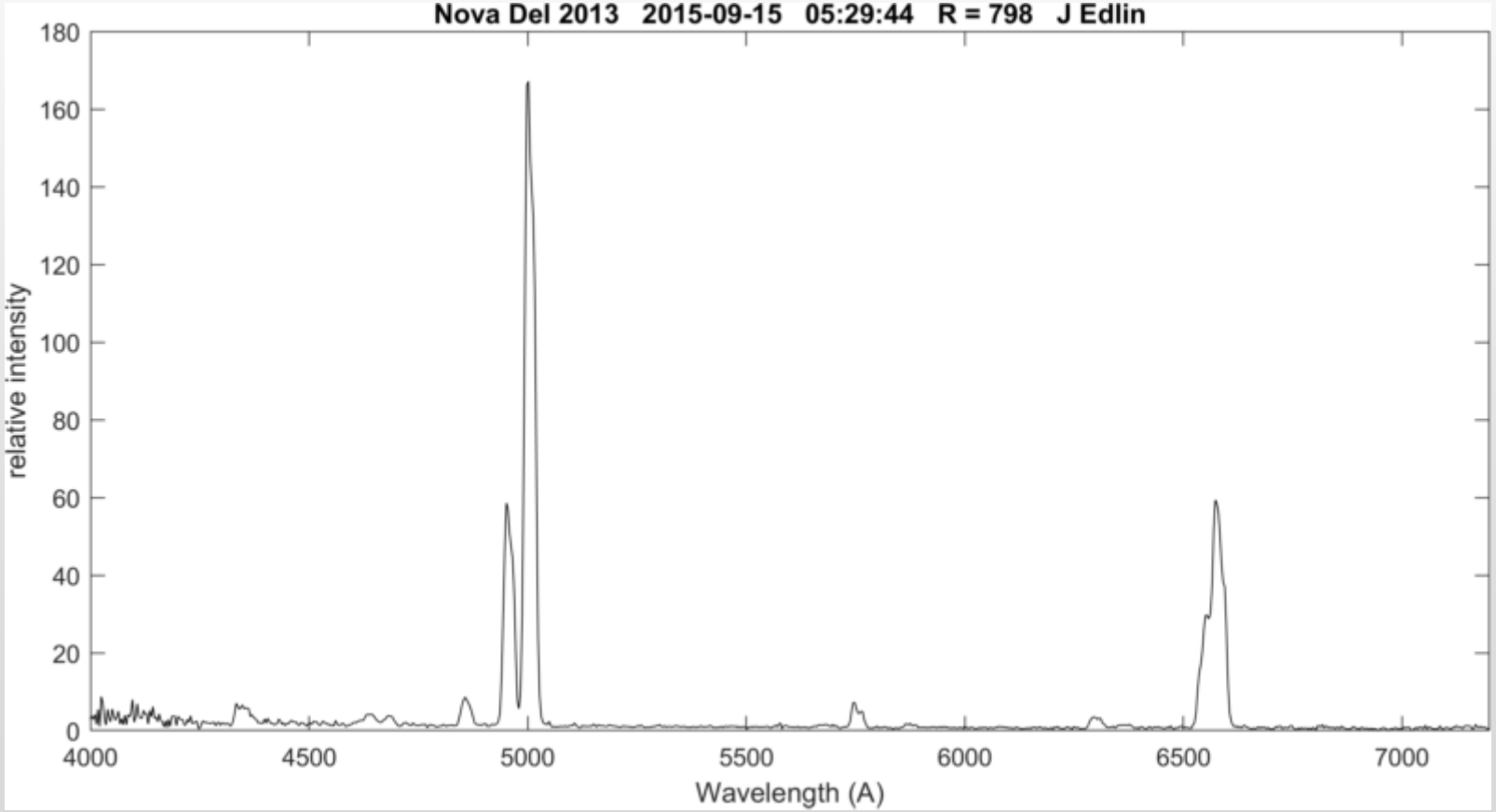
A world-wide coverage
at high frequency
e.g. 52 spectra on August, 15th

19-08-2013
24 hours coverage
LISA R = 1000
Spectra obtained by
J. Edin (US)
T. Bohlsen (AU)
F. Teyssier (FR)



Results: Novae
An example: the classical Nova Del 2013

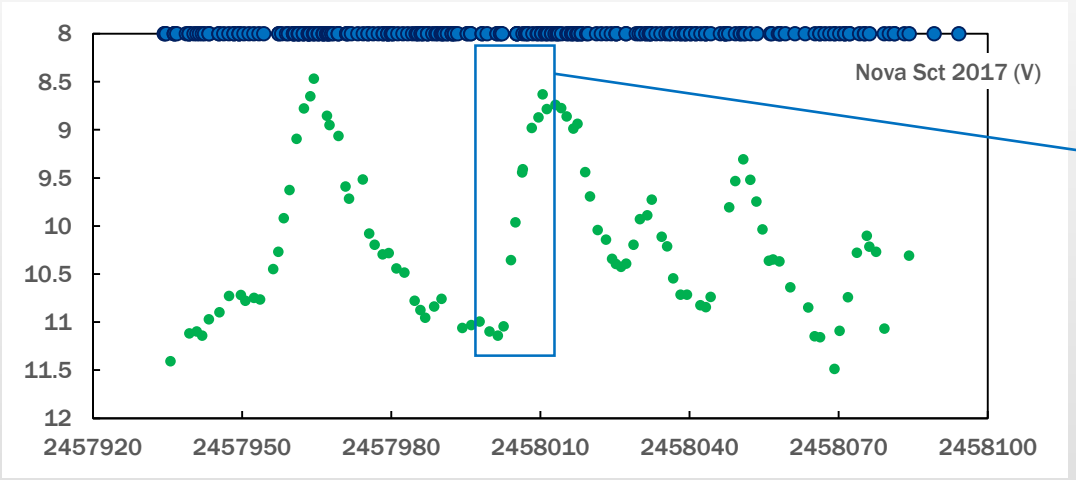
Nebular phase
Mag V =
2015, September
2 years after outburt



