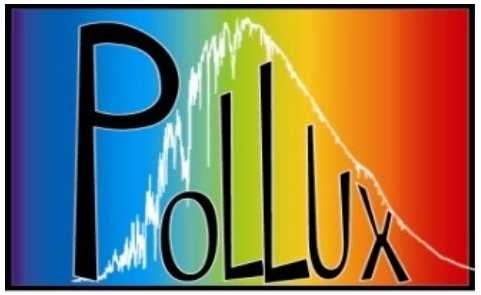
Atelier base de données POLLUX et données de spectroscopie en astrophysique



10:00 → 10:15 **Accueil**

Accueil des participants

10:15 → 12:15 **Présentation des bases de données et services**

- 10:15 **Présentation de la BDD POLLUX** — 20m
  Orateur: Ana Palacios (LUPM)
- 10:35 **Présentation de CASSIS** — 15m
  Orateur: Emmanuel Caux (IRAP)
- 10:50 **Présentation de la BDD Polarbase** — 15m
  Orateur: Pascal Petit (IRAP)
- 11:05 **Présentation LyDU et projet POPSYCLE** — 15m
  Orateur: Philippe Prugniel (CRAL)
- 11:20 **Présentation de CIGALE** — 15m
  Orateur: Yannick Roelhy (LAM)
- 11:35 **Spectroscopie UV : projets et besoins** — 15m
  Orateur: Jean-Claude Bouret (LAM)
- 11:50 **Présentation du service AMHRA** — 15m
  Orateur: Armando Domiciano (OCA)

12:15 → 14:00 **Pause déjeuner** — 1h 45m

14:00 → 17:00 **Discussion**

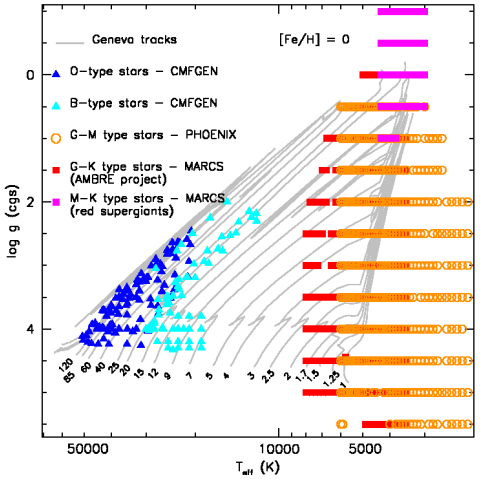
The POLLUX database : an ANO5 service for synthetic stellar spectra and SEDs

Database exists since 2006
10 releases to date

Evolution from a strict specifications to a more versatile tool able to distribute heterogeneous data in a uniform way

To date the publicly available database contains about 14 000 spectra covering a large range of stellar parameters (Teff, logg, [Fe/H], [α/Fe])

pollux.oreme.org



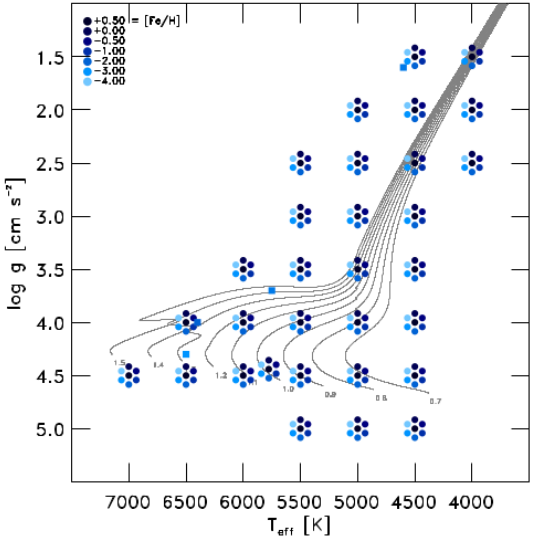


Table 1: Description of the different collections available in the POLLUX DB as of March 2021

