Guillermo Haro 2018 Workshop

Synergy between the GTC and GTM/LMT

September 3-14, 2018, Tonantzintla, Puebla, Mexico

Topics

* Early science with GTM-50m
* First results from GTC-MEGARA
* Science cases involving GTM and GTC
* Tutorial classes on data reduction with GTM and GTC instruments

More information at:
http://www.inaoep.mx/~progharo/gh2018/
Email: progharo@inaoep.mx

MEGARA Early-Science results:

The MEGARA-GTC Spectral Library

Marisa García Vargas, Esperanza Carrasco, Mercedes Mollá, Armando Gil de Paz etal.

September 3-14, 2018
Tonantzintla, Puebla, Mexico

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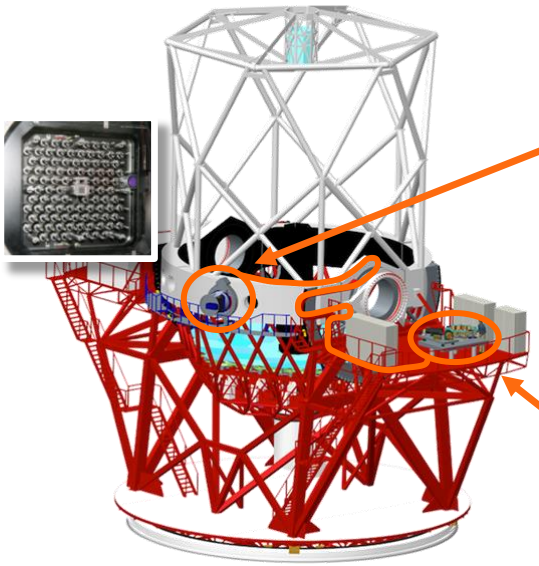
- PopStar models
- The need of the MEGARA spectral library
- MEGARA-GTC Spectral Library project goals
  - Prepare the stellar library
  - Pilot Program during MEGARA commissioning
  - Database and web-based software tool for managing the Library and the MEGARA-GTC observations.
  - GTC - MEGARA Filler program
- Short-term and mid-term plans

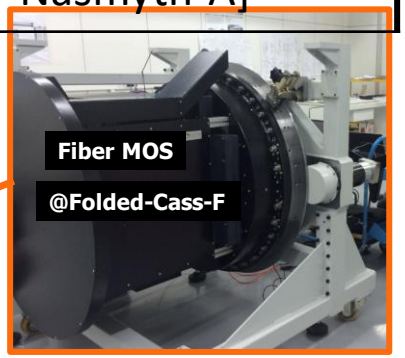
Multi Espectrógrafo en GTC de Alta Resolución para Astronomía

MEGARA @ GTC

IFU bundle (LCB)	12.5 arcsec x 11.3 arcsec
MOS	92 × 7-fiber mini-IFUs in 3.5 arcmin x 3.5 arcmin
Spaxel (fiber) size	0.62 arcsec
Wavelength range	3650 Å - 10000 Å
Spectral resolution	R = 6000 (LR), 12000 (MR), 20000 (HR)
# of spectra	623 / 644 simultaneous fiber spectra (LCB / MOS)
GTC station	Folded-Cass F [spectrograph @ Nasmyth-A]

VPH	λmin_1 (Å)	λmin (Å)	λc (Å)	λmax (Å)	λmax_2 (Å)	Disp (Å/pix)
LR-U	3640,04	3654,32	4035,83	4391,88	4417,33	0,195
LR-B	4278,43	4332,05	4802,10	5199,96	5232,02	0,230
LR-V	5101,13	5143,74	5698,50	6168,19	6206,04	0,271
LR-R	6047,62	6096,54	6753,49	7303,21	7379,88	0,321
LR-I	7166,47	7224,11	8007,27	8640,37	8822,29	0,380
LR-Z	7978,45	8042,74	8903,41	9634,92	9692,58	0,421
MR-U	3911,99	3919,81	4107,57	4282,17	4289,11	0,092
MR-UB	4217,44	4226,38	4433,65	4625,79	4633,65	0,103
MR-B	4575,84	4585,66	4814,05	5025,07	5033,66	0,112
MR-G	4952,15	4963,22	5213,96	5445,00	5454,62	0,126
MR-V	5369,03	5413,11	5670,35	5923,90	5659,56	0,135
MR-VR	5850,19	5894,23	6171,69	6448,52	6468,52	0,148
MR-R	6228,15	6243,10	6567,26	6865,26	6878,27	0,163
MR-RI	6748,88	6764,58	7117,12	7440,85	7454,46	0,172
MR-I	7369,39	7386,53	7773,10	8127,95	8142,75	0,189
MR-Z	8787,88	8810,52	9274,83	9698,97	9740,20	0,220
HR-R	6397,62	6405,61	6606,49	6797,14	6804,87	0,098
HR-I	8358,64	8380,20	8632,98	8882,38	8984,87	0,130





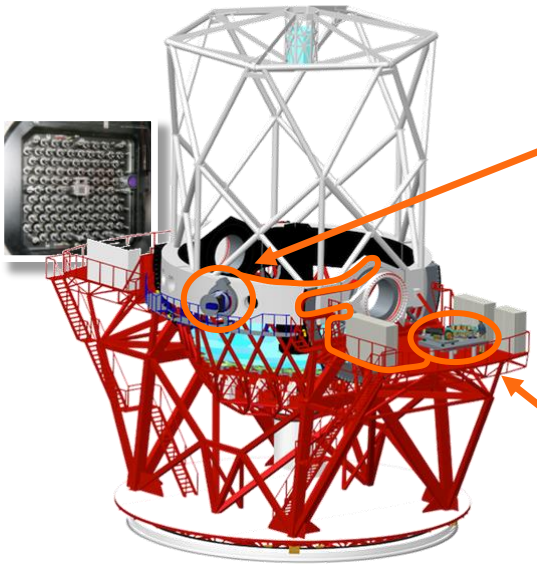
Multi
Espectrógrafo en
GTC de
Alta
Resolución para
Astronomía

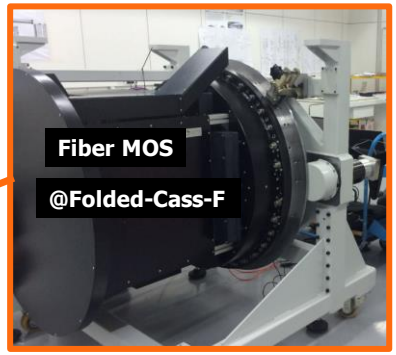
MEGARA @ GTC

Fully commissioned August 31st 2017

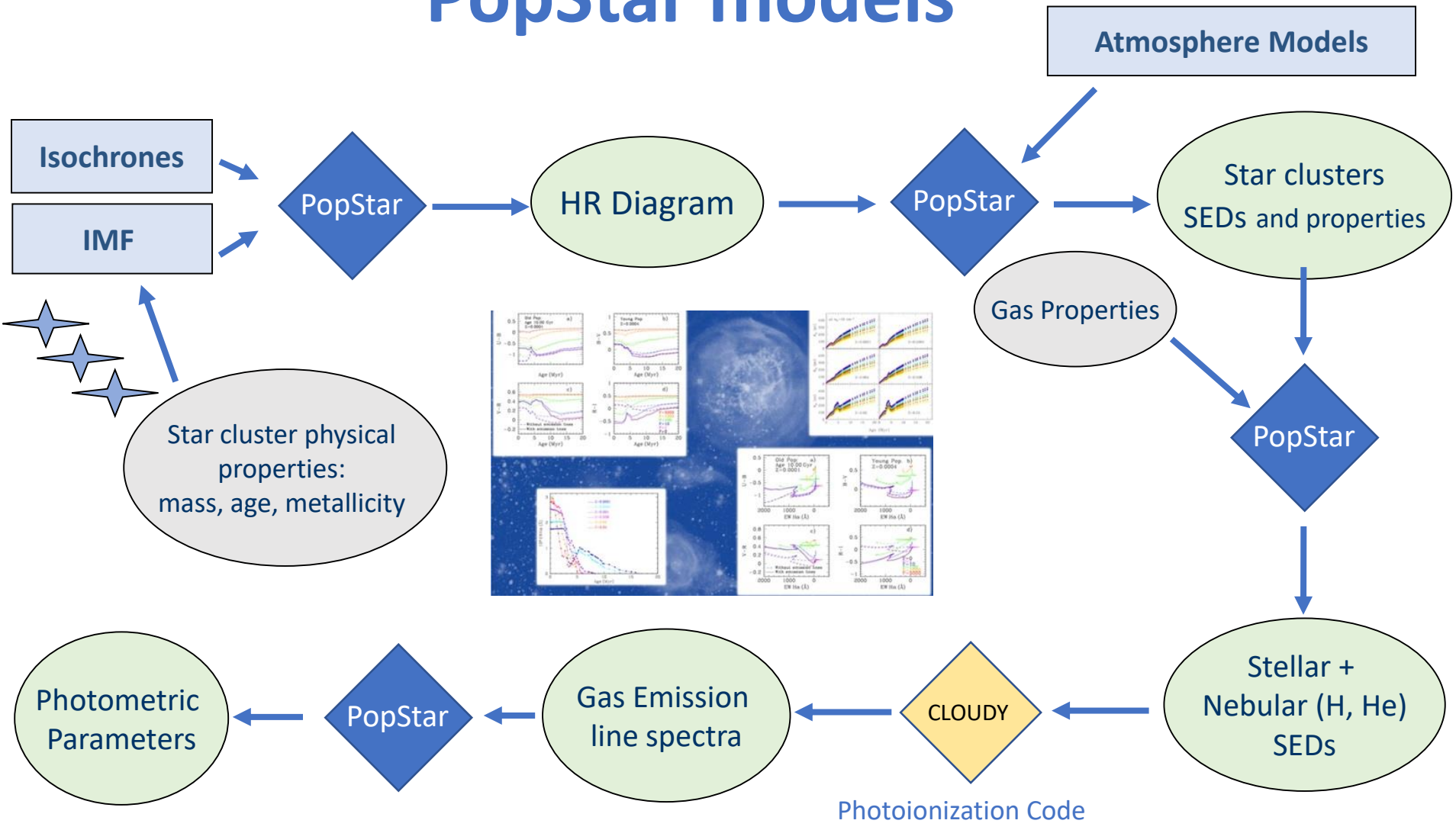
Offered for scientific operations in all observing modes in 2018B

VPH	λmin$_1$ (Å)	λmin (Å)	λc (Å)	λmax (Å)	λmax$_2$ (Å)	Disp (Å/pix)
LR-U	3640,04	3654,32	4035,83	4391,88	4417,33	0,195
LR-B	4278,43	4332,05	4802,10	5199,96	5232,02	0,230
LR-V	5101,13	5143,74	5698,50	6168,19	6206,04	0,271
LR-R	6047,62	6096,54	6753,49	7303,21	7379,88	0,321
LR-I	7166,47	7224,11	8007,27	8640,37	8822,29	0,380
LR-Z	7978,45	8042,74	8903,41	9634,92	9692,58	0,421
MR-U	3911,99	3919,81	4107,57	4282,17	4289,11	0,092
MR-UB	4217,44	4226,38	4433,65	4625,79	4633,65	0,103
MR-B	4575,84	4585,66	4814,05	5025,07	5033,66	0,112
MR-G	4952,15	4963,22	5213,96	5445,00	5454,62	0,126
MR-V	5369,03	5413,11	5670,35	5923,90	5659,56	0,135
MR-VR	5850,19	5894,23	6171,69	6448,52	6468,52	0,148
MR-R	6228,15	6243,10	6567,26	6865,26	6878,27	0,163
MR-RI	6748,88	6764,58	7117,12	7440,85	7454,46	0,172
MR-I	7369,39	7386,53	7773,10	8127,95	8142,75	0,189
MR-Z	8787,88	8810,52	9274,83	9698,97	9740,20	0,220
HR-R	6397,62	6405,61	6606,49	6797,14	6804,87	0,098
HR-I	8358,64	8380,20	8632,98	8882,38	8984,87	0,130





PopStar models

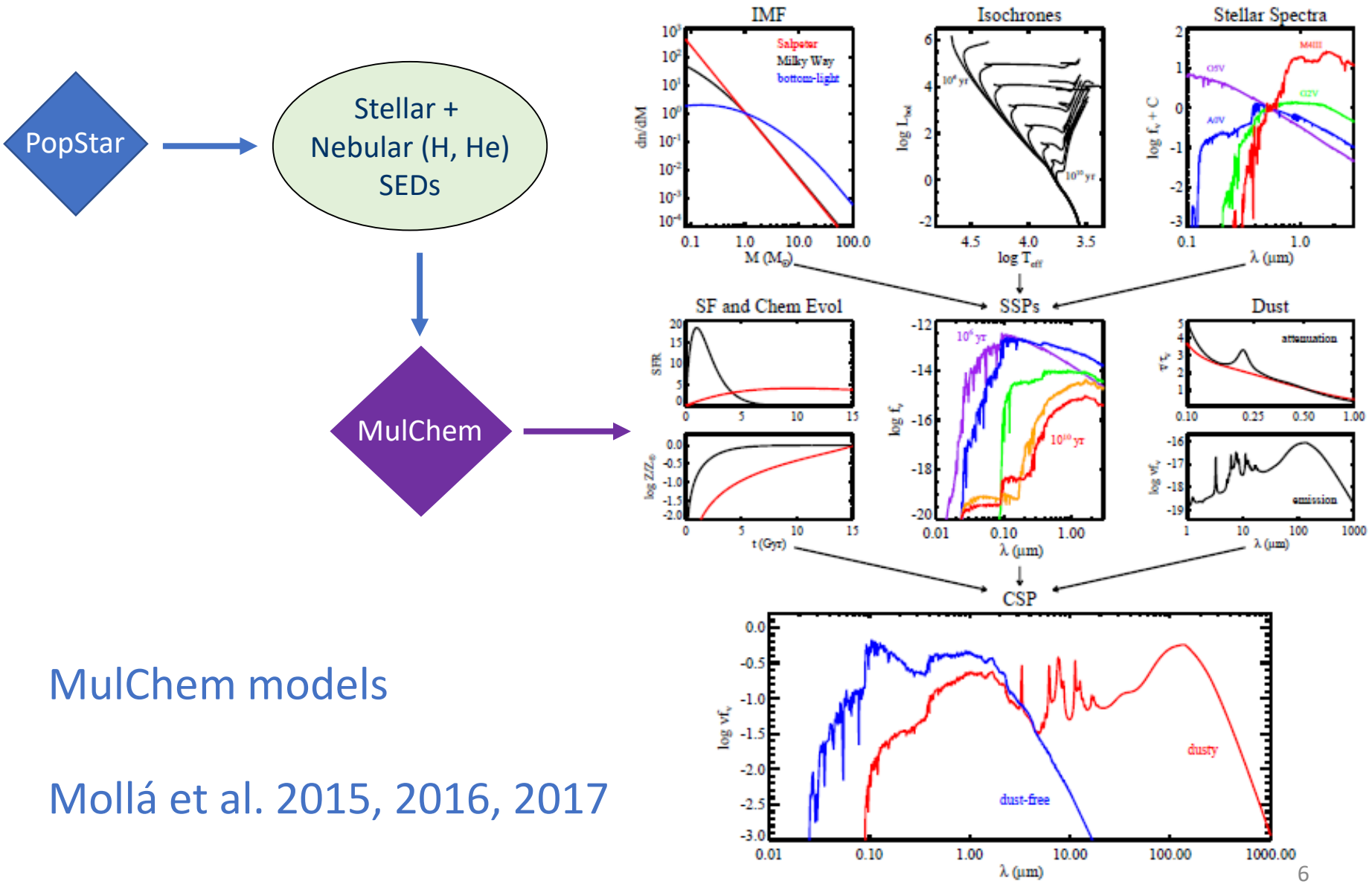


- Mollá, García-Vargas & Bressan (2009, PopStar I);
- Martín-Manjón et al. (2010, PopStar II)
- García-Vargas, Mollá & Martín-Manjón (2013; PopStar III).