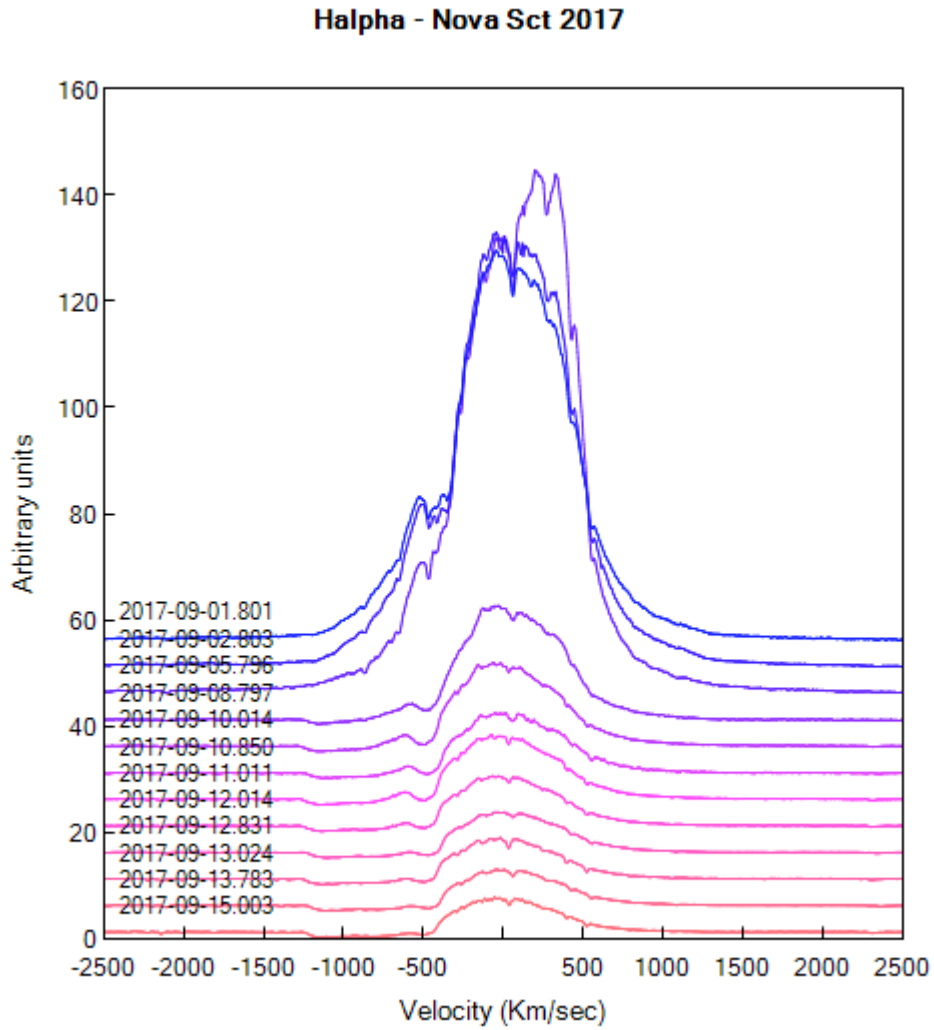
Jim Edlin (US)
DK 60 cm
LISA R = 1000

Results: Novae
An example: the peculiar Nova Sct 2017

A nova
with strong oscillations
at maximum



AAVSO V band – daily mean | ARAS spectra: blue dots at y = 8



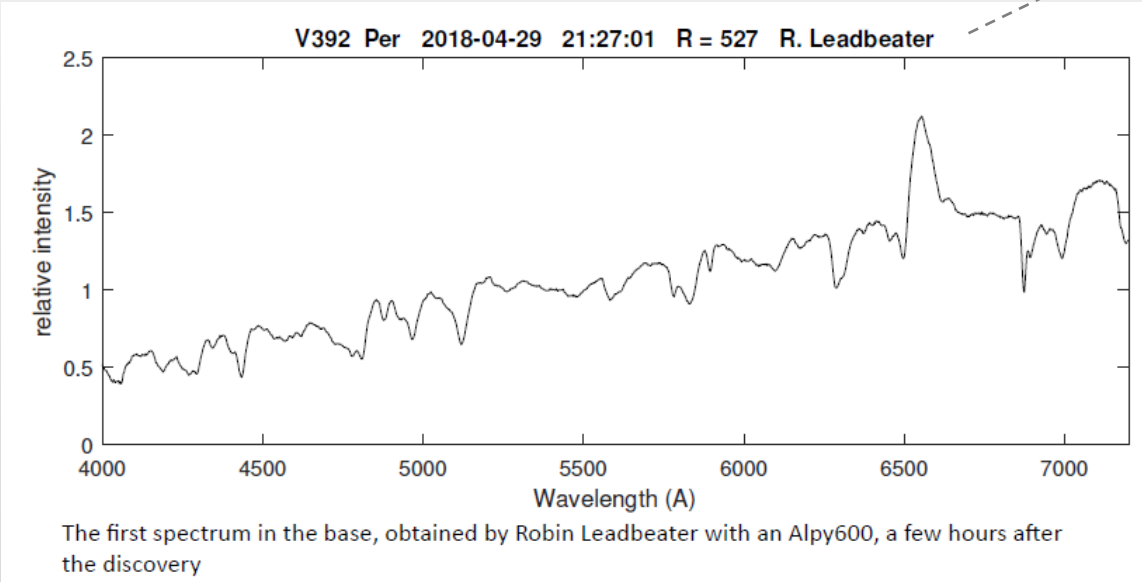
Echelle spectra
Joan Guarro
Tim Lester

Results: Novae
An example: Nova Per 2018 = V392 Per

Nova event in a known dwarf nova system (V392 Per)
A nova with narrow lines

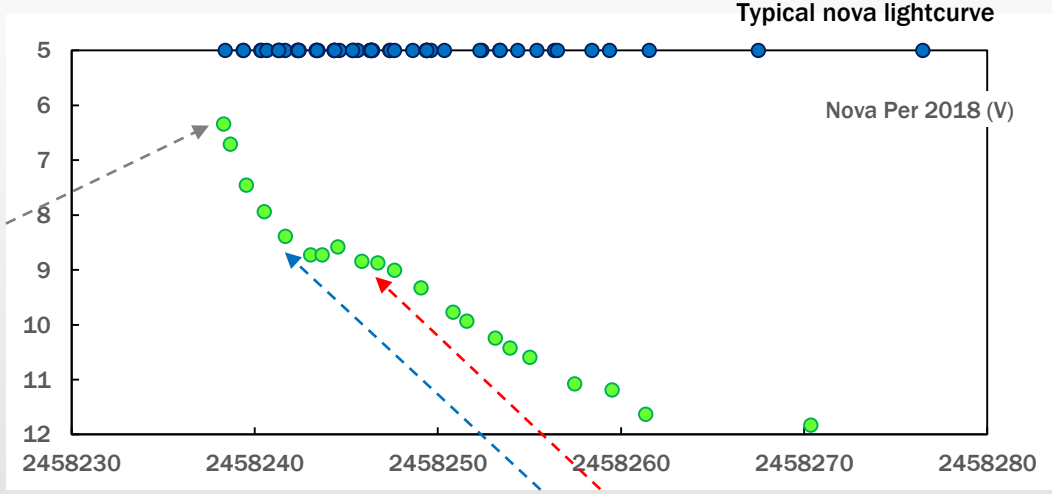
59 spectra from 10 observers (UK-FR-IT-US-DE)

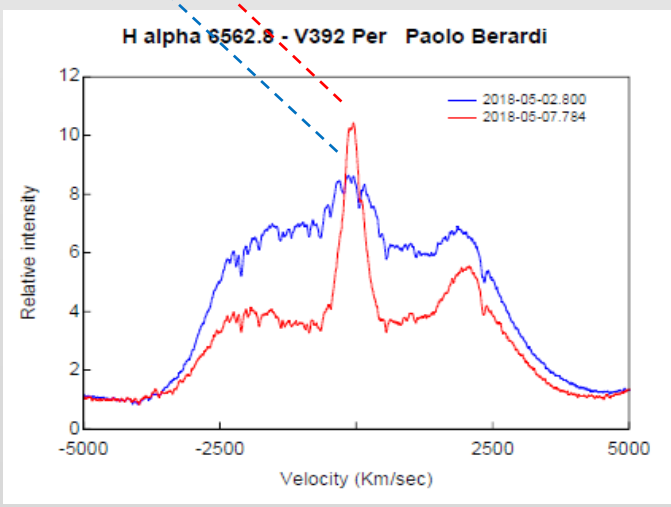
P. Berardi
C. Boussin
E. Bertrand
G. Martineau
Y. Buchet
J. Montier
J. Edin
M. Verlinden
O. Garde
R. Leadbeater
U. Zurmuehl