Collection	Radiative Transfer	Spectrum Synthesis	T_{eff}	Resolution	Spectral Range	Type	NLTE
AMBRE	MARCS[3]	TURBOSPECTRUM[4]	[2500 K - 8000 K]	> 150 000	VIS†	1–D	No
RSG	MARCS[3]	TURBOSPECTRUM[4]	[3000 K - 4300 K]	150 000	VIS†	1–D	No
CMFGEN	CMFGEN[5]	CMF-FLUX[5]	[12020 K - 63880 K]	150 000	UV – VIS – IR*	1–D	Yes
WR⋆	CMFGEN[5]	CMF-FLUX[5]	[33780 K - 74300 K]	150 000	VIS†	1–D	Yes
BT-Dusty	PHOENIX[6]	PHOENIX[6]	[2100 K - 6000 K]	> 100 000	VIS – IR◇	1–D	Yes for atoms
STAGGER	STAGGER[7]	OPTIM3D[8]	[3899K – 7000 K]	20 000	UV – VIS – IR‡	3–D	No
RVS	STAGGER[7]	OPTIM3D[8]	[3899K – 7000 K]	300 000	Gaia RVS•	3–D	No

The POLLUX database : an ANO5 service for synthetic stellar spectra and SEDs

Distributed data = synthetic stellar spectra and SEDs.

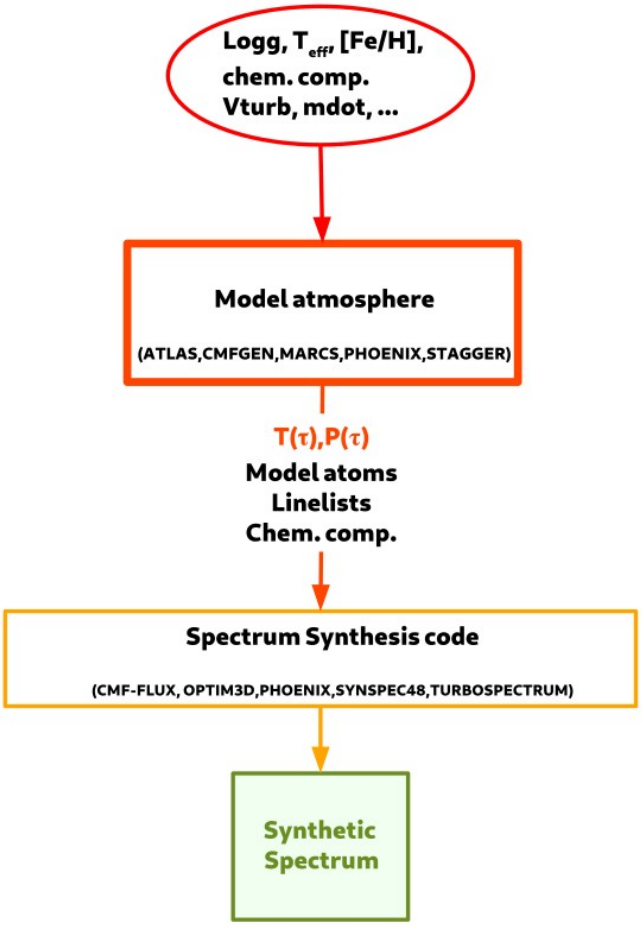
The SSS are given in the form of a 3 columns file containing the wavelength in the vacuum, the absolute flux and the flux normalized to the continuum

The SED are given in the form of a standard 2 columns file

All data are complemented with a dedicated and standardized header including a description of the workflow, the physics and the curation information

Access to the data is possible via

- dedicated website (pollux.oreme.org)
- SSAP VO protocol
- Vizier@CDS (https://cdsarc.cds.unistra.fr/viz-bin/cat/B/pollux)