IMF Initial Mass Function
SED Spectral Energy Distribution

http://www.fractalsIne.es/PopStar

Chemical Evolution models



MulChem models

Mollá et al. 2015, 2016, 2017

SCIENCE

Fractal SLNE

English | Castellano

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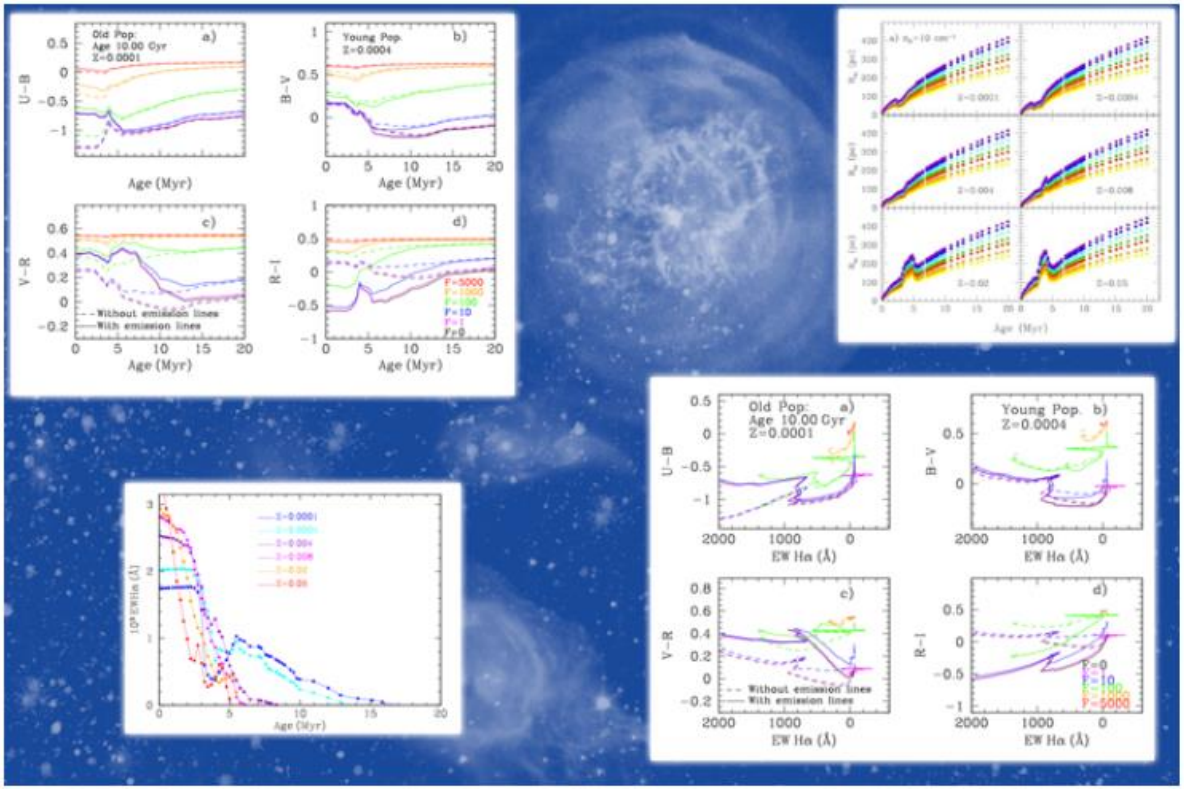
Astronomy

http://www.fractalslne.es/PopStar

Some of **FRACTAL** consultants are researchers in Astrophysics. This webpage contains the information to their Research projects and results.



PopStar Ingredients
PopStar Products
Download Models
References
Spectral Energy Distribution Model
SSP SED Plot
H-R Diagrams Model
SSP H-R Plot
SSP Properties
SSP properties Plot
Combination of 2 SSP SED Models
Combination of 2 SSP SED Plot
Photometrical Parameters of a combination of 2 SS
Photometrical Parameters 2 SSP Plot

PopStar Ingredients | SSP SED Plot

certain units, as described below the plot area. This spectrum can also be plotted normalized to a given wavelength and/or with an offset

- The plot can be visualized linear or log-log
- A wavelength range for visualization can be defined
- Once the plot is done, viewing, zooming and printing options will become available by clicking with the right mouse button over the graphic area. Also, it is possible to zoom over a certain plotted area by selecting it with the left mouse button

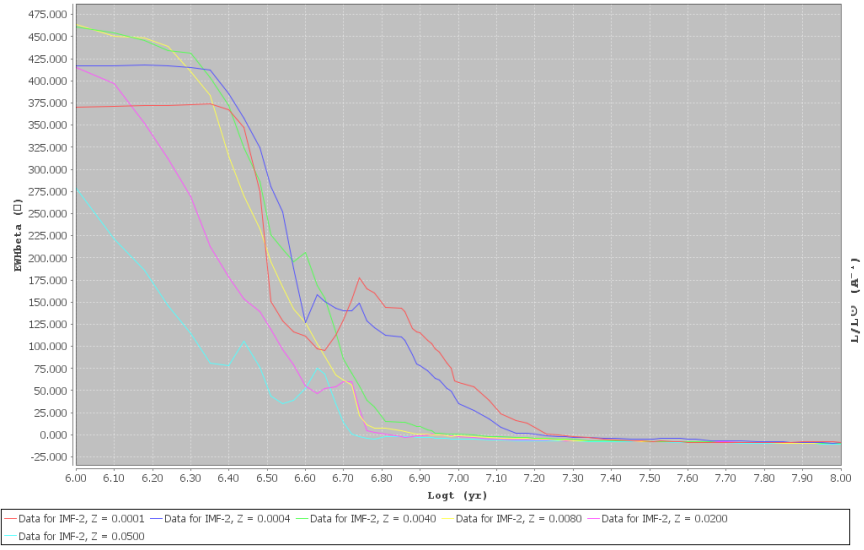
IMF	Z	Log t (yr)	E(B - V)	offset (constant)	Norm (λ, Å)	L type [$L/L_{\odot}$, $Å^{-1}$]
IMF-2 Salpeter (1955)	0.0200	5.00	0.00	0	0.000	Ltot
IMF-2 Salpeter (1955)	0.0200	6.00	0	0	0	Ltot
IMF-2 Salpeter (1955)	0.0200	7.00	0	0	0	Ltot
IMF-2 Salpeter (1955)	0.0200	8.00	0	0	0	Ltot

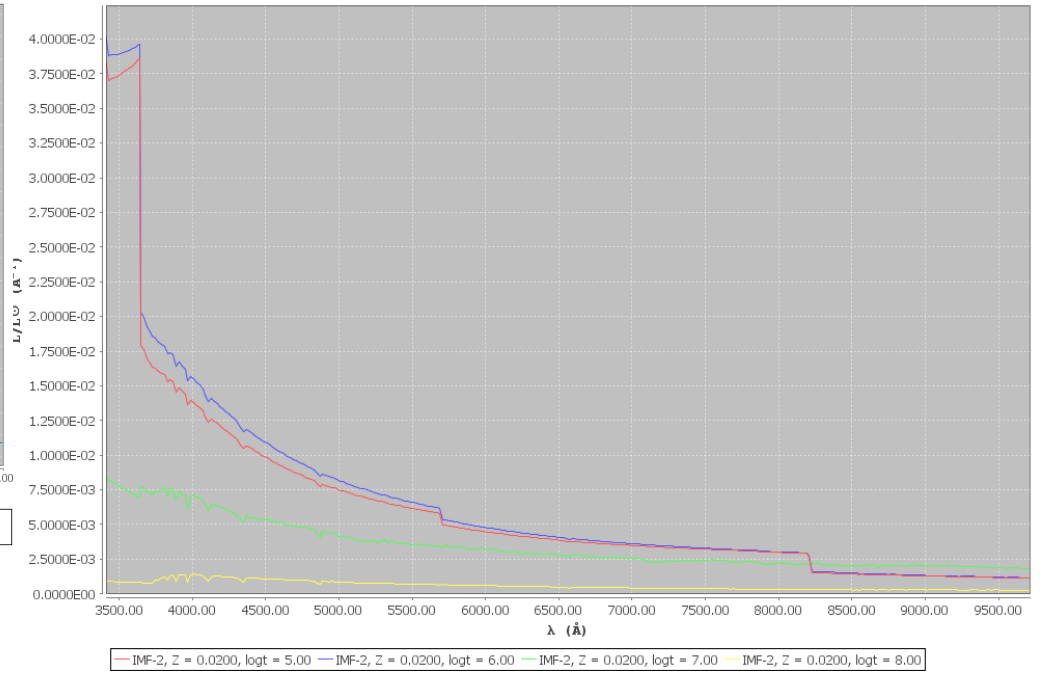
http://www.fractalsIne.es/PopStar

Add new row

User Custom Spectra (*)

Add custom spectra file? Offset (constant) : 0 Norm (λ, Å) : 0.000

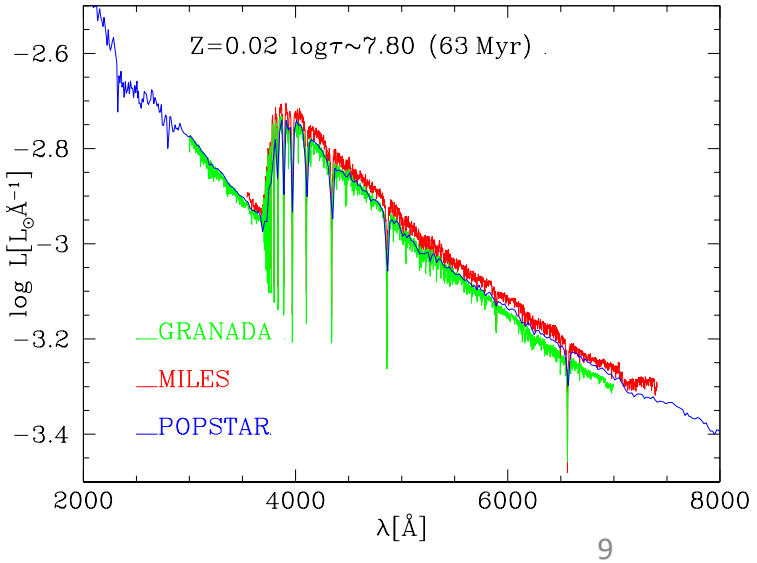




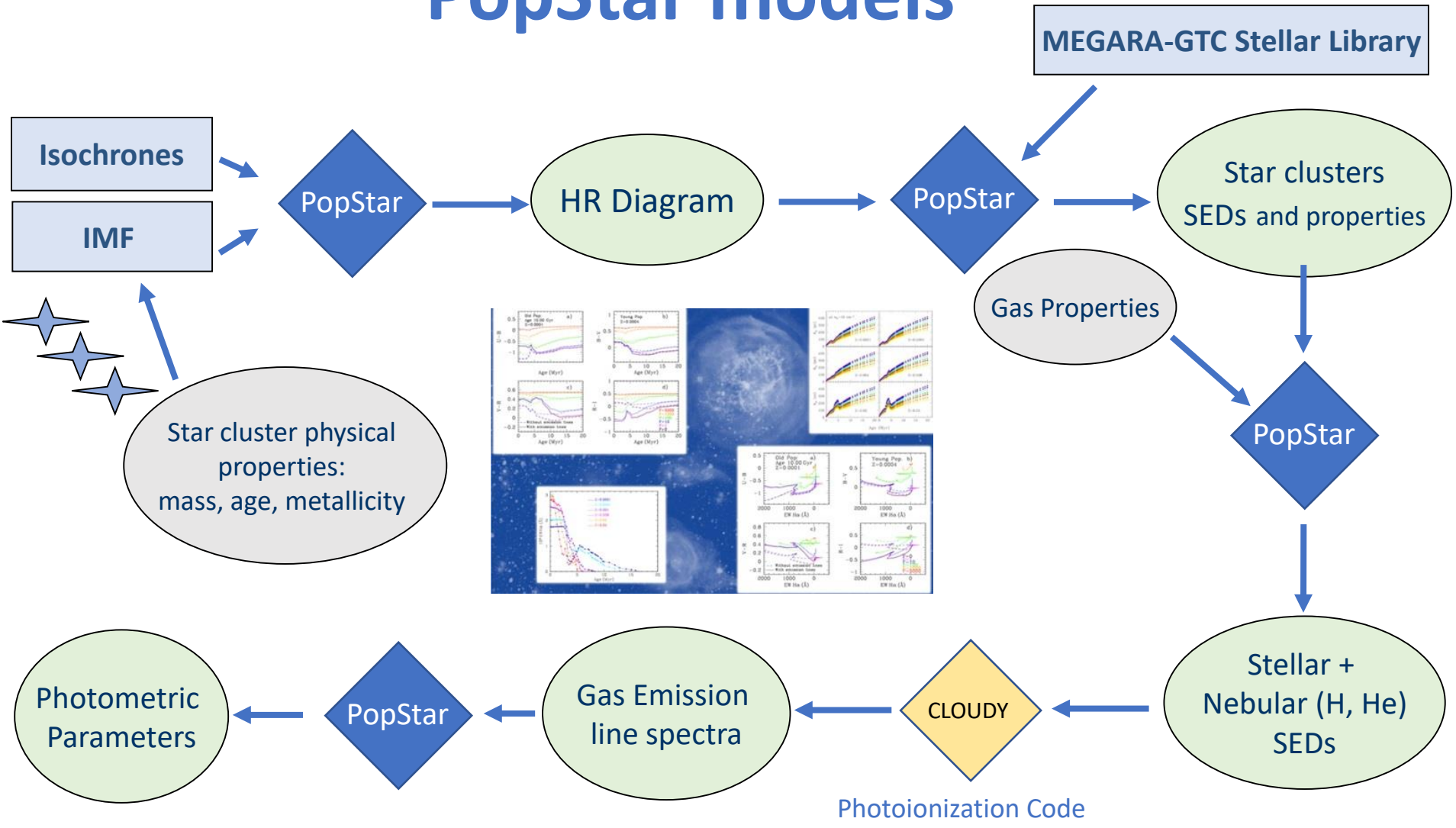
Available SED grids

- SEDs grids: García-Vargas & Díaz (1991), García-Vargas, Bressan & Díaz (1995), García-Vargas, Mollá & Bressan (1998), Leitherer et al. (1999); Mollá & García-Vargas (2000), Bruzual & Charlot (2003); Bicker et al. (2004); González Delgado et al. (2005); Maraston (2005,2011); Fritze-v. Alvensleben & Bicker (2006); Mollá, García-Vargas & Bressan (2009, PopStar I); Vazdekis et al. (2010, 2016); Martín-Manjón et al. (2010, PopStar II); García-Vargas, Mollá & Martín-Manjón (2013; PopStar III).
- Difference among these SSP models arise from the use of different stellar isochrones, stellar atmosphere libraries (theoretical or empirical), spectral coverage, resolution, inclusion of nebular emission and different input physics and computational algorithms.