R. Leadbeater (UK) Alpy R = 600

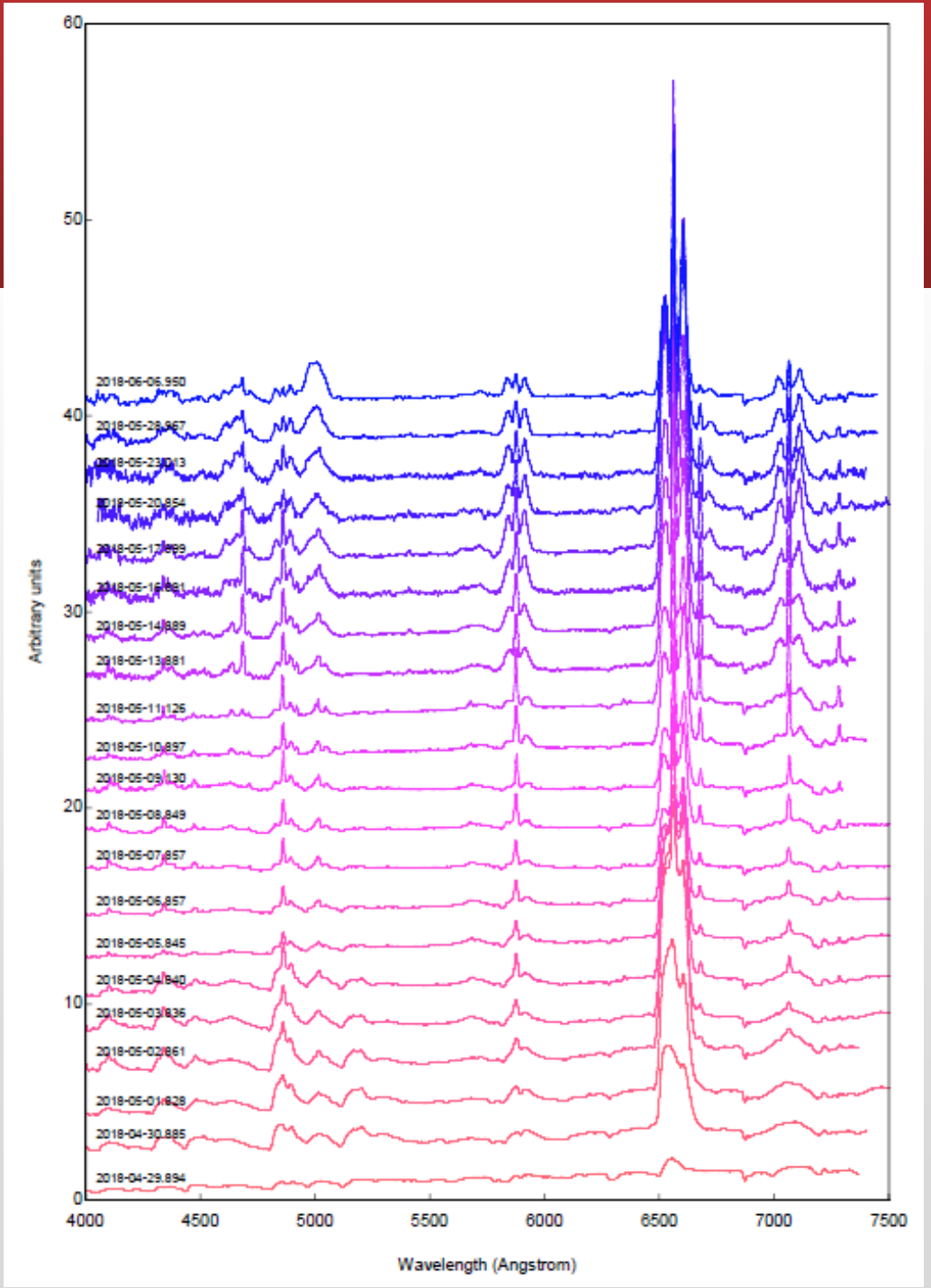
AAVSO V band – daily mean | ARAS spectra: blue dots at y = 5
Typical nova lightcurve