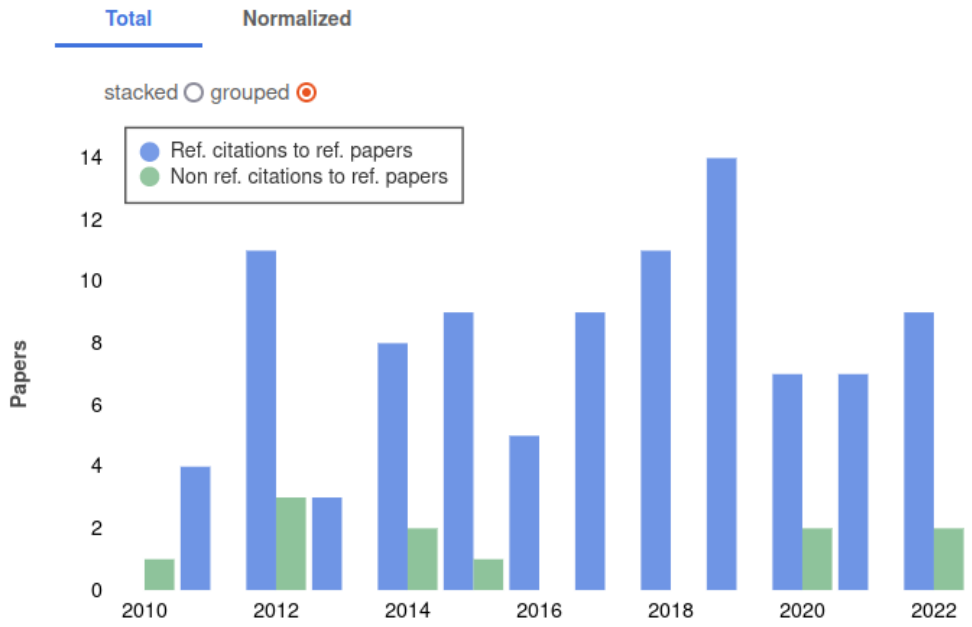


The POLLUX database : an ANO5 service for synthetic stellar spectra and SEDs

108 citations of the POLLUX paper (Palacios et al., A&A 516, A13(2010)

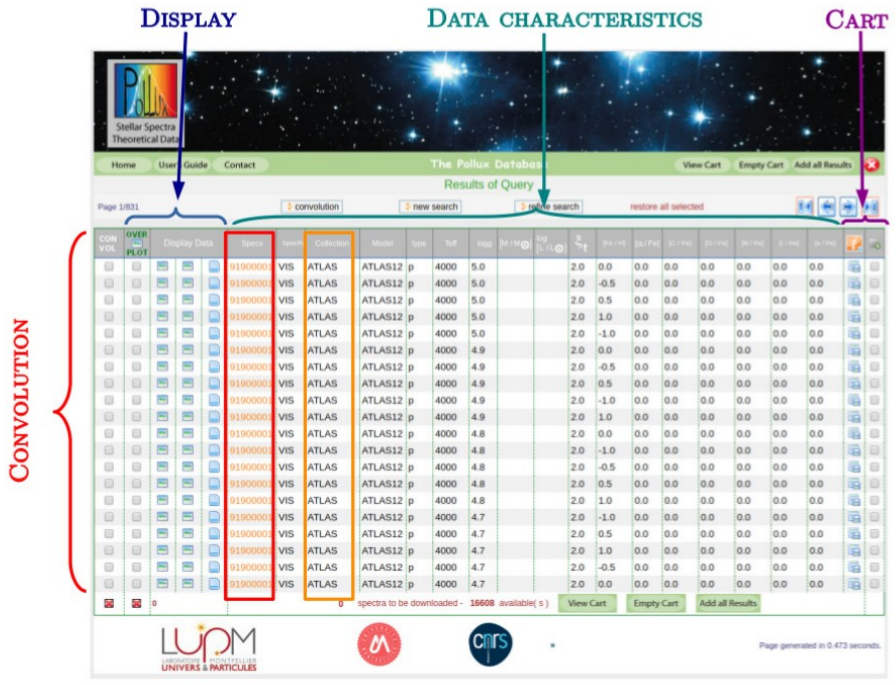
Also used as a testbed for VO protocols and data models