- **PopStar: low spectral resolution (R < 500)**
- **MEGARA resolution (6000 < R < 20000)**



PopStar models



http://www.fractalsIne.es/PopStar

The need of a MEGARA Spectral Library

- An empirical spectral library is crucial for having the necessary stellar population templates to interpret the observations taken with the same instrumental set-up.
- MEGARA has mid-high spectral resolution (6000 for LRs, 12000 for MRs and 20000 for HRs), full visible range coverage (for LRs and MRs and specific set-up around 6500 Å and 8600 Å at R ~ 20000).
- There is not a complete library, either empirical or theoretical able to fulfill the MEGARA parameters.
- **MEGARA needs its own spectral library**

MEGARA Stellar Library project goals

1. To produce a **Complete Stellar Library** for MEGARA
2. To observe library's stars during **MEGARA commissioning (pilot)**
3. To build **a database** with the Stellar Library and a **web-based software tool** for managing the observations.
4. To propose and carry out a **GTC - MEGARA Filler program**
5. To develop a public database with reduced and Q/C spectra.
6. To use these spectra to feed PopStar code to produce SSPs and composed population models to be used as stellar population templates to support the interpretation of MEGARA data

1. To produce a **Complete Stellar Library for MEGARA**

July, 2014

1. To produce a **Complete Stellar Library** for MEGARA

- We revised the existing catalogues and computed a list of bright stars within all ranges of spectral types and within the observation limits of GTC at ORM.
- We compiled and selected the stars for a **Complete Stellar Library** in all VPHs, taken some test-stars common to several catalogues to be observed with MEGARA.
- We assigned priorities to the observations and made exposure time estimates with the MEGARA Exposure Time Calculator .
- We needed MEGARA at the telescope to start

Credits:
Sara Rodríguez Berlanas (TFM) **July 2014**
Supervisors: Mercedes Mollá and Marisa García-Vargas
UCM Supervisor: Armando Gil de Paz

Catálogo estelar para MEGARA

MEGARA stellar library

Sara RodrígueL Berlanas
sarodr03@ucm.es

Trabajo de Fin de Máster (12 créditos)
Máster Universitario en Astrofísica UCM

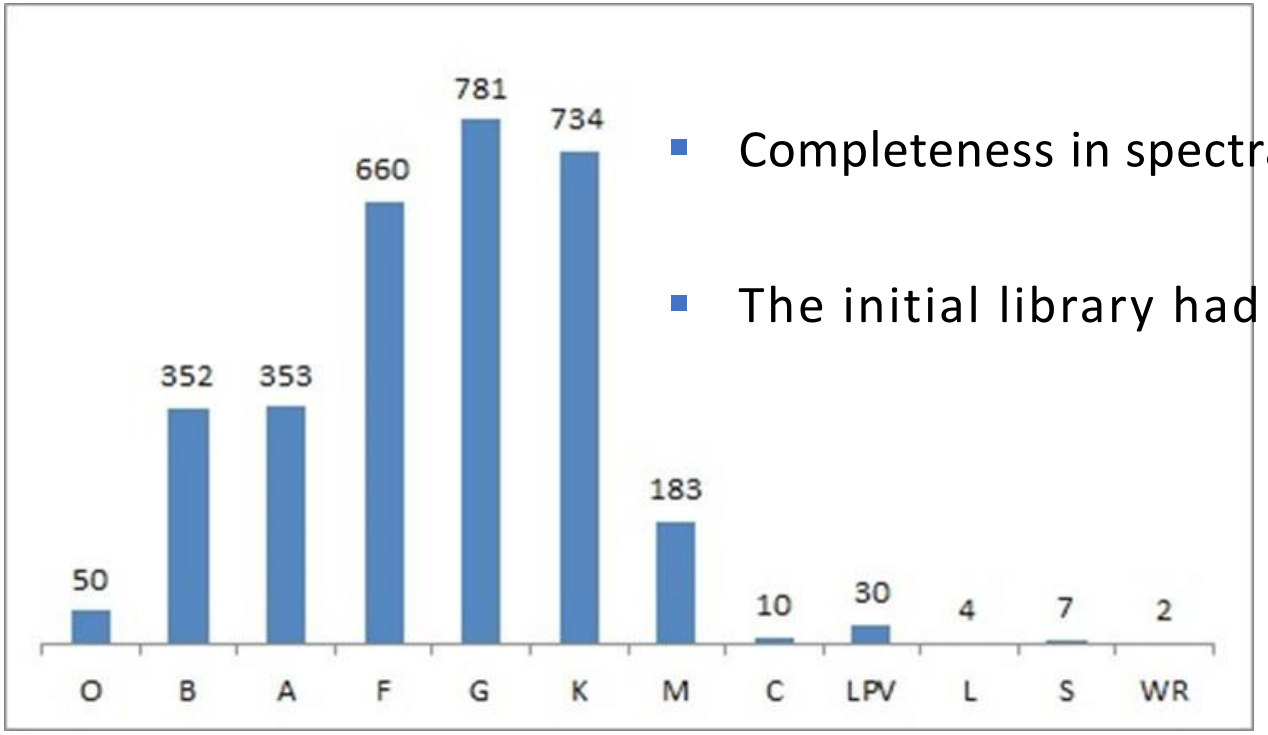
Supervisores: Mercedes Mollá (mercedes.molla@ciemat.es)
& Marisa García-Vargas (marisa.garcia@fractal-es.com)
Supervisor interno UCM: Armando Gil de Paz (agil@fis.ucm.es)

Dpto. de Astrofísica y Ciencias de la Atmósfera
Universidad Complutense de Madrid

Convocatoria: Julio 2014

Previous existing stellar libraries used for the MEGARA catalogue

Library	Resolving Power	Spectral Range	Number	set-up	Reference
INDO-US	5000	3460 - 9460	1237	LR	Valdes et al. (2004)
MILES	2000	3520 - 7500	987	LR	Sánchez-Blázquez et al. (2006)
NGSL	1000	1670 - 10250	374	LR	Gregg et al. (2006)
STELIB	2000	3200 - 9300	249	LR	Le Borgne et al. (2003)
ELODIE	10000	3900 - 6800	1388	MR	Prugniel & Soubiran (2001, 2004)
FOE	12000	3800 - 10000	125	MR	Montes, Ramsey, & Welty (1999)
X-SHOOTER	10000	3000 - 25000	379	MR	Chen et al. (2012)
ELODIE	42000	3900 - 6800	1388	HR	Prugniel & Soubiran (2001, 2004)
UES	55000	4800 - 10600	83	HR	Montes & Martin (1998)
UVES-POP	80000	3070 - 10300	300	HR	Bagnulo et al. (2003)

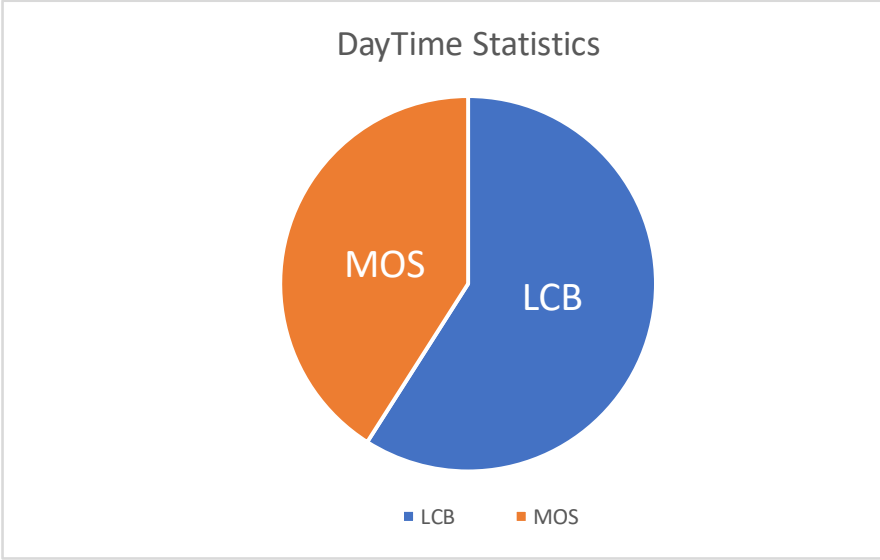


- Completeness in spectral type for Teff and log
- The initial library had **3166 stars**

2. To observe library stars during **MEGARA commissioning**

June – August 2017

DayTime commissioning



~ 1000 spectrograph mechanisms movements

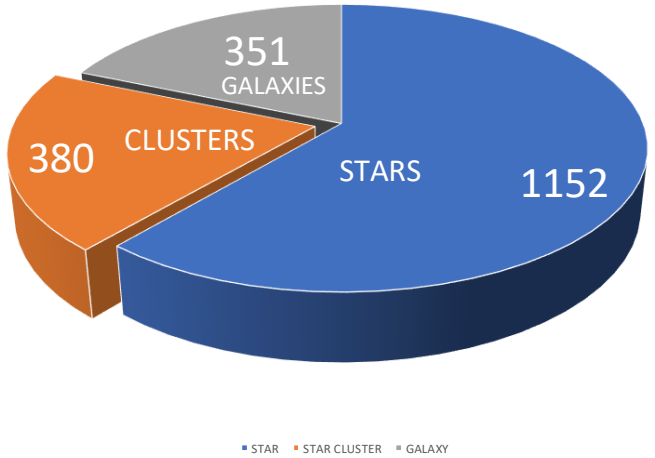
~ 50,000 MOS robotic positioners movements

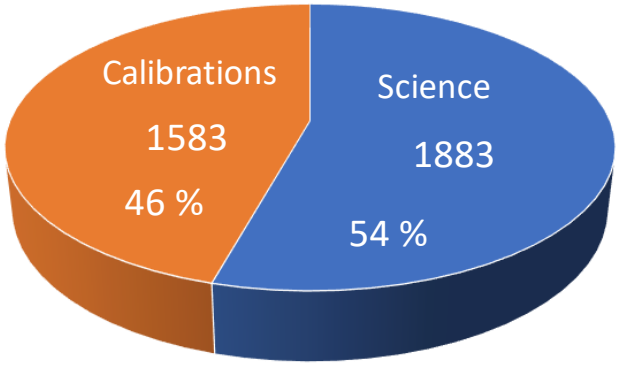
851 Images

530,431 spectra !

NightTime commissioning

SCIENTIFIC TARGETS

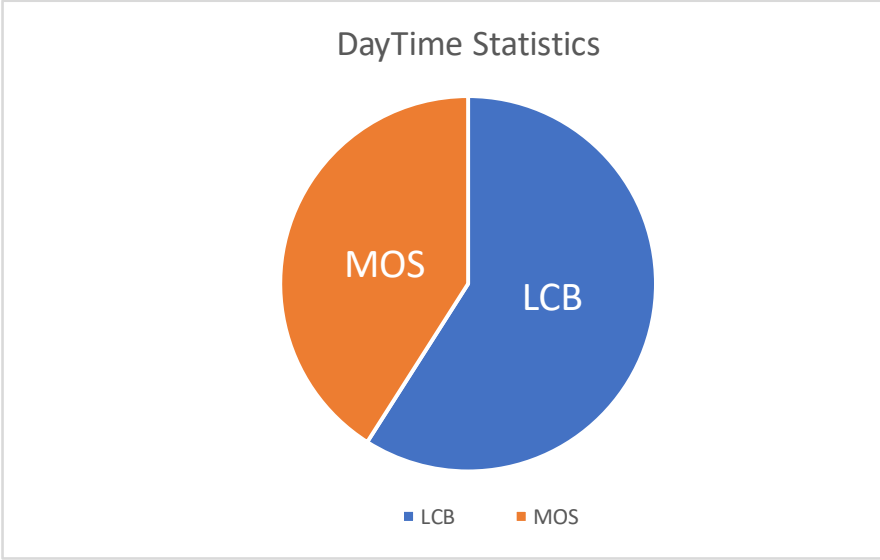




3,469 Images

2,148,920 spectra !

DayTime commissioning



~ 1000 spectrograph mechanisms movements

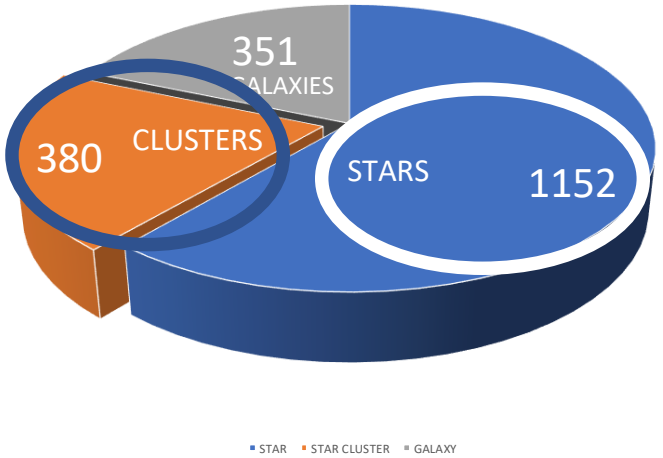
~ 50,000 MOS robotic positioners movements

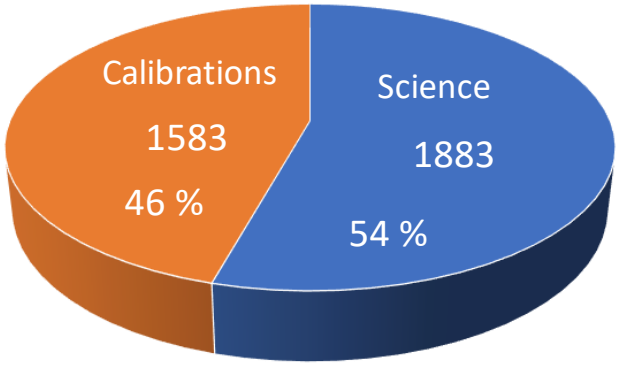
851 Images

530,431 spectra !

NightTime commissioning

SCIENTIFIC TARGETS





3,469 Images

2,148,920 spectra !