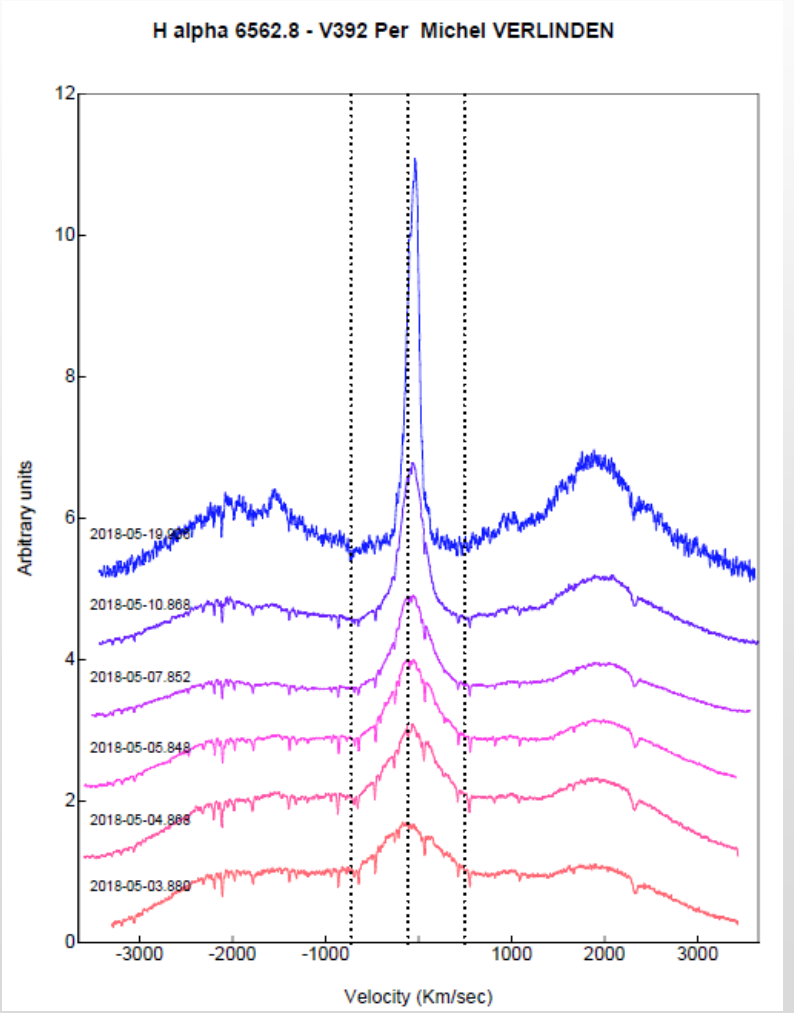




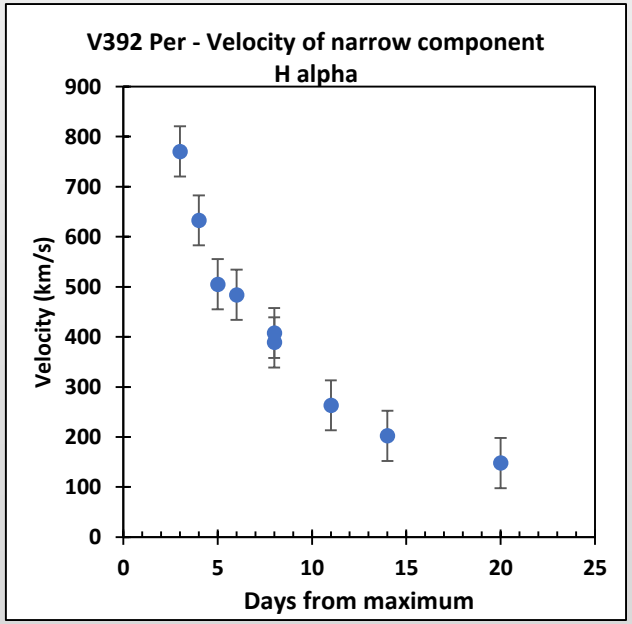
P. Berardi (IT)
Lhires III 2400 l/mm
R = 15000

Results: Novae
An example: Nova Per 2018





SC 20 cm – Lhires III 2400 l/mm – R = 15000

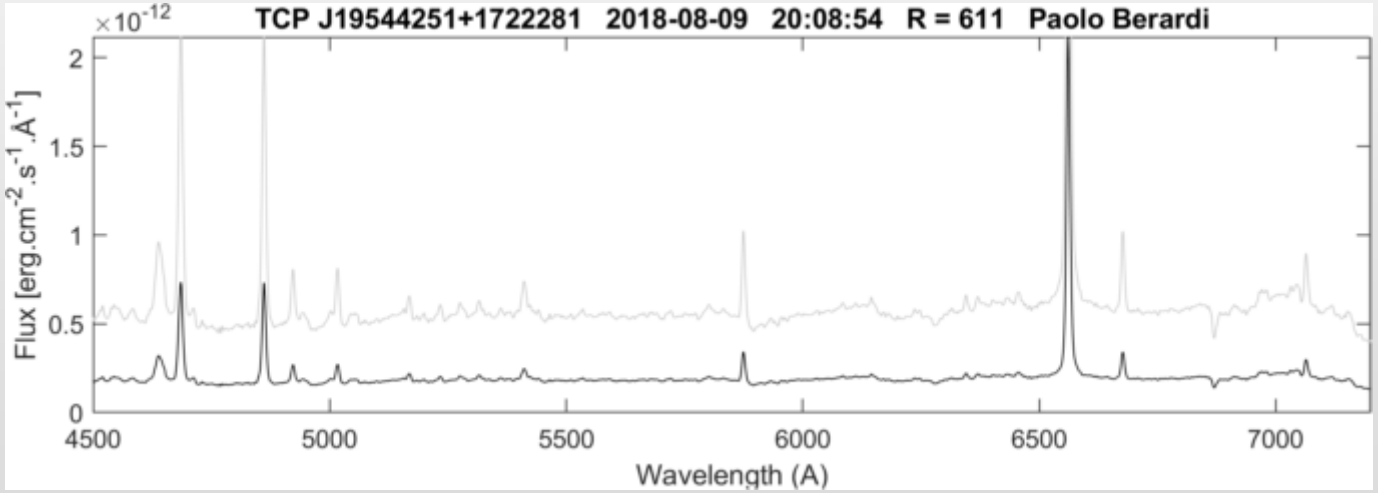


FWHM (km.s^{-1})

Results: spectroscopic identification of « New » stars

Reactivity: identification of newly discovered eruptive stars

New bright symbiotic discovered in outburst: TCP J19544251+1722281 = HbHa 1704-05 = Vend47
Photometric alert by Robert Fidrich 2018/08/08.94 TG = 10.7
Identification spectrum obtained by Paolo Berardi (IT) with Lhires III 150 l/mm



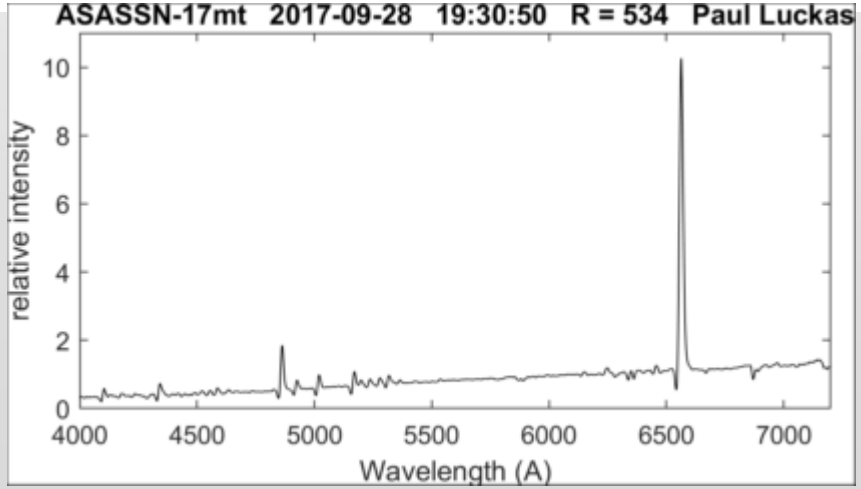
The Astronomer's Telegram

HBHa 1704-05: a bright and newly discovered symbiotic star, currently undergoing an "hot-type" outburst

ATel #11937; *U. Munari (INAF Padova), S. Dallaporta, P. Valisa (ANS Collaboration), P. Ochner (Univ. Padova), R. Fidrich (HAA/VSS), P. Berardi, O. Garde, C. Buil (ARAS Group)*
on 11 Aug 2018; 11:20 UT
Credential Certification: U. Munari (ulisse.munari@oapd.inaf.it)

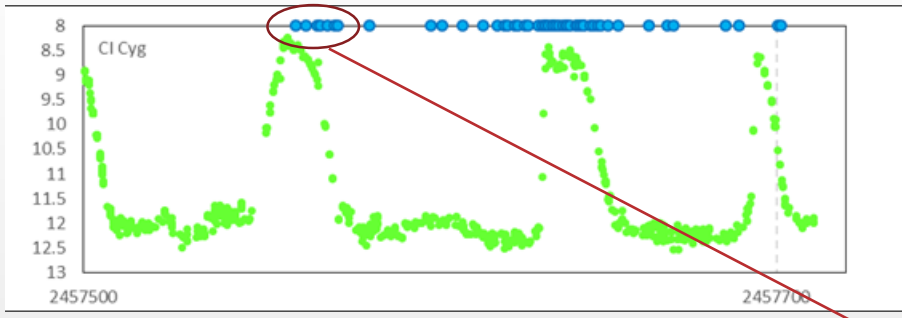
Spectroscopic confirmation of ASASSN-17mt as a classical nova in the optically thick (Fe curtain) stage