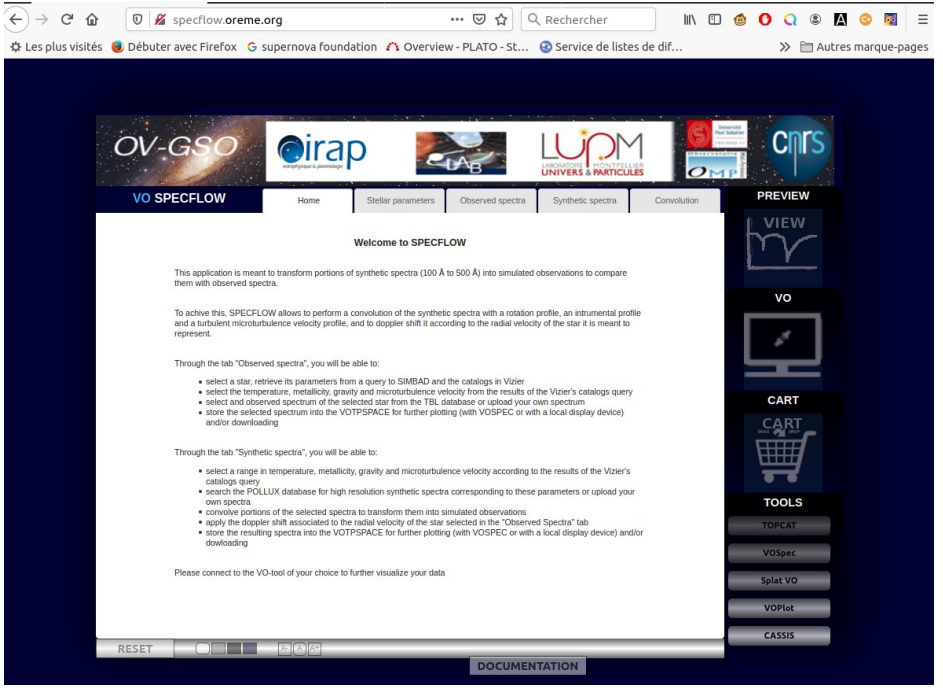
(SSA, TSAP, Provenance SimDAL and SimDM)



Tools and services associated to POLLUX

- Pollux (pollux.oreme.org) :database of synthetic stellar spectra
- Speconvol : convolution program (ivo://ov-gso/tsap/speconvol)
- SPECFLOW (specflow.oreme.org)