2. To observe library stars during MEGARA commissioning

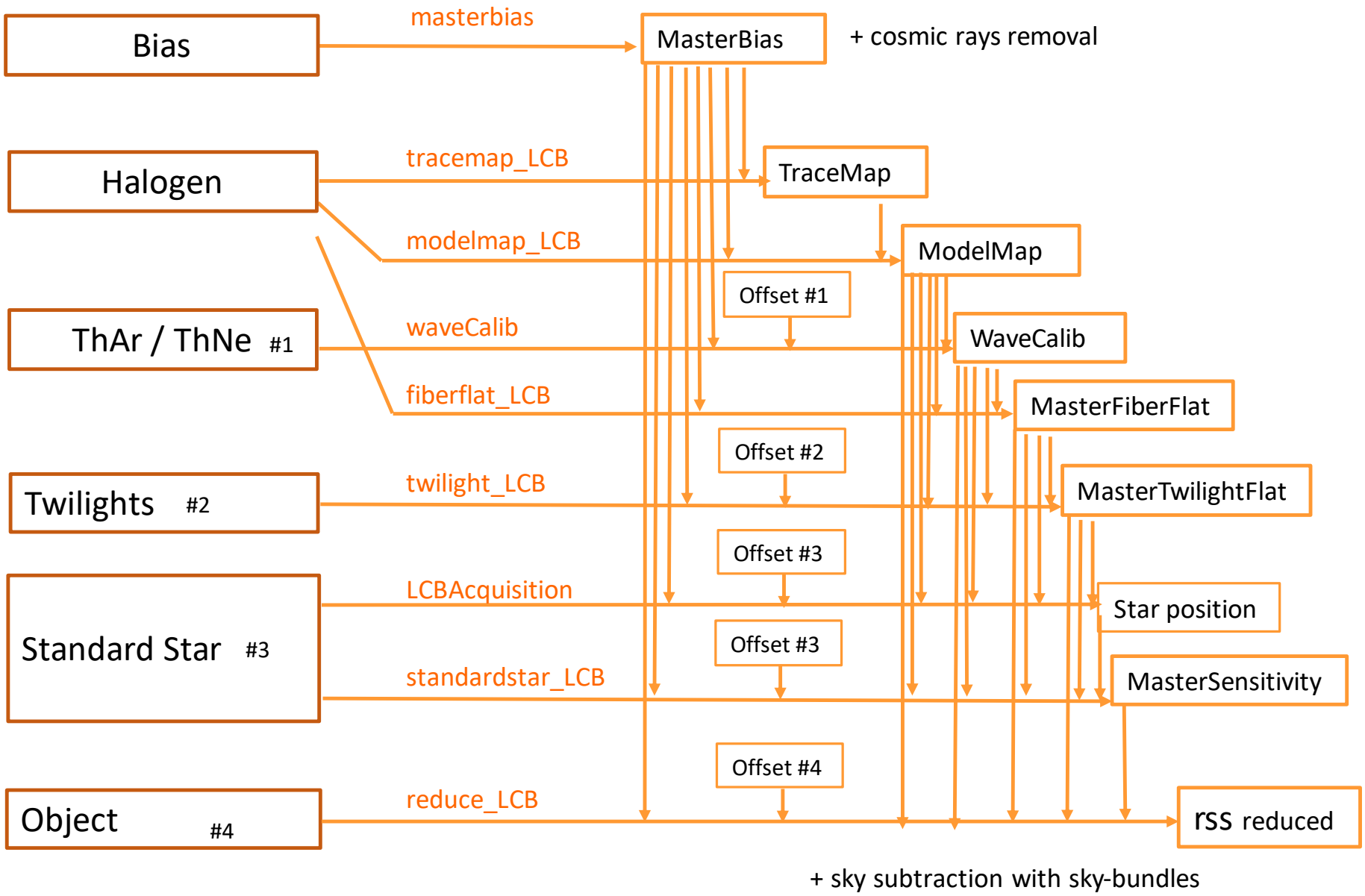
- We carried out a Pilot Program during MEGARA commissioning by observing stars of different spectral types and luminosity range.
- Stars were observed even up to 1 hour after twilight
  - 40 stars in different spectral set-ups with the LCB, 23 in HR-I (CaT range)
  - 88 stars in M15 cluster in all set-ups + M71 in several set-ups
  - 101 stars in HR-I already observed
- The data were reduced with the pipeline, included flux calibration and were used also for ETC tests
- These prototype observations helped us to re-design the observational strategy and the exposure times for a uniform S/N.

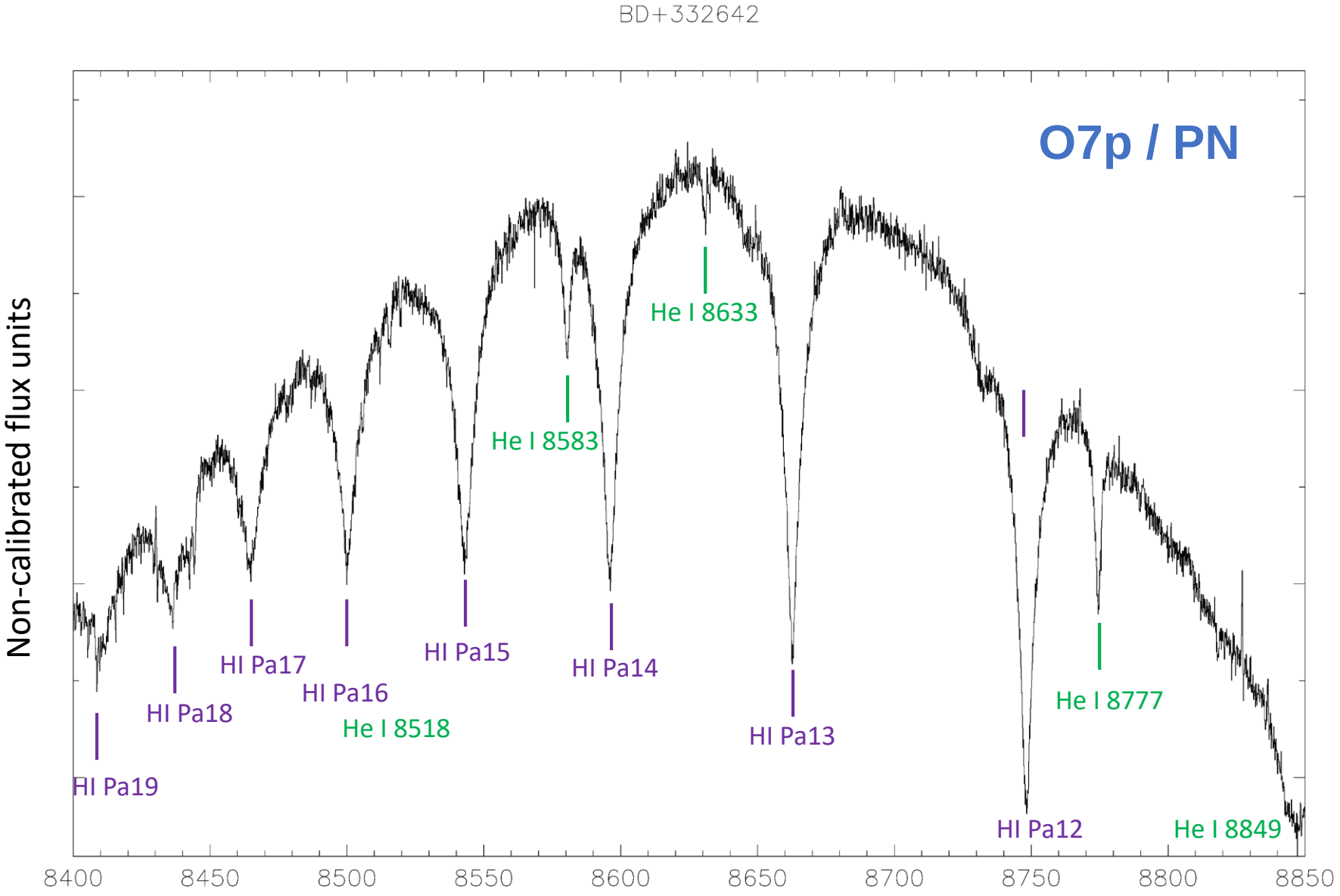
Individual stars observed in HR-I during commissioning

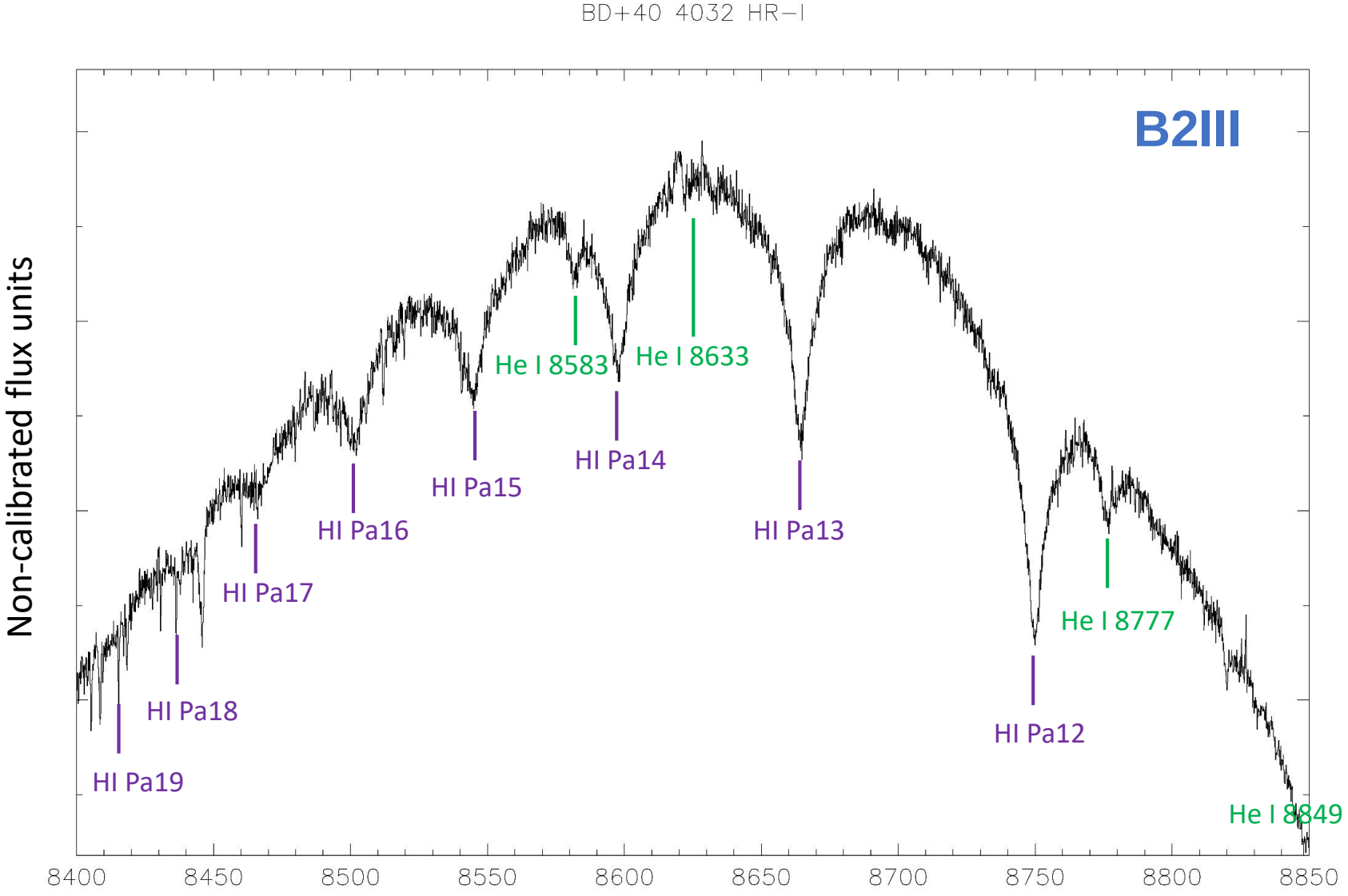
Star name	Spectral type	U	B	V	R	I	Date	T exp
BD+122237 Feige 15	sdA0IVHe1 B	-	10,4	10,2	-	-	29/08/2017	3 x 90
BD+174708	sdF8 D	9,7	9,9	9,5	9,0	8,7	30/07/2017	3 x 45
BD+254655	sdO6 C	8,3	9,4	9,7	-	-	01/07/2017	3 x 30
BD+332642	O7p D	9,8	10,6	10,7	10,9	11,0	29/06/2017	3 x 300
BD+404032 HD227900	B2III D	5,0	10,8	10,6	-	-	28/08/2017	3 x 100
BD+423227	A0 D	-	10,1	10,1	-	-	23/08/2017	3 x 60
HD011544	G2Ib C	-	8,0	6,8	-	-	23/08/2017	3 x 20
HD019445	G2VFe-3 C	8,3	8,5	8,1	7,6	7,3	23/08/2017	3 x 30
HD020123	G5Ib-IIa C	7,0	6,2	5,0	-	-	23/08/2017	3 x 15
HD025975	K1III C	7,8	7,0	6,1	5,5	5,0	29/08/2017	60
HD026630	G0Ib B	5,8	5,1	4,2	3,4	2,8	29/08/2017	1 x 20 + 1 x 10
HD027971	K1III C	-	6,3	5,3	-	-	29/08/2017	60
HD174350	K1III C	-	9,1	7,9	-	-	30/06/2017	3 x 100
HD185622	K4Ib C	-	8,3	6,3	-	-	24/06/2017	2 x 20
HD192281	O4.5V(n)((f)) C	7,3	7,9	7,6	-	-	28/08/2017	3 x 25
HD218915	O9.2Iab	6,3	7,2	7,2			31/08/2017	1 x 30
HD216219	G1II-III:Fe-1CH0.5 C	-	8,1	7,4	-	-	30/06/2017	3 x 150
HD219978	K4.5Ib C	-	8,9	6,7	-	-	25/07/2017	1 x 5 + 1 x 20 + 1 x 60
HD220575	B8IIIc	6,4	6,7	6,7			31/08/2017	2 x 15
HD220954	K0.5III	6,4	5,4	4,3	3,5		31/08/2017	1 x 5
HD224458	G8III C	-	9,3	8,3	-	-	30/06/2017	3 x 150
SCHULTE 9	O4.5If C	13,4	12,8	11,0	11,0	-	30/07/2017	3 x 200

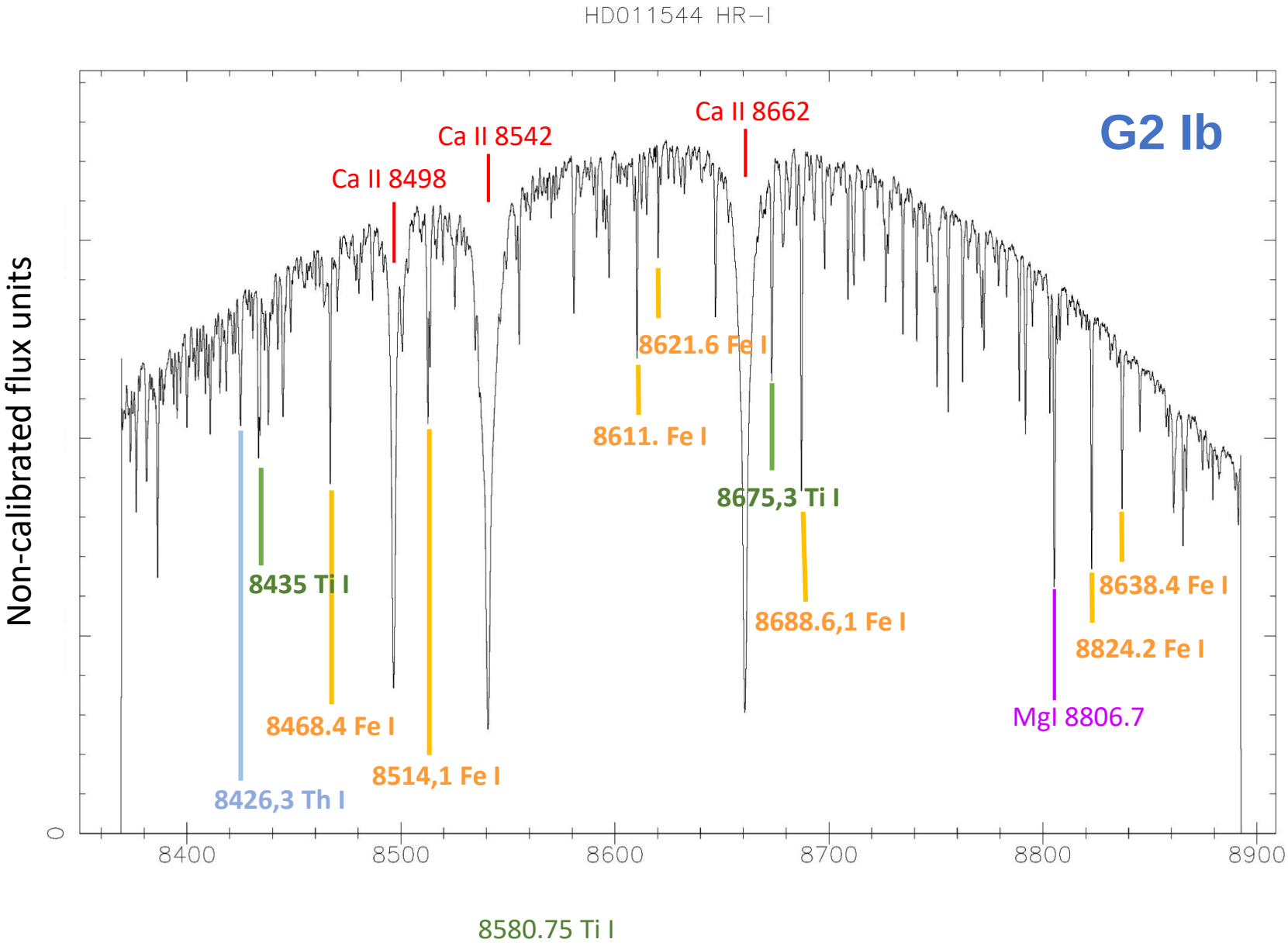
Individual stars observed in HR-I during commissioning