ATel #10795; *Paul Luckas, International Centre for Radio Astronomy Research, University of Western Australia -17mt Confirmed as a Classical Nova in the Iron Curtain Phase*
on 28 Sep 2017; 19:59 UT
Distributed as an Instant Email Notice Novae
Credential Certification: S. N. Shore (shore@df.unipi.it)

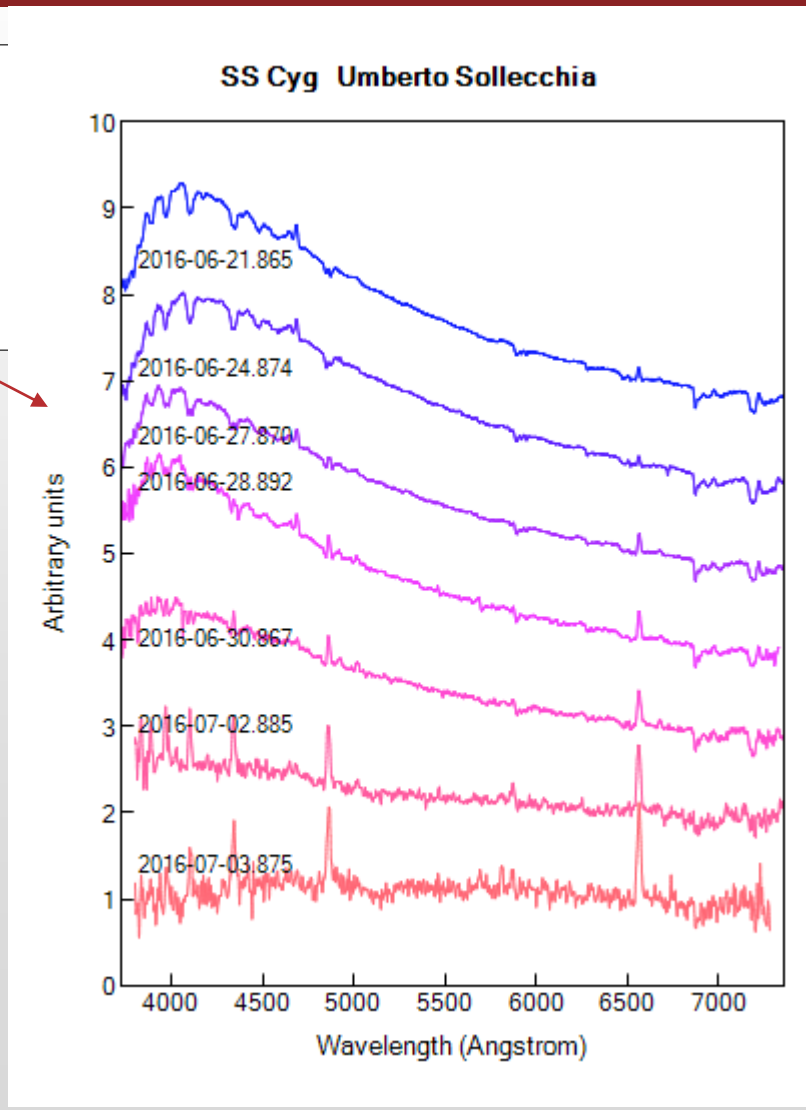


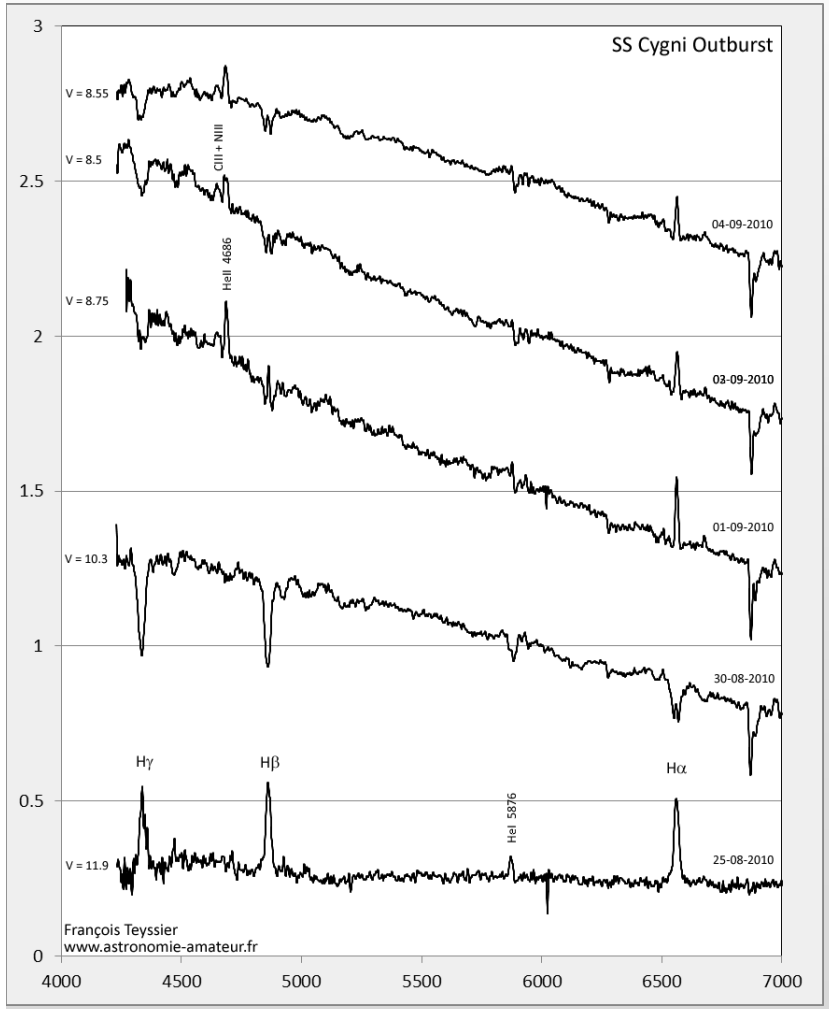
Paul Luckas (AU) Alpy R =600

En brief:
dwarf novae outbursts



SS Cygni AAVSO light curve in 2016
ARAS Spectra: blue dots





Left:
U. Sollecchia
Alpy 600 R = 600
Right:
F. Teyssier
LISA R = 1000

Eruptive stars ARAS Data Base

A.R.A.S. Eruptive Stars Spectroscopic DataBase

Cataclymic Variables	Novae	Symbiotic Stars	Novae Like
objects	34 objects	53 objects	1 object
118 spectra	2091 spectra	3790 spectra	19 spectra

Open data base
Resolution : 500 to 15000

Preliminary check
Users have to verify in detail
ARAS data and observers should be aknowledged – Obs. journal
Pivotal observations → co-author

http://www.astrosurf.com/aras/Aras_DataBase/DataBase_EruptiveStars.htm

Publications using Eruptive stars ARAS Data Base
1. Symbiotics

7 **HbHa 1704-05: a bright and newly discovered symbiotic star, currently undergoing an "hot-type" outburst**
U. Munari (INAF Padova), S. Dallaporta, P. Valisa (ANS Collaboration), P. Ochner (Univ. Padova), R. Fidrich (HAA/VSS), P. Berardi, O. Garde, C. Buil (ARAS Group)
http://www.astronomerstelegram.org/?read=11937