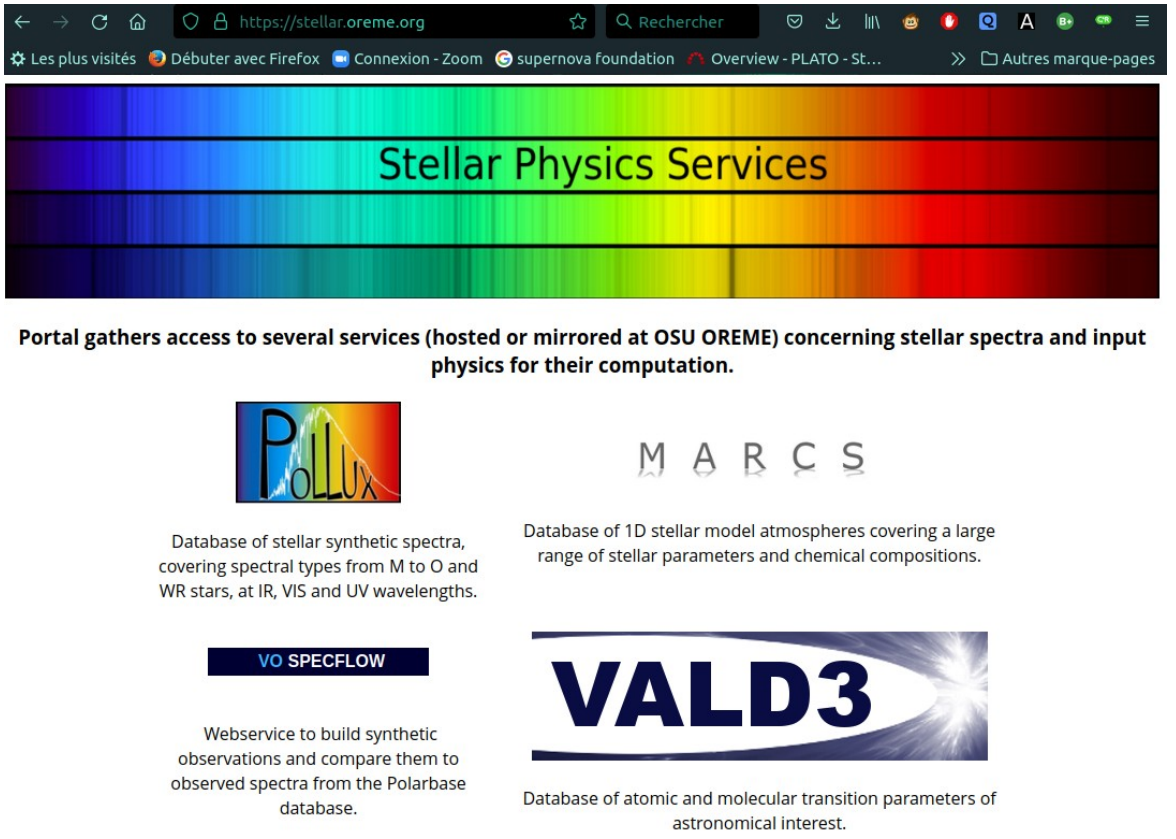




Tools and services associated to POLLUX

In addition to these services, we host mirrors of the MARCS and VALD3 databases.

All services are gathered under a simple static portal @ stellar.oreme.org



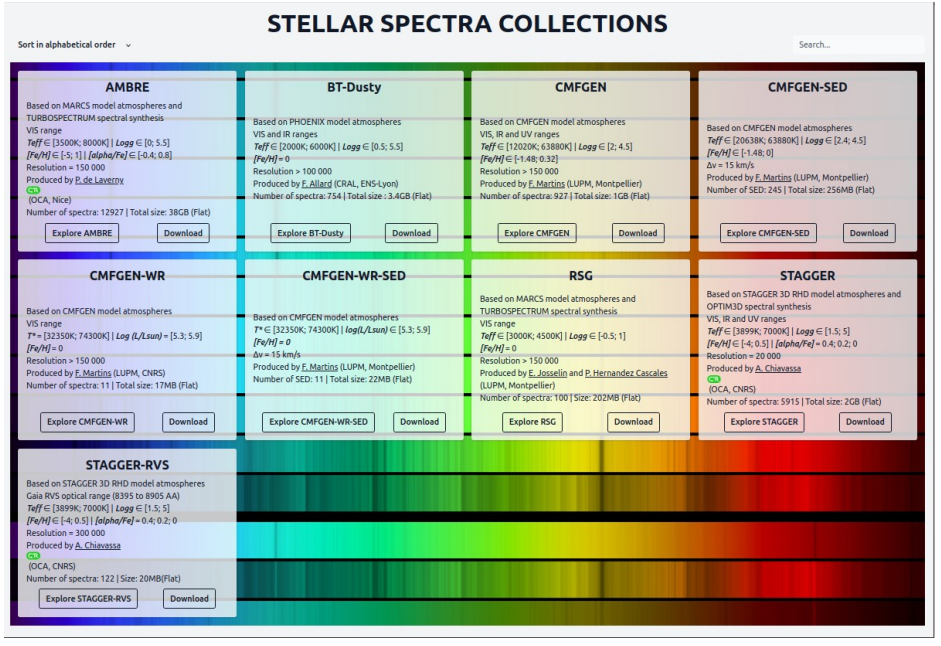
The POLLUX database : an ANO5 service for synthetic stellar spectra and SEDs