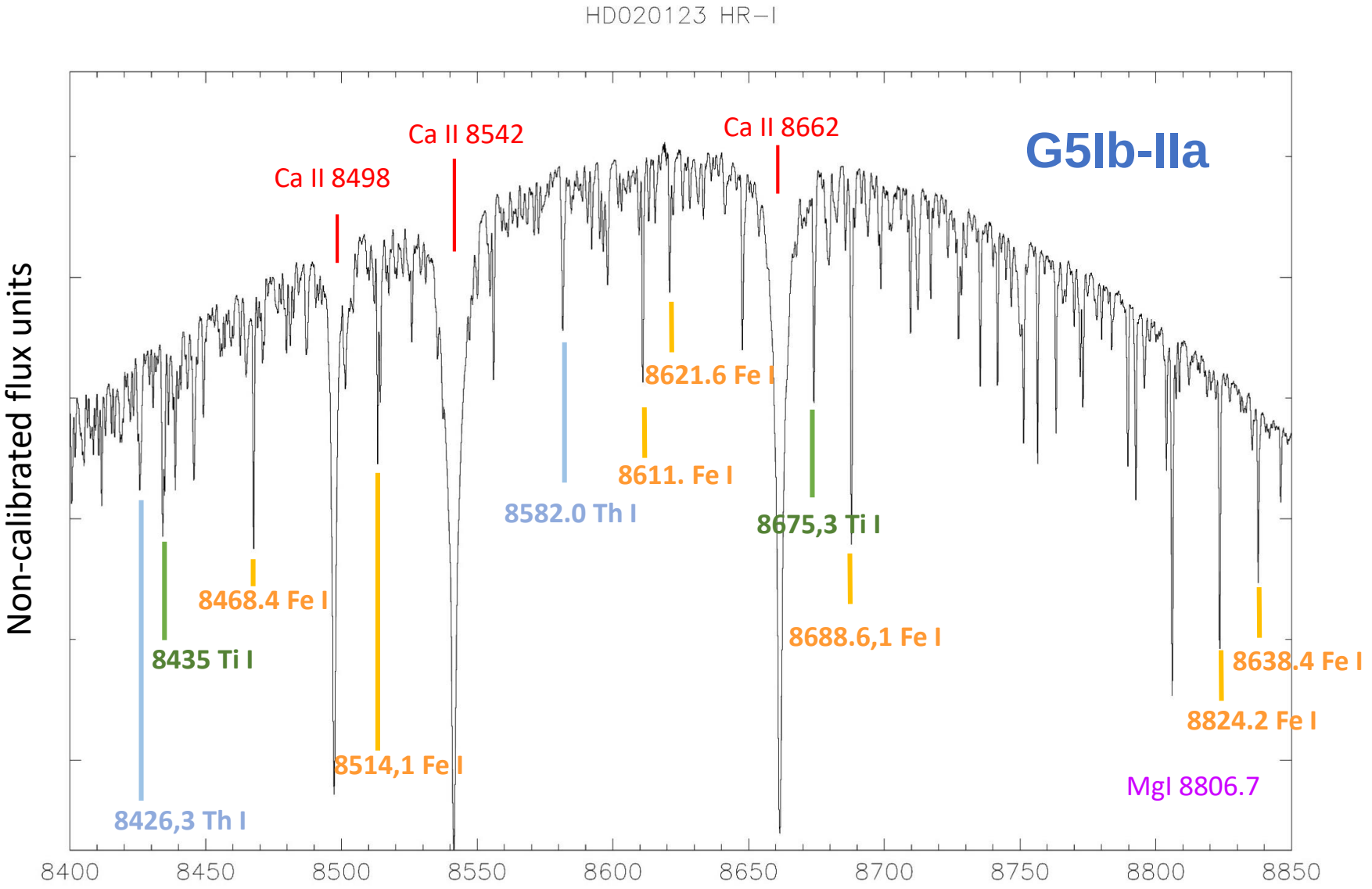
Star name	Spectral type	U	B	V	R	I	Date	T exp
BD+122237 Feige 15	sdA0IVHe1 B	-	10,4	10,2	-	-	29/08/2017	3 x 90
BD+174708	sdF8 D	9,7	9,9	9,5	9,0	8,7	30/07/2017	3 x 45
BD+254655	sdO6 C	8,3	9,4	9,7	-	-	01/07/2017	3 x 30
BD+332642	O7p D	9,8	10,6	10,7	10,9	11,0	29/06/2017	3 x 300
BD+404032 HD227900	B2III D	5,0	10,8	10,6	-	-	28/08/2017	3 x 100
BD+423227	A0 D	-	10,1	10,1	-	-	23/08/2017	3 x 60
HD011544	G2Ib C	-	8,0	6,8	-	-	23/08/2017	3 x 20
HD019445	G2VFe-3 C	8,3	8,5	8,1	7,6	7,3	23/08/2017	3 x 30
HD020123	G5Ib-IIa C	7,0	6,2	5,0	-	-	23/08/2017	3 x 15
HD025975	K1III C	7,8	7,0	6,1	5,5	5,0	29/08/2017	60
HD026630	G0Ib B	5,8	5,1	4,2	3,4	2,8	29/08/2017	1 x 20 + 1 x 10
HD027971	K1III C	-	6,3	5,3	-	-	29/08/2017	60
HD174350	K1III C	-	9,1	7,9	-	-	30/06/2017	3 x 100
HD185622	K4Ib C	-	8,3	6,3	-	-	24/06/2017	2 x 20
HD192281	O4.5V(n)((f)) C	7,3	7,9	7,6	-	-	28/08/2017	3 x 25
HD218915	O9.2Iab	6,3	7,2	7,2			31/08/2017	1 x 30
HD216219	G1II-III:Fe-1CH0.5 C	-	8,1	7,4	-	-	30/06/2017	3 x 150
HD219978	K4.5Ib C	-	8,9	6,7	-	-	25/07/2017	1 x 5 + 1 x 20 + 1 x 60
HD220575	B8IIIc	6,4	6,7	6,7			31/08/2017	2 x 15
HD220954	K0.5III	6,4	5,4	4,3	3,5		31/08/2017	1 x 5
HD224458	G8III C	-	9,3	8,3	-	-	30/06/2017	3 x 150
SCHULTE 9	O4.5If C	13,4	12,8	11,0	11,0	-	30/07/2017	3 x 200

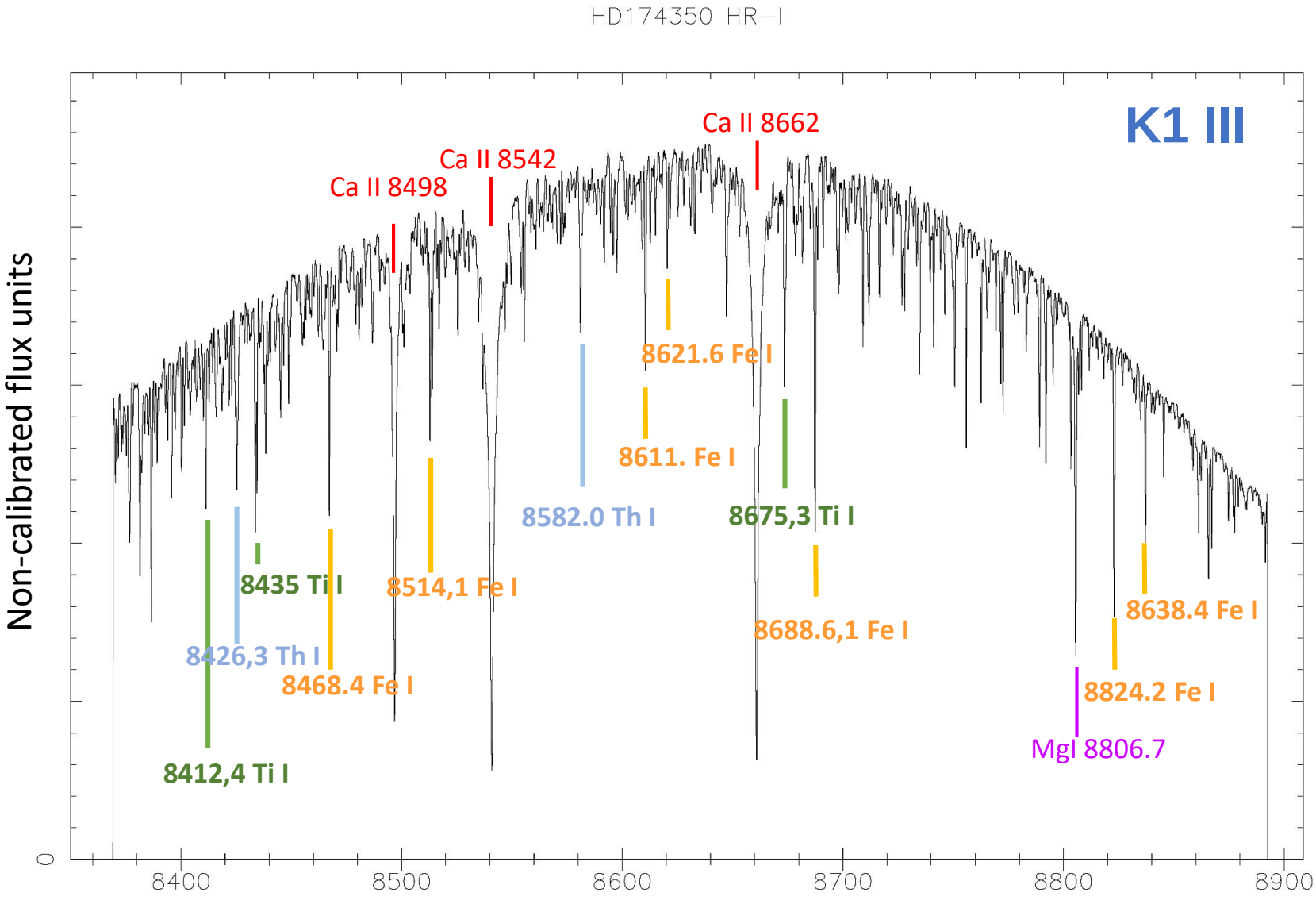

Bias
masterbias
MasterBias
+ cosmic rays removal
Halogen
tracemap_LCB
TraceMap
modelmap_LCB
ModelMap
Offset #1
ThAr / ThNe #1
waveCalib
WaveCalib
fiberflat_LCB
MasterFiberFlat
Offset #2
Twilights #2
twilight_LCB
MasterTwilightFlat
Offset #3
LCBAcquisition
Star position
Standard Star #3
Offset #3
standardstar_LCB
MasterSensitivity
Offset #4
Object #4
reduce_LCB
rss reduced
+ sky subtraction with sky-bundles

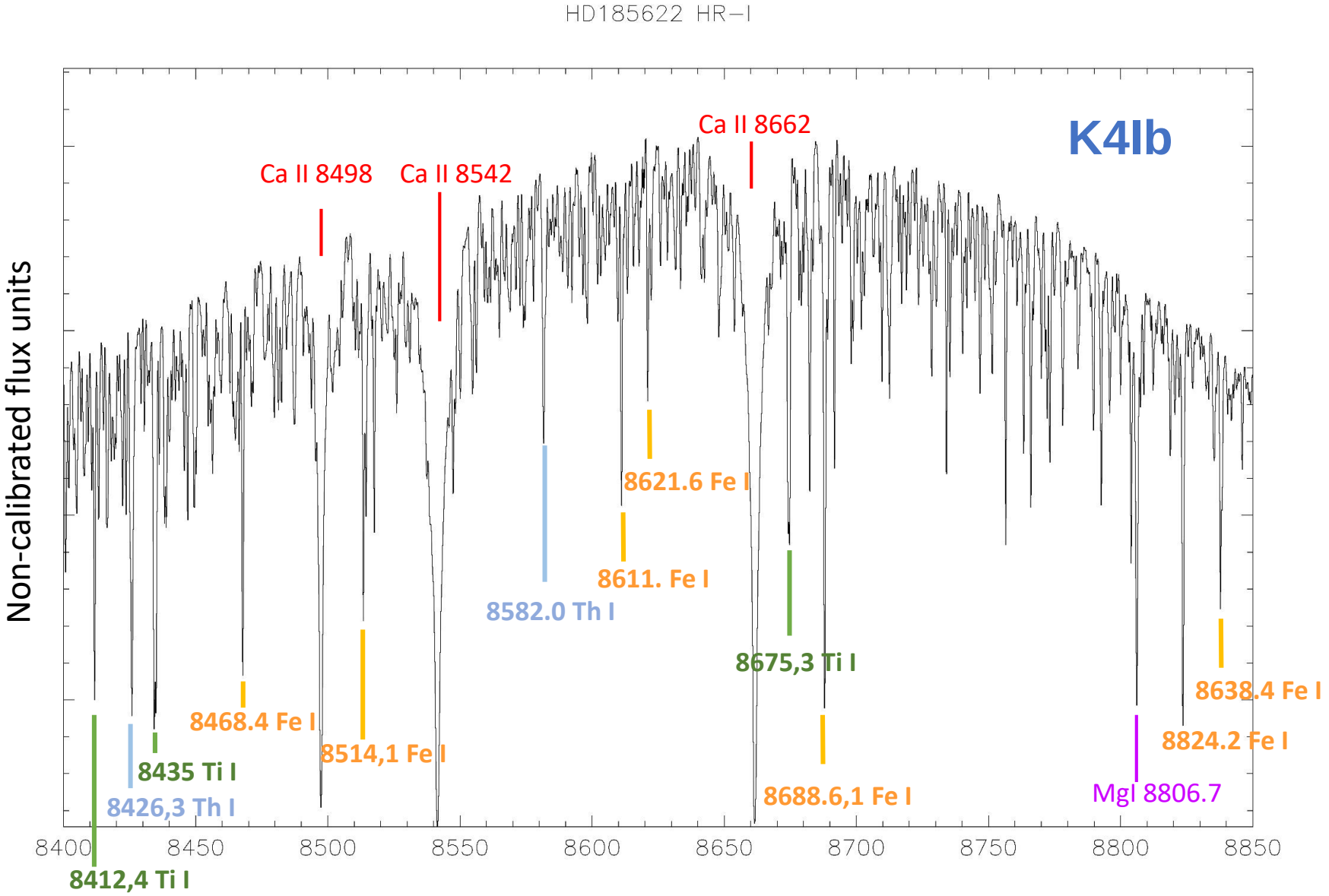

BD+332642
O7p / PN
Non-calibrated flux units
HI Pa19
HI Pa18
HI Pa17
HI Pa16
He I 8518
HI Pa15
He I 8583
HI Pa14
He I 8633
HI Pa13
HI Pa12
He I 8777
He I 8849
8400
8450
8500
8550
8600
8650
8700
8750
8800
8850