6 **Recent outburst activity of the symbiotic binary AG Draconis**
Merc, Jaroslav, Gális, Rudolf, Leedjärv, Laurits
Proceedings of The Golden Age of Cataclysmic Variables and Related Objects IV, 11-16 September 2017. Palermo, Italy
http://adsabs.harvard.edu/abs/2018arXiv180605935M

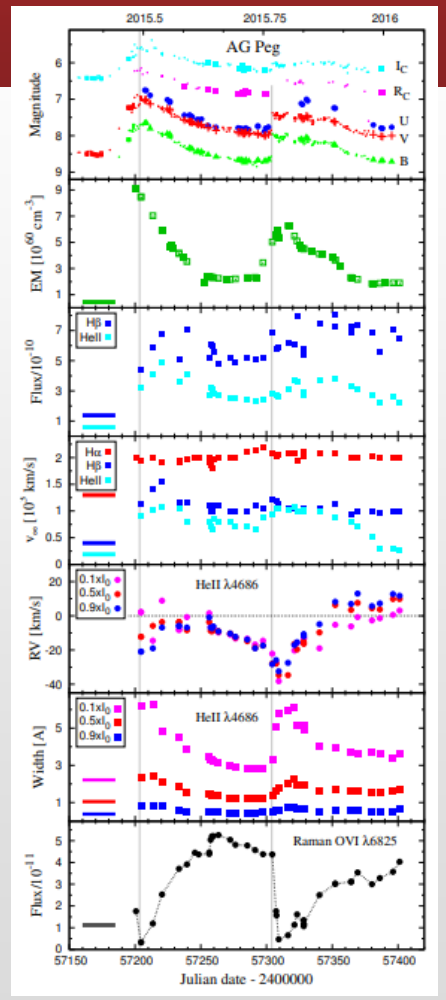
5 **The fourth outburst during the present active stage of symbiotic binary AG Dra**
Galis, R., Merc, J., Vrastak, M., Teyssier, F., Lester, T., Boyd, D., Sims, W., Leedjarv, L.
The Astronomer's Telegram, No. 11559
2018-04

4 **Recent outburst activity of the super-soft X-ray binary AG Draconis**
Merc, J., Gális, R., Leedjärv, L.
http://adsabs.harvard.edu/abs/2017CoSka..47..192M
2017-10

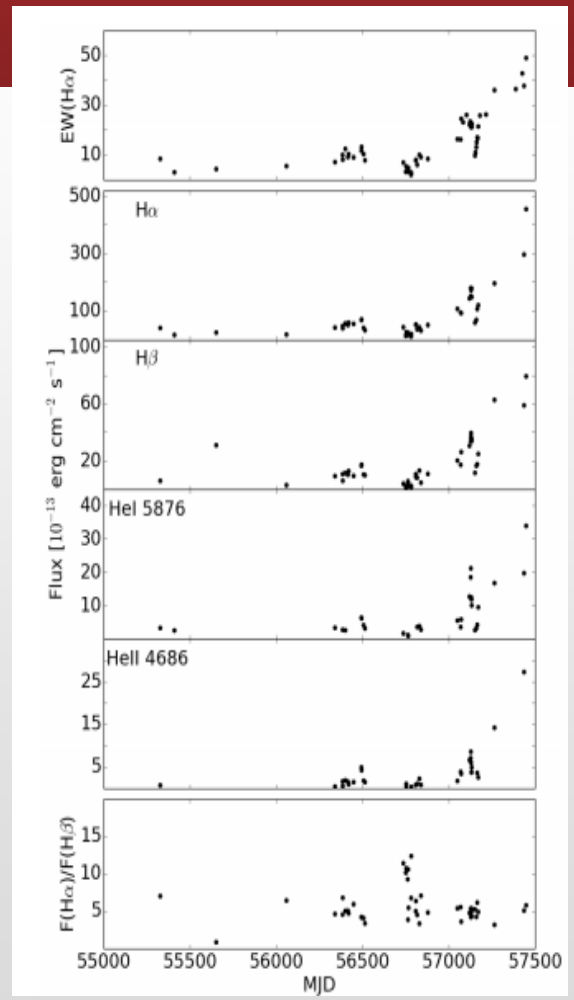
3 **New outburst of the symbiotic nova AG Peg after 165 years**
A. Skopal, S. Yu. Shugarov, M. Sekeráš, M. Wolf, T. N. Tarasova, F. Teyssier, M. Fujii, J. Guarro, O. Garde, K. Graham, T. Lester, V. Bouttard, T. Lemoult, U. Sollecchia, J. Montier, D. Boyd
https://arxiv.org/pdf/1705.00076.pdf
2017-04

2 **Active phases and flickering of a symbiotic recurrent nova T CrB**
Ilkiewicz, Krystian, Mikolajewska, Joanna, Stoyanov, Kiril, Manousakis, Antonios, Miszalski, Brent
http://adsabs.harvard.edu/abs/2016arXiv160706804I
2016-07

1 **Swift observations of the 2015 outburst of AG Peg – from slow nova to classical symbiotic outburst**
Ramsay, Gavin, Sokoloski, J. L., Luna, G. J. M., Nuñez, N. E.
Monthly Notices of the Royal Astronomical Society, vol. 461, issue 4, pp. 3599-3606
http://adsabs.harvard.edu/abs/2016MNRAS.461.3599R
2016-10



AG Peg 2015 outburst
Skopal & al., 2017



T CrB active phase 2015
Ilkiewicz, Miko lajewska & al., 2016

Publications using Eruptive stars ARAS Data Base
2. Novae

The expanding fire ball of Nova Delphini 2013
Schaefer, G. H. & al.
Nature, 515, 234-236 (13 November 2014)

Fermi establishes classical novae as a distinct class of gamma-ray sources
Ackermann, M. & al.
Science, Volume 345, Issue 6196, pp. 554-558 (2014)

We acknowledge with thanks …
the dedicated observers of the Astronomical Ring for Access to Spectroscopy (ARAS) group
for their tireless and selfless efforts.