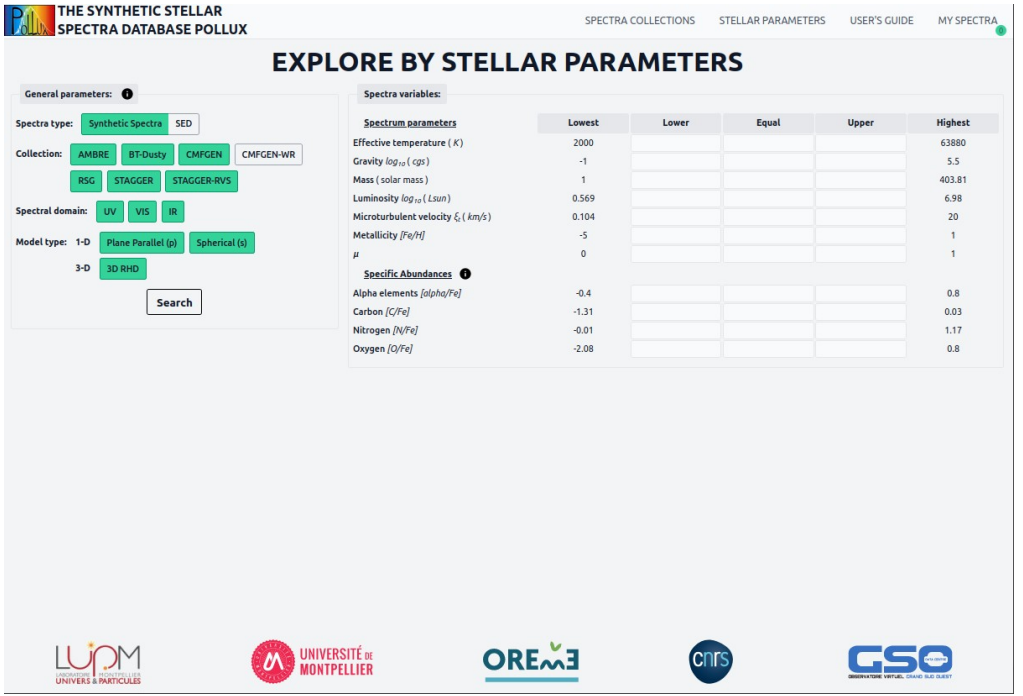
Aging system fully revisited to offer a better browsing experience

POLLUX 2.0

2 modes of exploration :

- by collection (full collection can now be retrieved at once)
- by spectral parameters