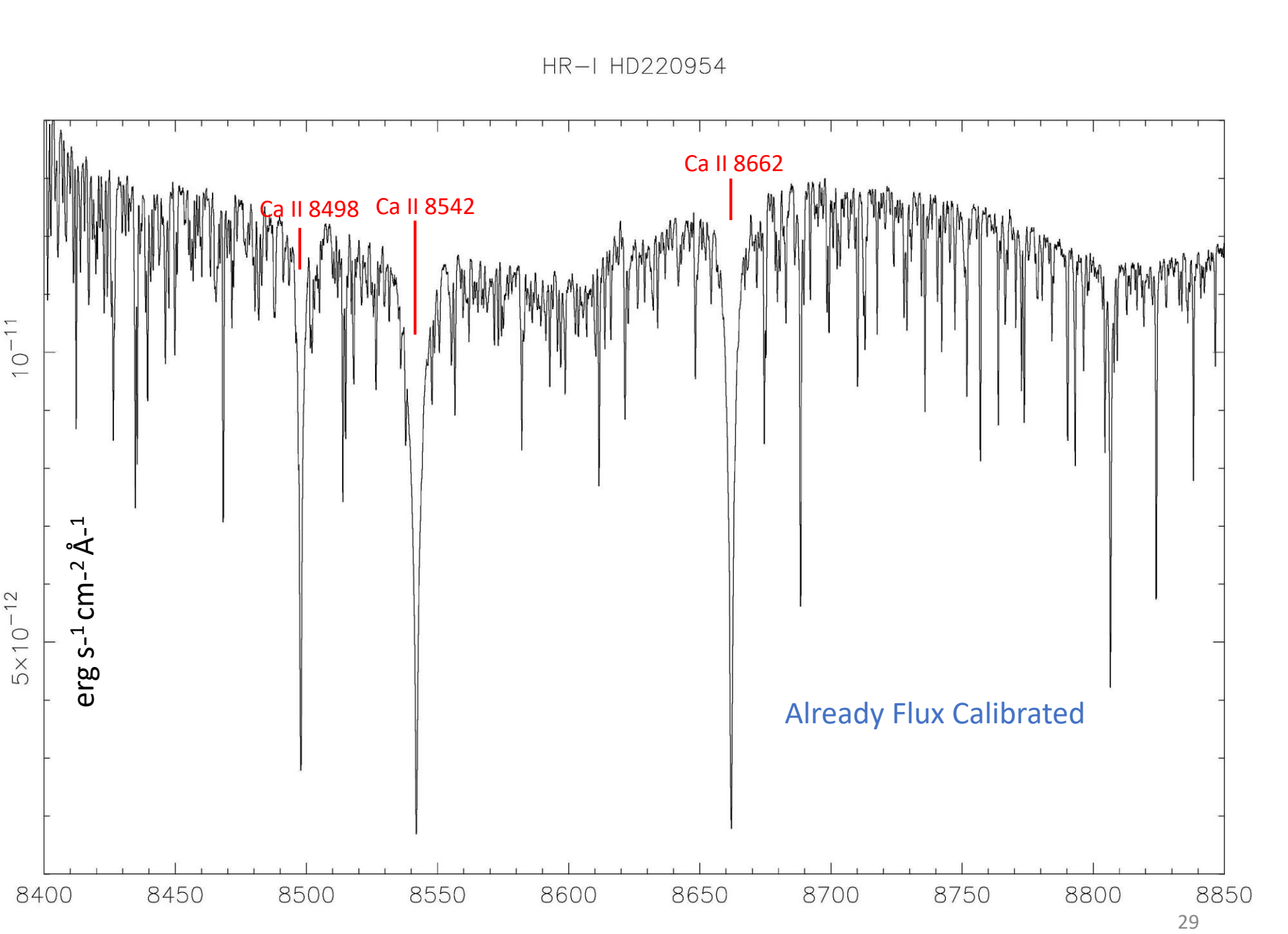

BD+40 4032 HR−I
B2III
Non-calibrated flux units
HI Pa19
HI Pa18
HI Pa17
HI Pa16
HI Pa15
He I 8583
HI Pa14
He I 8633
HI Pa13
HI Pa12
He I 8777
He I 8849
8400
8450
8500
8550
8600
8650
8700
8750
8800
8850

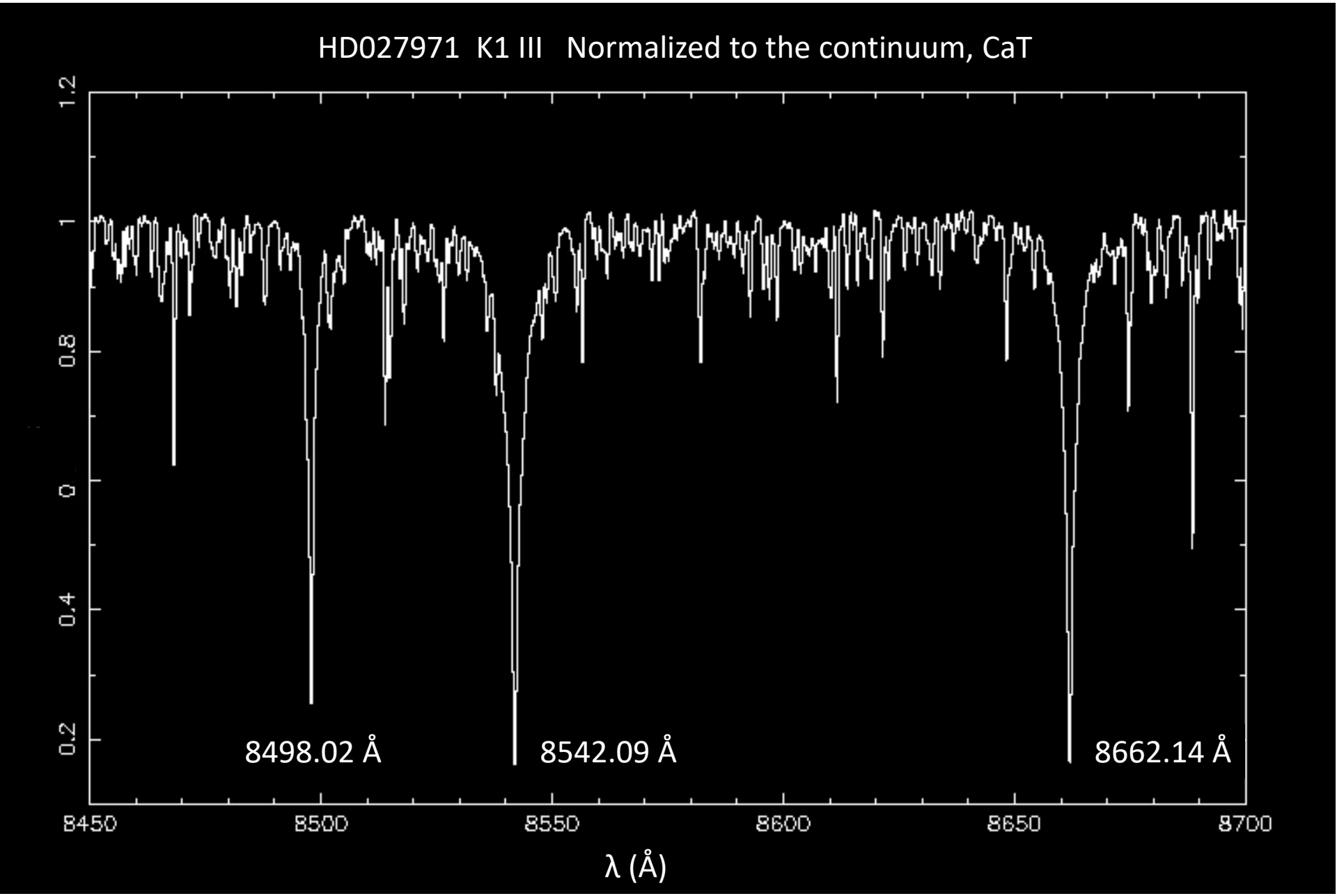

HD011544 HR-I
G2 Ib
Ca II 8662
Ca II 8542
Ca II 8498
8621.6 Fe I
8611. Fe I
8675,3 Ti I
8435 Ti I
8688.6,1 Fe I
8638.4 Fe I
8824.2 Fe I
8468.4 Fe I
MgI 8806.7
8514,1 Fe I
8426,3 Th I
Non-calibrated flux units
0
8400
8500
8600
8700
8800
8900
8580.75 Ti I

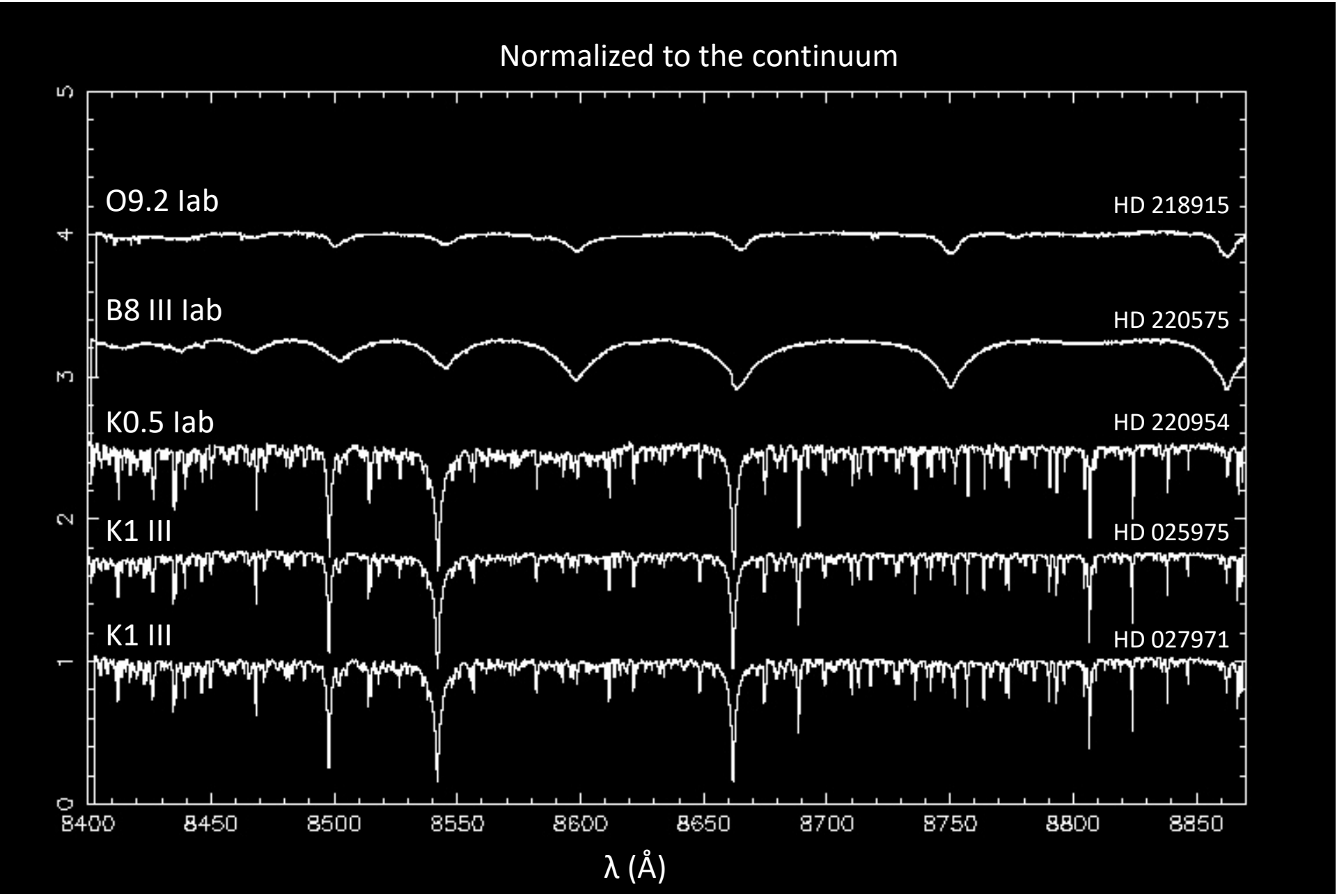

HD020123 HR-I
G5Ib-IIa
Ca II 8498
Ca II 8542
Ca II 8662
8621.6 Fe I
8611. Fe I
8582.0 Th I
8675,3 Ti I
8468.4 Fe I
8435 Ti I
8688.6,1 Fe I
8638.4 Fe I
8824.2 Fe I
8514,1 Fe I
MgI 8806.7
8426,3 Th I
Non-calibrated flux units
8400
8450
8500
8550
8600
8650
8700
8750
8800
8850


HD174350 HR−I
K1 III
Ca II 8662
Ca II 8542
Ca II 8498
8621.6 Fe I
8611. Fe I
8582.0 Th I
8675,3 Ti I
8435 Ti I
8514,1 Fe I
8688.6,1 Fe I
8638.4 Fe I
8426,3 Th I
8468.4 Fe I
8824.2 Fe I
MgI 8806.7
8412,4 Ti I
Non-calibrated flux units
0
8400
8500
8600
8700
8800
8900


HD185622 HR−I
K4Ib
Non-calibrated flux units
Ca II 8498
Ca II 8542
Ca II 8662
8621.6 Fe I
8611. Fe I
8582.0 Th I
8675,3 Ti I
8638.4 Fe I
8824.2 Fe I
8468.4 Fe I
8514,1 Fe I
8435 Ti I
8426,3 Th I
8412,4 Ti I
8688.6,1 Fe I
MgI 8806.7
8400
8450
8500
8550
8600
8650
8700
8750
8800
8850


HR−I HD220954
Ca II 8498
Ca II 8542
Ca II 8662
10^{-11}
5×10^{-12}
erg s^{-1} cm^{-2} Å^{-1}
Already Flux Calibrated
8400
8450
8500
8550
8600
8650
8700
8750
8800
8850


HD027971 K1 III Normalized to the continuum, CaT
1.2
1
0.8
0
0.4
0.2
8498.02 Å
8542.09 Å
8662.14 Å
8450
8500
8550
8600
8650
8700
λ (Å)


Normalized to the continuum
O9.2 Iab
HD 218915
B8 III Iab
HD 220575
K0.5 Iab
HD 220954
K1 III
HD 025975
K1 III
HD 027971
0
1
2
3
4
5
8400
8450
8500
8550
8600
8650
8700
8750
8800
8850
λ (Å)

3. To build **a database** with the Stellar Library and a **web-based software tool** for managing the observations.

July, 2018

3. To build **a database** with the Stellar Library and a **web-based software tool** for managing the observations.

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Project description

MEGARA-GTC Stellar Library

The motivation of this project is to obtain, in a short timescale, and through filler-type observations in telescope scratch time, a spectral atlas for MEGARA, focused on the highest resolution setups.

To delimit the goal and consequently the telescope time, this filler proposal is focused on HR-I (first priority) and HR-R (second priority) spectra at R ~ 20,000. HR-I is crucial to detect both very young (through the Pa series) and old to very old (through the CaT and MgI features) populations. HR-R is centered in Ha at z=0 so that the stellar templates will support to subtract and interpret the underlying stellar population in nearby galaxies. Both ranges also contain important clues for abundance determination.

To date, there is no complete library, either empirical or theoretical, able to fulfill the MEGARA parameters. The scientific exploitation of MEGARA will require from the existence of this empirical library to interpret the contribution of the stellar population in a wide range of observations after receiving some expressions of interest by members of our community requesting high resolution stellar population models.