Early evolution of the extraordinary Nova Delphini 2013 (V339 Del)
Skopal, A., Drechsel, H., Tarasova, T., Kato, T., Fujii, M., Teyssier, F., Garde, O., Guarro, J., Edlin, J.,
Buil, C., Antao, D., Terry, J.-N., Lemoult, T., Charbonnel, S., Bohlsen, T., Favaro, A., Graham, K.
Astronomy & Astrophysics, Volume 569 (2014)

The panchromatic spectroscopic evolution of the classical CO nova V339 Delphini (Nova Del 2013) until X-ray turnoff
Shore, S. N., Mason, E., Schwarz, G. J., Teyssier, F. M., Buil, C., De Gennaro Aquino, I., Page, K. L., Osborne, J. P., Scaringi, S., Starrfield, S., van Winckel, H., Williams, R. E., Woodward, C. E.
Astronomy & Astrophysics, Volume 590 (2015)

A nova outburst powered by shocks *(Note: Nova Sgr 2016d = V5856 Sgr)*
Li, Kwan-Lok, Metzger, Brian D., Chomiuk, Laura, Vurm, Indrek, Strader, Jay, Finzell, Thomas, Beloborodov, Andrei M., Nelson, Thomas,
Shappee, Benjamin J., Kochanek, Christopher S., Prieto, José L., Kafka, Stella, Holoien, Thomas W.-S., Thompson, Todd A., Luckas, Paul J., Itoh, Hiroshi
Nature Astronomy, Volume 1, (2017)

Near-infrared studies of V2944 Ophiuchi (Nova Ophiuchi 2015)
Srivastava, Mudit K., Banerjee, D. P. K., Ashok, N. M., Venkataraman, V., Sand, D., Diamond, T.
Monthly Notices of the Royal Astronomical Society, Volume 462, Issue 2

Publications using Eruptive stars ARAS Data Base
3. Various ATel (Novae, Symbiotics, Cataclysmics)

HBHa 1704-05: a bright and newly discovered symbiotic star, currently undergoing an "hot-type" outburst

ATel #11937; *U. Munari (INAF Padova), S. Dallaporta, P. Valisa (ANS Collaboration), P. Ochner (Univ. Padova), R. Fidrich (HAA/VSS), P. Berardi, O. Garde, C. Buil (ARAS Group)*
on 11 Aug 2018; 11:20 UT
Credential Certification: U. Munari (ulisse.munari@oapd.inaf.it)

Continuing ARAS visible spectroscopic monitoring of the slow classical nova Sct 2017 = ASASSN-17hx

ATel #10737; *Joan Guarro, Paolo Berardi, Umberto Sollecchia, Tim Lester, Terry Bohlsen, Paul Luckas, Fran Campos, Lorenzo Franco, Olivier Garde, Christian Buil, Jim Edlin, FranÃ§ois Teyssier (ARAS Group)*
on 12 Sep 2017; 01:37 UT
Distributed as an Instant Email Notice Novas
Credential Certification: S. N. Shore (shore@df.unipi.it)

Continuing spectroscopic monitoring of Nova Sct 2017 = ASASSN-17hx

ATel #10558; *Paolo Berardi, Woody Sims, and Umberto Sollecchia (ARAS Group)*
on 6 Jul 2017; 02:40 UT
Credential Certification: S. N. Shore (shore@df.unipi.it)

Spectroscopic classification of ASASSN-15ni as a cataclysmic variable in outburst

ATel #7854; *Paolo Berardi (ARAS)*
on 28 Jul 2015; 23:35 UT
Credential Certification: Krzysztof Stanek (stanek.32@osu.edu)

Spectroscopic classification of ASASSN-14jv as a cataclysmic variable in outburst

ATel #6684; *Paolo Berardi (ARAS)*
on 10 Nov 2014; 22:44 UT
Credential Certification: Krzysztof Stanek (stanek.32@osu.edu)

Spectroscopic classification of ASASN-14cl as a cataclysmic variable in outburst

ATel #6235; *Francois Teyssier (ARAS)*
on 15 Jun 2014; 10:06 UT
Credential Certification: Krzysztof Stanek (stanek.32@osu.edu)

Spectroscopic classification of ASASSN-14cv as a cataclysmic variable in outburst

ATel #6258; *Paolo Berardi, Tim Lester, Francois Teyssier (ARAS)*
on 23 Jun 2014; 18:48 UT
Credential Certification: Krzysztof Stanek (stanek.32@osu.edu)

Continuing spectroscopic observations (3500-8800A) of Nova Del 2013 with the Ondrejov Observatory and the ARAS group

ATel #5312; *S. N. Shore (Univ. of Pisa, INFN-Pisa); P. Skoda, D. Korcakova, P. Koubsky R. K? Ã?ek, P. Rutsch, M. Slechta ((Astronomical Institute, Academy of Sciences of the Czech Republic- Ondrejov, Czech Republic); O. Garde, O. Thizy , T. de France, D. Antao, J. Edlin, K. Graham, J. Guarro, F. Teyssier, P. Berard, i T. Bohlsen, E. Pollmann, T. Lemoult, A. Favaro, J.-N. Terry, E. Barbotin, F. Boubault, J. P. Masviel, R. Leadbeater, C. Buil, B. Mauclaire (contributing participants, ARAS)*
on 23 Aug 2013; 01:15 UT
Distributed as an Instant Email Notice Novas
Credential Certification: S. N. Shore (shore@df.unipi.it)

First high resolution ultraviolet (HST/STIS) and supporting optical spectroscopy of V339 Del = Nova Del 2013

ATel #5409; *S. N. Shore (Univ. of Pisa, INFN-Pisa); G. J. Schwarz (AAS); K. Alton, D. Antao, E. Barbotin, P. Berardi, T. Blank, T. Bohlsen, F. Boubault, D. Boyd, J. Briol, C. Buil, S. Charbonnel, P. Dubreuil, M. Dubs, J. Edlin, T. de France, A. Favaro, O. Garde, K. Graham, D. Greenan, J. Guarro, T. Hansen, D. Hyde, T. Lemoult, R. Leadbeater, G. Martineau, Y. Buchet, J. P. Masviel, J. Montier, B. Mauclaire, E. Pollmann, J. Ribeiro, B. Schram, O. Thizy, J.-N. Terry, F. Teyssier (contributing participants, ARAS); K. L. Page, J. P. Osborne (Leicester); J-U Ness (ESA); S. Starrfield (ASU); F. M. Walter (SUNY-SB); C. E. Woodward (Minnesota); M. F. Bode (John Moores Univ. Liverpool)*
on 22 Sep 2013; 23:24 UT

Continuing spectroscopic monitoring of Nova Sct 2018

ATel #11859; *Paolo Bernardi, David Boyd, Christian Buil, Stephane Charbonnel, Lorenzo Franco, Olivier Garde, Keith Graham, Massimiliano Mannucci, Nico Montigiani, Umberto Sollecchia, Peter Somogyi (ARAS Group*
on 16 Jul 2018; 02:05 UT
Distributed as an Instant Email Notice Novas
Credential Certification: S. N. Shore (shore@df.unipi.it)

Continuing echelle spectroscopy of the classical nova TCP J18292290-1430460A = Nova Sct 2018

ATel #11826; *Olivier Garde (ASAS Group)*
on 8 Jul 2018; 18:21 UT
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Credential Certification: S. N. Shore (shore@df.unipi.it)

Confirmation of ASASSN-16kd as a classical nova in the optically thick stage

ATel #9477; *T. Bohlsen (Armidale NSW, ARAS Group)*
on 9 Sep 2016; 13:51 UT
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Credential Certification: S. N. Shore (shore@df.unipi.it)

Continuing spectroscopic observations (3600-8800A) of V339 Del = Nova Del 2013 in the early nebular stage with the Nordic Optical Telescope, Ondrejov Observatory and the ARAS group