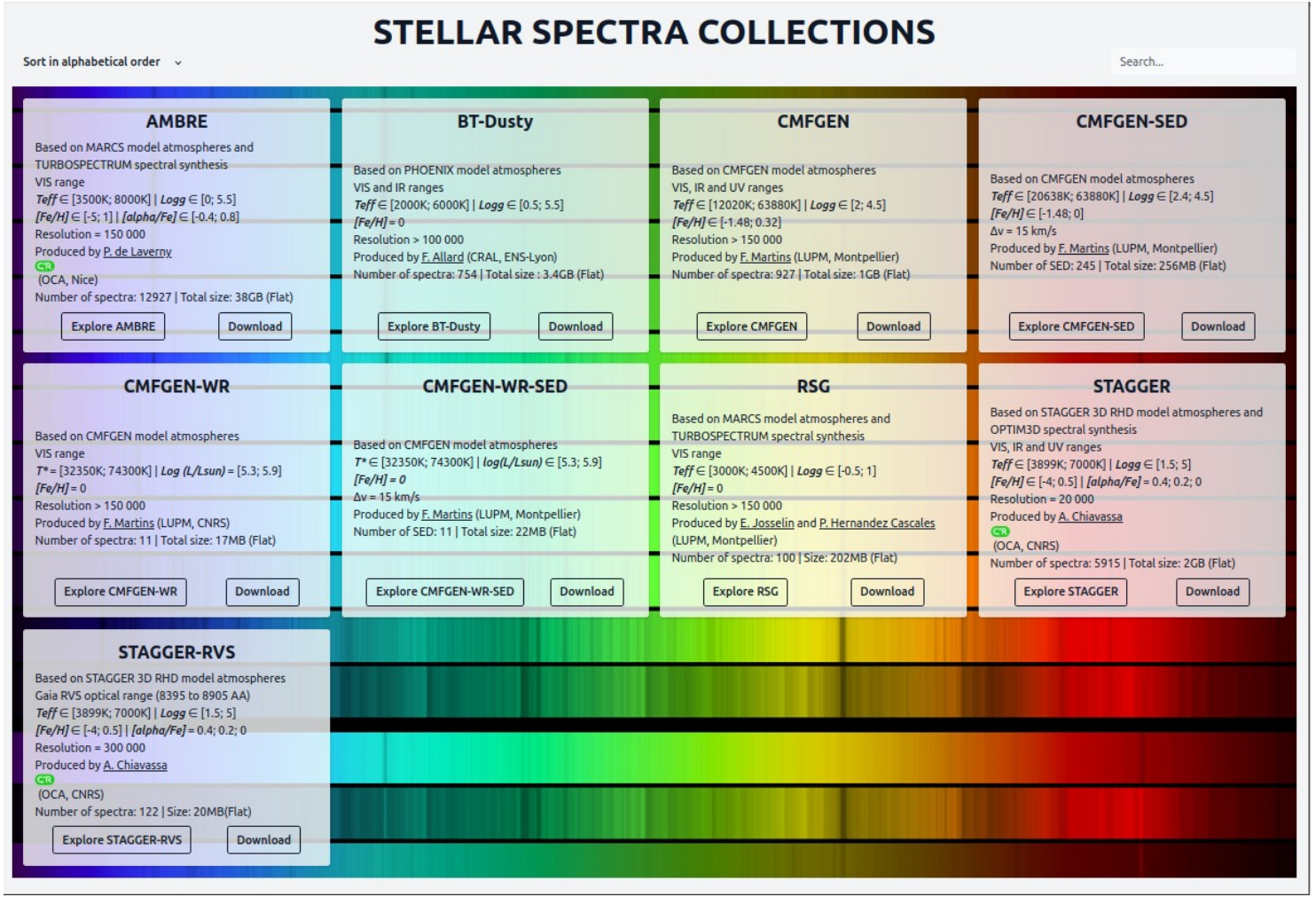


POLLUX 2.0 : future prospects

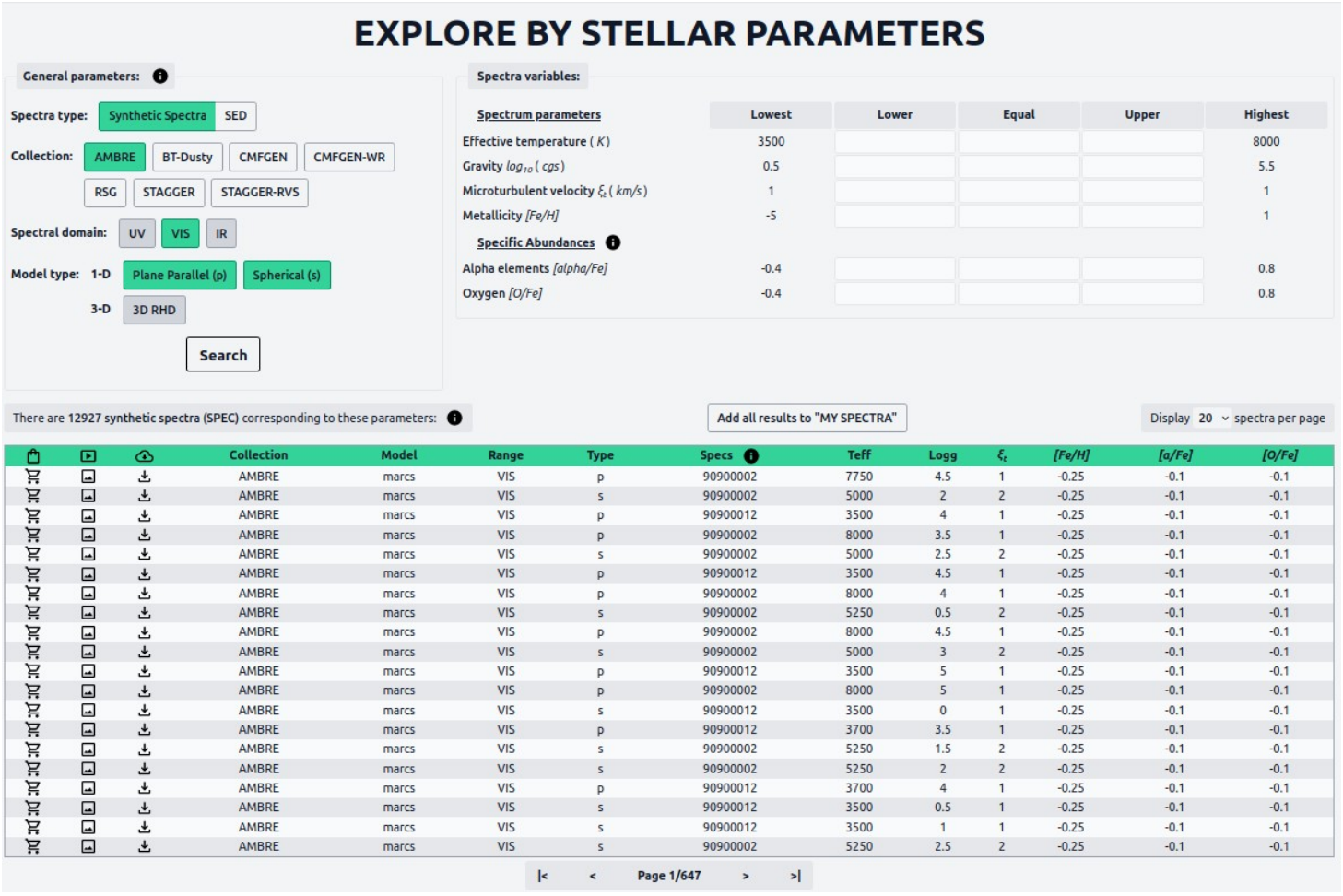
This workshop is meant to help us design a tool that will continue to be useful to the community and will answer the scientific needs.