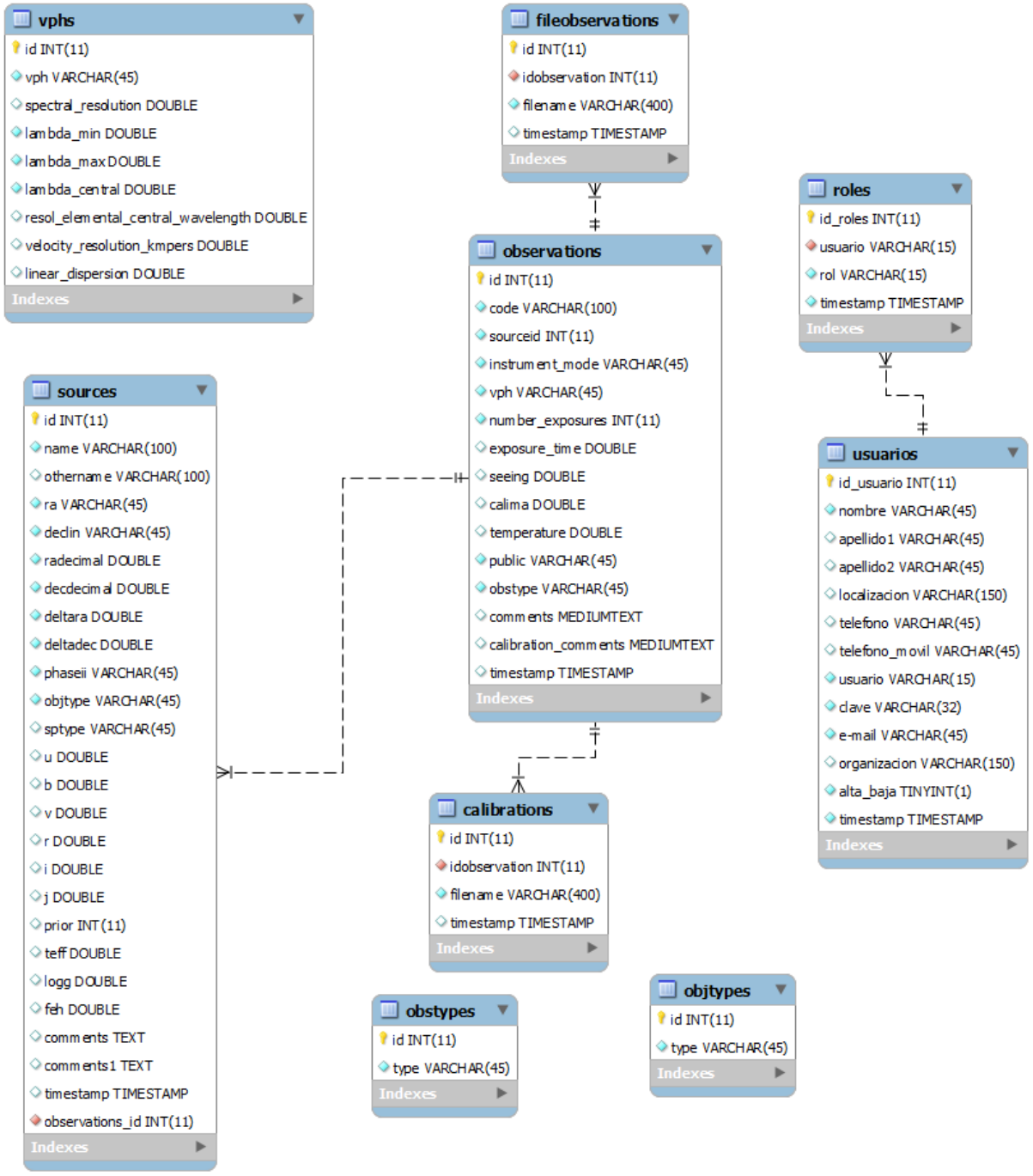
We are developing a new grid of PopStar models based on theoretical spectra, which however is far from optimum for the correct interpretation of real MEGARA data.

The proposal has received 50hr Open Time in 2018B as Filler Program. Proposal 35-GTC22/18B

Actual library 2988 stars

Tasks related to the database and interface to GTC-Phase II

- Data compilation
- Database architecture
- Star library ingestion in the database
- Star data checking by parsing SIMBAD database
- Web Tool for Stellar Library access and observations handling
- Study of the software interface to GTC Phase II
- Preparation of .tab files supported by Phase II by filtering the database
- OB generation for GTC Phase II 2018B



Database architecture

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  - Add new source
  - Find sources
- Observations
- Useful links
- Project description

Source list

Name	RA 2000.0 (hh:mm:ss.s)	DEC 2000.0 (dd:mm:ss.s)		
2MASS J15065441+1321060	15:06:54.4	+13:21:06.1	modify	delete
2MASS J15074769-1627386	15:07:47.7	-16:27:38.6	modify	delete
2MASS J17474233-3519573	17:47:42.3	-35:19:57.5	modify	delete
2MASS J17482503-2315344	17:48:25.0	-23:15:34.5	modify	delete
2MASS J17483035-2305234	17:48:30.3	-23:05:23.5	modify	delete
2MASS J22244381-0158521	22:24:43.8	-01:58:52.1	modify	delete
BD+002058A	07:43:44.0	+00:04:01.0	modify	delete
BD+003740	17:38:37.8	+00:01:44.1	modify	delete
BD+007294	01:47:12.4	+73:28:27.2	modify	delete
BD+012916	14:21:45.3	+00:46:59.2	modify	delete
BD+020571	03:37:22.6	+03:16:24.2	modify	delete
BD+023375	17:39:45.6	+02:25:00.0	modify	delete
BD+024651	23:19:40.5	+03:22:16.7	modify	delete
BD+029366	02:10:24.5	+29:48:23.7	modify	delete
BD+036368	01:57:37.6	+37:39:37.9	modify	delete
BD+037448	01:58:52.9	+37:48:57.2	modify	delete

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Project description

Source search form

Name	
Other Name	
RA (hh:mm:ss.s) (range between [00:00:11.6,23:59:31.3])	-
DEC (±dd:mm:ss.s) (range between [-51:19:31.9,+89:15:50.8])	-
Δ RA (mas/yr)	-
Δ DEC (mas/yr)	-
SP Type	
Phase-2 (HR-R & HR-I)	Select an Option
Object Type	Select an Option
U (range between [-0.5,16.7])	-
B (range between [-1.5,21.5])	-
V (range between [0.1,18.9])	-
R (range between [0.1,18.9])	-
I (range between [-0.7,16.9])	-
J (range between [-3,14.1])	-
Teff	-
Logg	-
[Fe/H]	-
Comments	
Other Comments	

cancel search

Source form

Name*	HD011544	RA (hh:mm:ss.s)*	01:54:56.4
Other Name		DEC (±dd:mm:ss.s)*	+56:34:56.9

Δ RA (mas/yr)*	0.622	Δ DEC (mas/yr)*	-0.272
SP Type	G2Ib	Priority*	1
Phase-2 (HR-R & HR-I)*	No	Object Type	COMM-2017
U		R	
B	8	I	
V	6.8	J	5.2
Teff		Logg	
[Fe/H]			
Comments	Observed-HR-I		
Other Comments			

Link to the SIMBAD database to check coordinates

create an observation | browse observations

cancel | modify

Source form

Name*	HD011544	RA (hh:mm:ss.s)*	01:54:56.4
Other Name		DEC (±dd:mm:ss.s)*	+56:34:56.9

Δ RA (mas/yr)*	0.622	Δ DEC (mas/yr)*	-0.272
SP Type	G2Ib	Priority*	1
Phase-2 (HR-R & HR-I)*	No	Object Type	COMM-2017
U		R	
B	8	I	
V	6.8	J	5.2
Teff		Logg	
[Fe/H]			

Comments: Observed-HR-I

Other Comments:

Link to the SIMBAD database to check coordinates

create an observation | browse observations

cancel | modify

Observation add form

Source data

Name*	HD011544
RA (hh:mm:ss.s)*	01:54:56.4
DEC (±dd:mm:ss.s)*	+56:34:56.9

Observation data

Observation id		VPH*	HR-I
Instrument mode*	LCB	Obs. Type	Select an Opt...
Number of exposures*		Exposure time (of each exposure, in s)*	
Seeing estimate		Calima estimate	
Temperature (ºC)		Public*	No

Comments

Observation files:

Filename*	Delete

Add observation file

Calibration Comments

Calibration files:

Filename*	Delete

Add calibration file

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Observation search form

Source data

Source Name

RA (hh:mm:ss.s) (range between [00:00:11.6,23:59:31.3])

DEC (±dd:mm:ss.s) (range between [-51:19:31.9,+89:15:50.8])

Observation data

Observation id

VPH*

Instrument mode*

Obs. Type

Number of exposures

Exposure time (of each exposure, in s)

Seeing estimate

Calima estimate

Temperature (ºC)

Public

Comments

Calibration Comments

cancel search

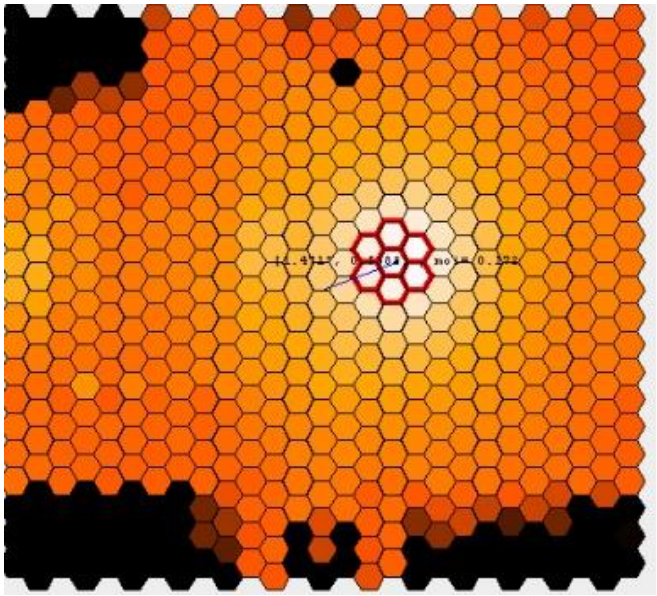
4. To propose a **GTC - MEGARA Filler program**

July 2018, July 2020

4. To propose a GTC - MEGARA Filler program

- Filler programs require relaxed observing conditions so that can be executed only when no other approved program in A or B bands fit.
- A perfect filler program, should accept the following values:
  - Seeing Any (1.5 - 2.5)
  - Night type Any (better if bright is accepted)
  - Sky Any (better if bright is accepted)
  - The most important parameter is seeing
- We applied to CAT for observations in 2018B
- We have obtained 50 hours of open time (Spanish CAT) with the proposal GTC22-18B in a Filler Program with the highest priority when bad conditions
- Priorities are: HR-I (0.12 Å/pix 15 Km/s), HR-R (0.09 Å/pix 15 Km/s), LRs, MRs
- The program started July 2018 and stars are being observed in HR-R and HR-I

Star on LCB



12.5 arcsec

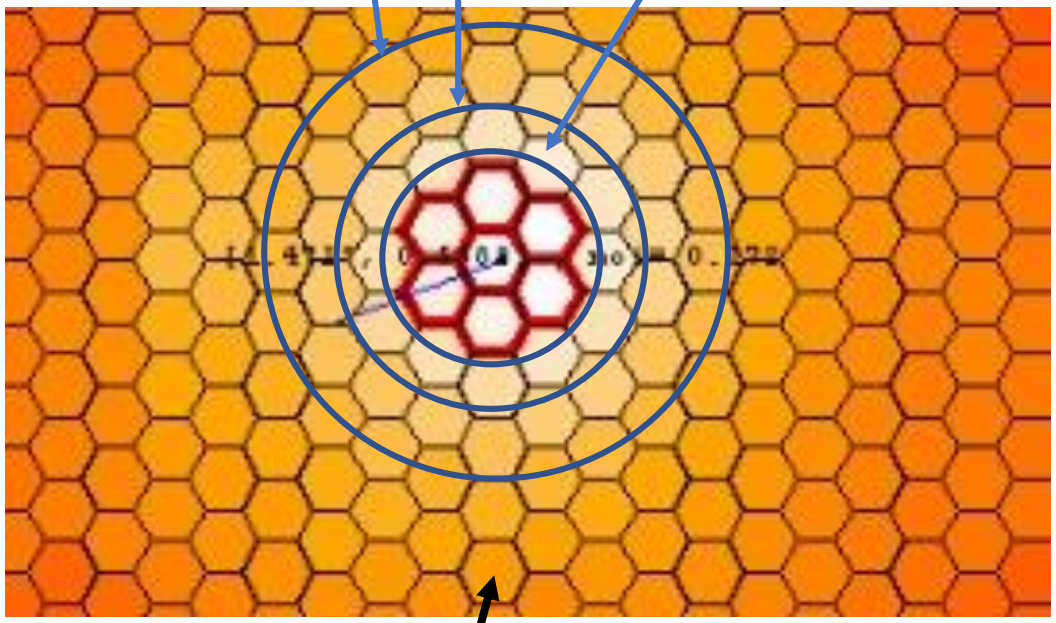
Real image of HD192281 LCB HR-I
02-08-2017 MEGARA Commissioning

11.3 arcsec

5 “

3”

2”



Flux is never lost!

Spectral Resolution is never lost!

Image quality cannot degrade!

1 spaxel = 0,62 arcsec

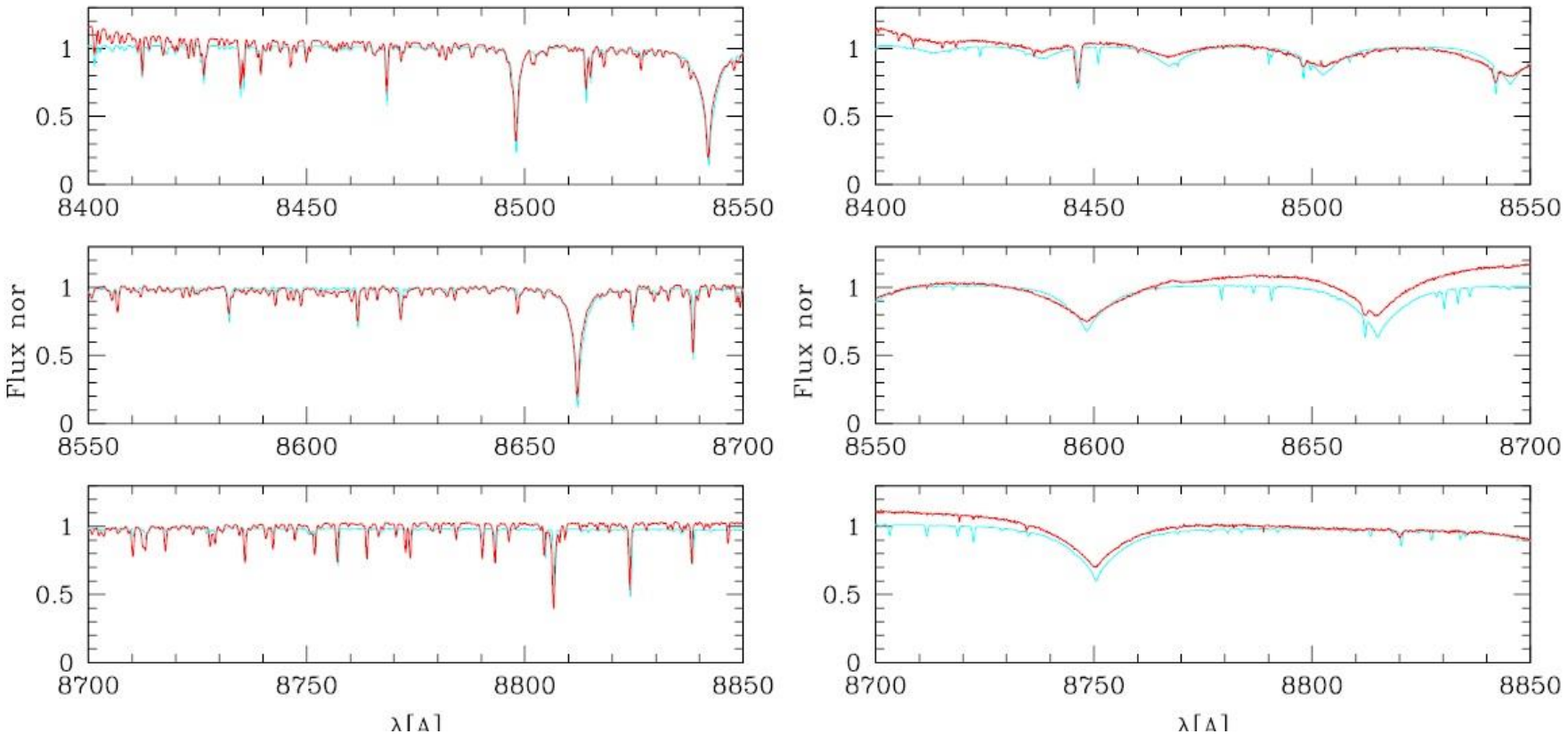
Observed Stars HR-I / HR-R

- Commissioning
  - 21 HR-I + 14 HR-R
  - > 100 stars mostly unclassified in M15/M71 MOS
- GTC22-18B
  - 3 OBs July (both HR-R and HR-I)
  - 12 OBs August (both HR-R and HR-I)
  - Consumed Time: 3.8hr of 50 hr granted
  - A total between 150 and 200 stars are expected for 2018B
  - We plan to apply for 2019A