ATel #5546; *S. N. Shore (Univ. of Pisa, INFN-Pisa); J. Cechura, D. Korcakova, J. Kubat, P. Skoda, M. Slechta, V Votruba (Charles Univ. and Astronomical Institute, Academy of Sciences of the Czech Republic- Ondrejov, Czech Republic); K. Alton, D. Antao, E. Barbotin, P. Berardi, T. Blank, P. Bohlsen, F. Boubault, D. Boyd, J. Briol, Y. Buchet, C. Buil, S. Charbonnel, P. Dubreuil, M. Dubs, J. Edlin, T. de France, A. Favaro, P. Gerlach, O. Garde, K. Graham, D. Greenan, J. Guarro, T. Hansen, D. Hyde, T. Lemoult, R. Leadbeater, G. Martineau, J. P. Masviel, B. Mauclaire, J. Montier, E. Pollmann, M. Potter, J. Ribeiro, B. Schramm, O. Thizy, J.-N. Terry, F. Teyssier (contributing participants, ARAS)*
on 5 Nov 2013; 01:12 UT
Distributed as an Instant Email Notice Novas
Credential Certification: S. N. Shore (shore@df.unipi.it)

Continuing optical spectroscopy of V339 Del = Nova Del 2013 with the Nordic Optical Telescope and the ARAS Group

ATel #5378; *S. N. Shore (Univ. of Pisa, INFN-Pisa), K. Alton, D. Antao, E. Barbotin, P. Berardi, P. Bohlsen, F. Boubault, D. Boyd, J. Briol, C. Buil, S. Charbonnel, P. Dubreuil, M. Dubs, J. Edlin, T. de France, A. Favaro, O. Garde, K. Graham, D. Greenan, J. Guarro, T. Hansen, D. Hyde, T. Lemoult, R. Leadbeater, G. Martineau, Y. Buchet, J. P. Masviel, J. Montier, E. Pollmann, J. Ribeiro, O. Thizy, J.-N. Terry, F. Teyssier (contributing participants, ARAS)*
on 9 Sep 2013; 04:22 UT
Distributed as an Instant Email Notice Transients
Credential Certification: S. N. Shore (shore@df.unipi.it)

High resolution optical spectroscopy of nova Mus 2018 = PNV J11261220-6531086

ATel #11183; *Terry C. Bohlsen (ARAS group, Mirranook Armidale,*
on 17 Jan 2018; 11:52 UT
Distributed as an Instant Email Notice Novas
Credential Certification: S. N. Shore (shore@df.unipi.it)

ARAS Group Additional Optical Spectroscopy of Classical Nova ASASSN-16ig (Sgr 2016 no. 2)

ATel #9379; *Lorenzo Franco, Terry Bohlsen (ARAS)*
on 16 Aug 2016; 15:21 UT
Distributed as an Instant Email Notice Novas
Credential Certification: S. N. Shore (shore@df.unipi.it)

Spectroscopic observations of ASASSN-17gk

ATel #10399; *Paul Luckas (International Centre for Radio Astronomy Research, University of Western Australia)*
on 19 May 2017; 00:32 UT
Credential Certification: S. N. Shore (shore@df.unipi.it)

Spectroscopic Observations of PNV J17184504-2454221 (Nova Oph 2017) as a Classical Nova in the Iron Curtain Phase

ATel #10975; *Paul Luckas, International Centre for Radio Astronomy Research, University of Western Australia*
on 16 Nov 2017; 01:35 UT
Distributed as an Instant Email Notice Novas
Credential Certification: S. N. Shore (shore@df.unipi.it)

Spectroscopic Observations of ASASSN-18fv as a Classical Nova in the Iron Curtain Phase

ATel #11460; *Paul Luckas (International Centre for Radio Astronomy Research, University Western Australia)*
on 21 Mar 2018; 17:35 UT
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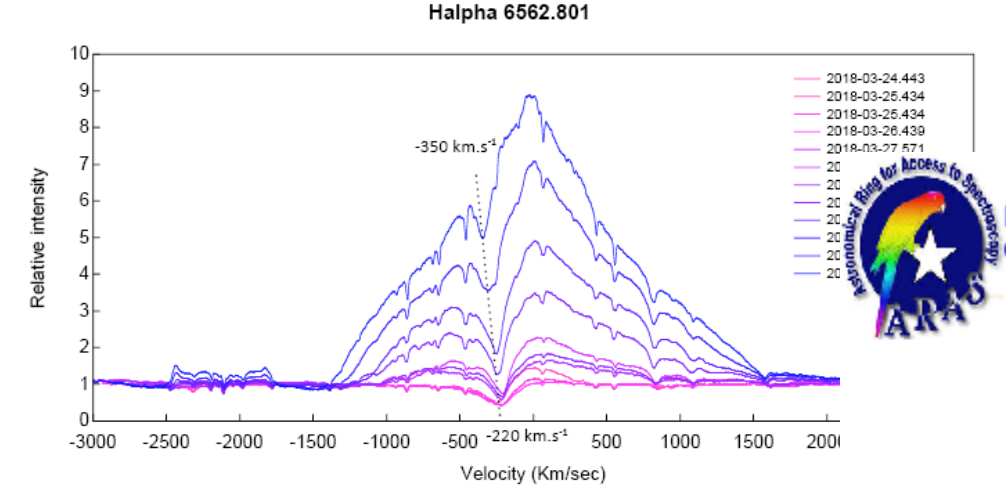
Credential Certification: S. N. Shore (shore@df.unipi.it)

Information Letter



Nova Cen 2018 = ASASSN-18fv
H alpha evolution
Terry Bohlsen – Paul Luckas (AU)
Lhires III 2400 l/mm R = 15000

Eruptive stars spectroscopy
Cataclysmics, Symbiotics, Novae

ARAS Eruptive Stars
Information Letter n° 38 #2018-01 30-04-2018
Observations of Jan. - Mar. 2018

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Last minute: AG Dra in outburst late April

Miscellanous
MAXI J1820+70, a possible black hole X-Ray binary in outburst
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Steve Shore:
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in symbiotics, novae, ...

Authors : F. Teyssier, S. Shore, J. Guarro, W. Sims, D. Boyd, P. Somogyi, F. Campos, U. Sollecchia, T. Lester, O. Garde, T. Bohlsen, P. Lucas, B. Heathcote, J. Edlin, F. Boubault, V. Marik, M. Rodriguez, F. Cazzato

"We acknowledge with thanks the variable star observations from the AAVSO International Database contributed by observers worldwide and used in this letter."
Kafka, S., 2015, Observations from the AAVSO International Database, http://www.aavso.org

Since 2014

Quaterly publication
- Main results
- Basic analysis
- And notes from
  - Steve Shore
  - Augustin Skopal,
  - Rudolf Galis, Jaroslav Merc,
  - Margarita Karovska …

Download:
http://www.astrosurf.com/aras/novae/InformationLetter/InformationLetter.html

Other ARAS Projects

Be stars monitoring

Identification of new planetary nebulae
in collaboration with Agnès Acker
http://spectro-aras.com/forum/viewforum.php?f=30

VV Cep ...
in collaboration with Phil Bennett and Ernst Pollmann
http://spectro-aras.com/forum/viewforum.php?f=19

Comets

...