Tasks in progress

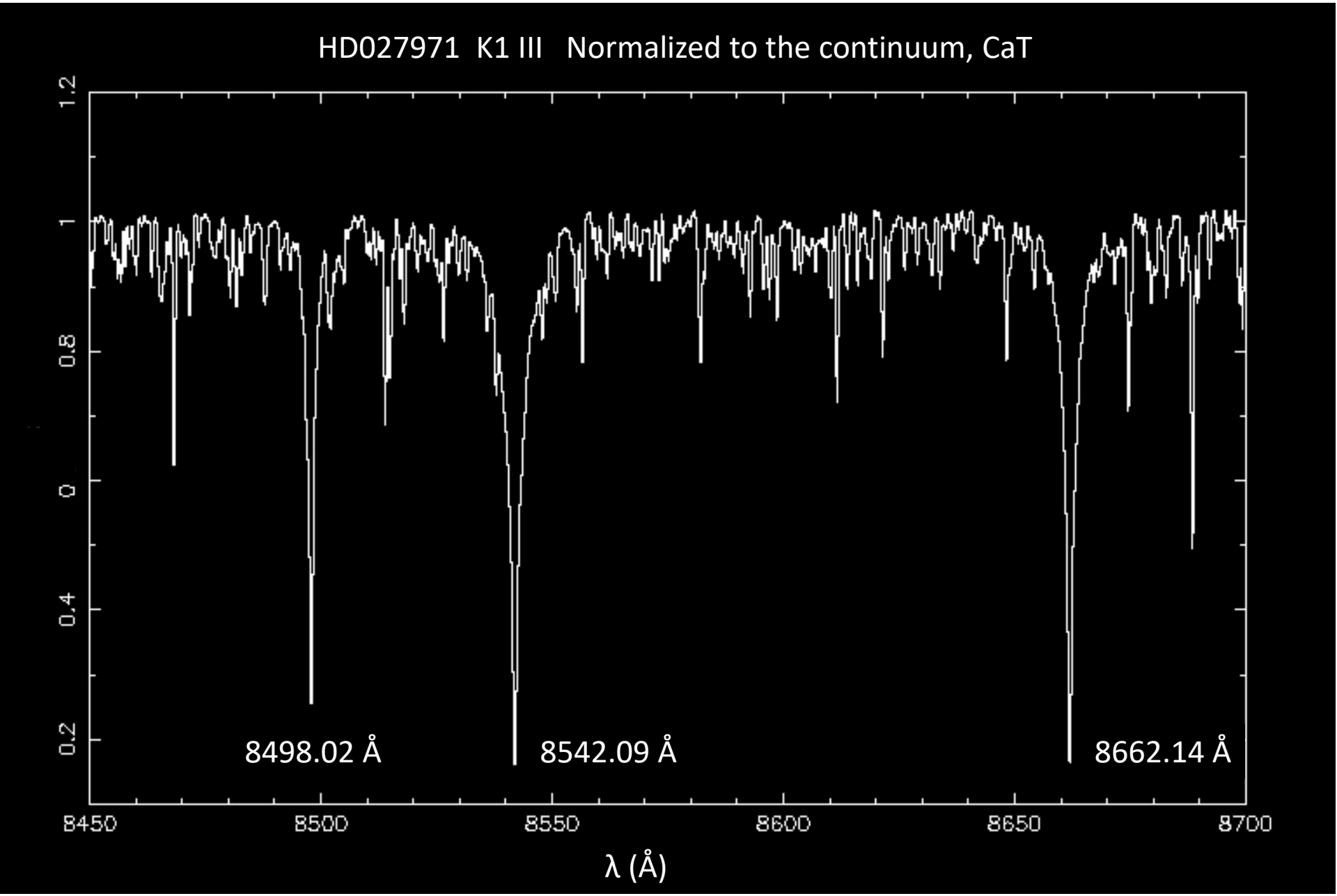
- Reduce all data for IFU and MOS including flux calibration
- Identify spectral lines
- Re-confirm spectral types and derive physical parameters by model fitting
- Measure Equivalent widths and Intensities
- Measure and/or re-define the stellar indices
- Publish and prepare a first release of reduced data
- Prepare simple prototype templates with PopStars

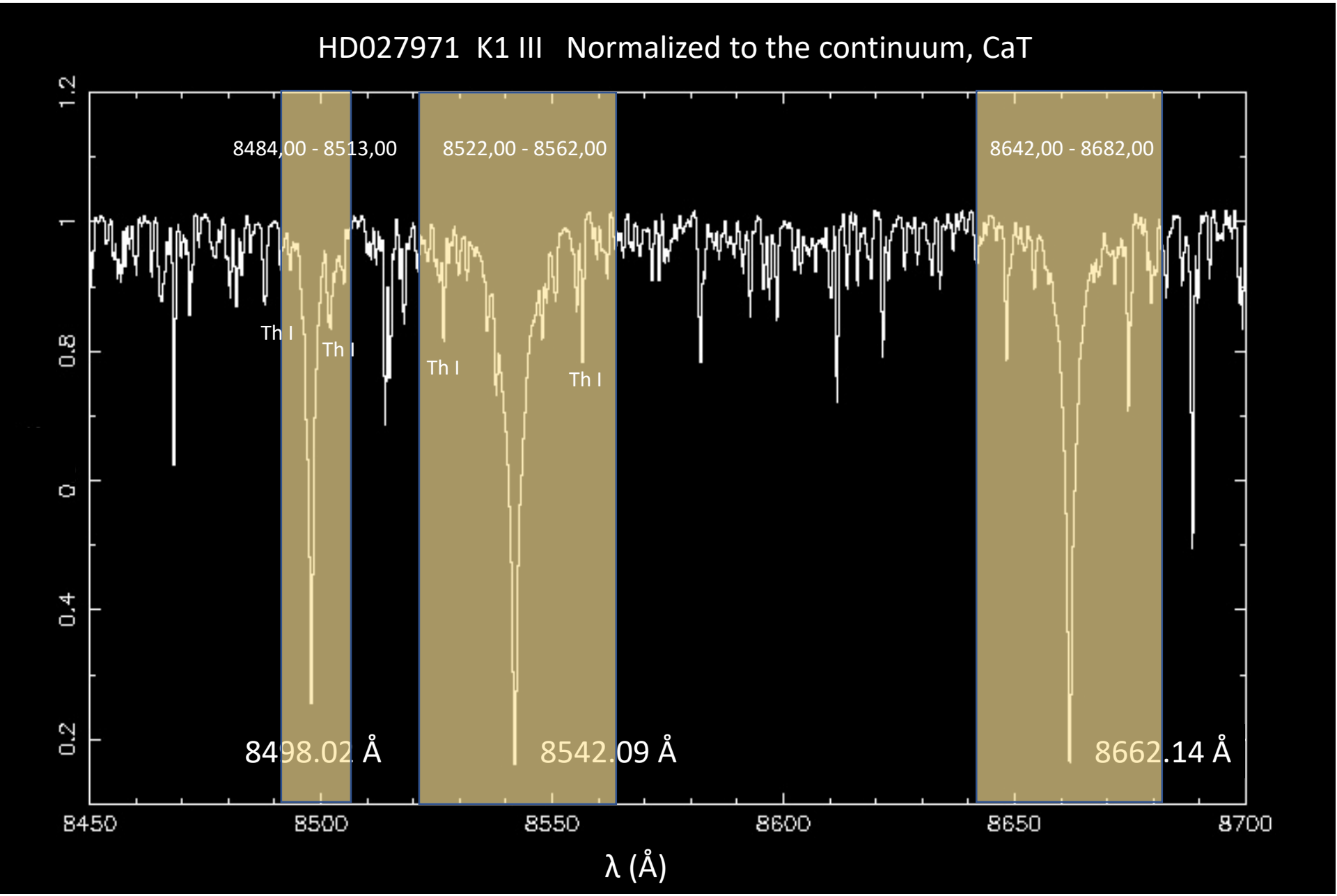
Model fitting χ^2



HD025975 Spectrum. A model from Munari (2005) grid is overplotted

Model: R=20000; Teff=4250K, logg=0.0, [Fe/H] = -1.5


HD027971 K1 III Normalized to the continuum, CaT
1.2
1
0.8
0
0.4
0.2
8498.02 Å
8542.09 Å
8662.14 Å
8450
8500
8550
8600
8650
8700
λ (Å)


HD027971 K1 III Normalized to the continuum, CaT
8484,00 - 8513,00
8522,00 - 8562,00
8642,00 - 8682,00
Th I
Th I
Th I
Th I
8498.02 Å
8542.09 Å
8662.14 Å
1.2
1
0.8
0
0.4
0.2
8450
8500
8550
8600
8650
8700
λ (Å)

Mon. Not. R. Astron. Soc. **000**, 1–8 (2011) Printed 31 August 2018 (MN LATEX style file v2.2)

MEGARA-GTC Stellar Spectral Library (I)

M.L. García-Vargas[1⋆], A. Gil de Paz[2], E. Carrasco[3], M. Mollá[4], S. Rodríguez-Berlanas[5].
J. Gallego [2], J. Iglesias-Páramo[6], R. Cedazo[7], P. Gómez-Alvarez[1], S. Pascual [2],
A. Castillo-Morales [2], N. Cardiel [2], A. Pérez-Calpena [1], I. Martínez-Delgado[1]

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Accepted Received ; in original form

To be submitted November 2018

ABSTRACT

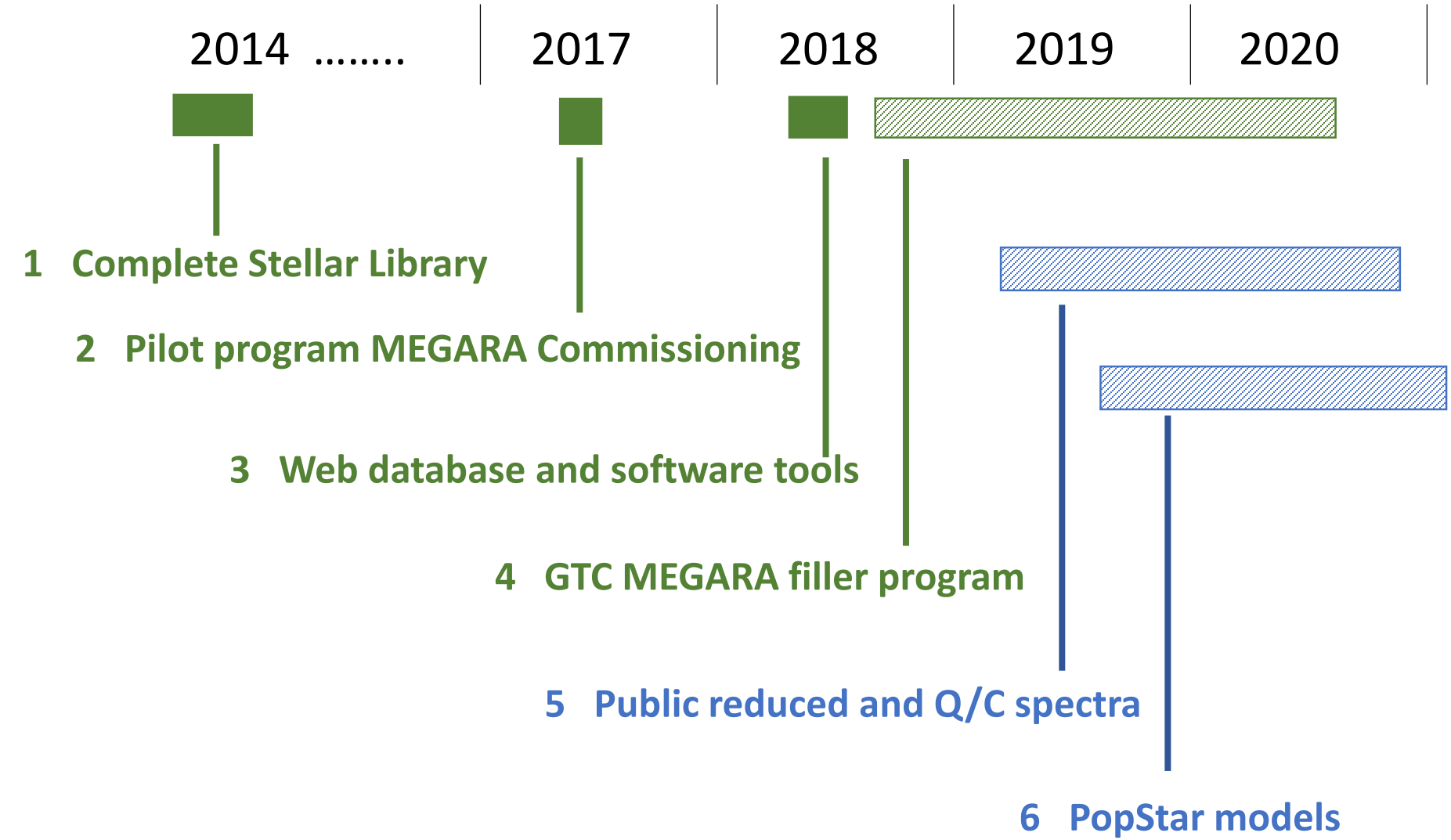
MEGARA (Multi Espectrógrafo en GTC de Alta Resolución para Astronomía) is a medium-high spectral resolution (R = 6000, 12000, 20000, covering the range 3700Å – 9800Å) fibre-fed spectrograph for the GTC 10.4m telescope, in the Observatorio del Roque de los Muchachos (La Palma, Spain). MEGARA was successfully commissioned during the summer of 2017 and is currently in operation.

The scientific exploitation of MEGARA demands an empirical library to interpret the contribution of the stellar populations in a wide range of observations for the different spectral set-ups. To date, there is no complete library, either empirical or theoretical, able to fulfil the MEGARA parameters.

In this paper, MEGARA-GTC spectral library is introduced, detailing the rationale behind the catalogue building, which has taken advantage of the heritage of previous empirical libraries. The second goal of this piece of work is to describe the filler program submitted (and awarded) for observing this library with the GTC and MEGARA, showing the first results of a sub-sample of 22 stars observed with HR-I set-up (centred in 8633 Å) from the pilot program carried out during MEGARA commissioning.

Key words: Stellar Library – MEGARA – GTC – Galaxy: abundances – Galaxy: star formation

MEGARA-GTC Spectral Library



Thank you!