- inclusion of more data
- enlarge spectral range
- dedicated production of spectra
- VO-compliant and standardized distribution of international databases
- develop the interaction with other services and tools (CASSIS, AMHRA, Polarbase, ...?)
- use our experience to develop new tools to exploit spectroscopic data in astrophysics

POLLUX 2.0


STELLAR SPECTRA COLLECTIONS
Sort in alphabetical order
Search...
AMBRE
Based on MARCS model atmospheres and TURBOSPECTRUM spectral synthesis
VIS range
Teff ∈ [3500K; 8000K] | Logg ∈ [0; 5.5]
[Fe/H] ∈ [-5; 1] | [alpha/Fe] ∈ [-0.4; 0.8]
Resolution = 150 000
Produced by P. de Laverny
(OCA, Nice)
Number of spectra: 12927 | Total size: 38GB (Flat)
Explore AMBRE
Download
BT-Dusty
Based on PHOENIX model atmospheres
VIS and IR ranges
Teff ∈ [2000K; 6000K] | Logg ∈ [0.5; 5.5]
[Fe/H] = 0
Resolution > 100 000
Produced by F. Allard (CRAL, ENS-Lyon)
Number of spectra: 754 | Total size : 3.4GB (Flat)
Explore BT-Dusty
Download
CMFGEN
Based on CMFGEN model atmospheres
VIS, IR and UV ranges
Teff ∈ [12020K; 63880K] | Logg ∈ [2; 4.5]
[Fe/H] ∈ [-1.48; 0.32]
Resolution > 150 000
Produced by F. Martins (LUPM, Montpellier)
Number of spectra: 927 | Total size: 1GB (Flat)
Explore CMFGEN
Download
CMFGEN-SED
Based on CMFGEN model atmospheres
Teff ∈ [20638K; 63880K] | Logg ∈ [2.4; 4.5]
[Fe/H] ∈ [-1.48; 0]
Δv = 15 km/s
Produced by F. Martins (LUPM, Montpellier)
Number of SED: 245 | Total size: 256MB (Flat)
Explore CMFGEN-SED
Download
CMFGEN-WR
Based on CMFGEN model atmospheres
VIS range
T* = [32350K; 74300K] | Log (L/Lsun) = [5.3; 5.9]
[Fe/H] = 0
Resolution > 150 000
Produced by F. Martins (LUPM, CNRS)
Number of spectra: 11 | Total size: 17MB (Flat)
Explore CMFGEN-WR
Download
CMFGEN-WR-SED
Based on CMFGEN model atmospheres
T* ∈ [32350K; 74300K] | log(L/Lsun) ∈ [5.3; 5.9]
[Fe/H] = 0
Δv = 15 km/s
Produced by F. Martins (LUPM, Montpellier)
Number of SED: 11 | Total size: 22MB (Flat)
Explore CMFGEN-WR-SED
Download
RSG
Based on MARCS model atmospheres and TURBOSPECTRUM spectral synthesis
VIS range
Teff ∈ [3000K; 4500K] | Logg ∈ [-0.5; 1]
[Fe/H] = 0
Resolution > 150 000
Produced by E. Josselin and P. Hernandez Cascales (LUPM, Montpellier)
Number of spectra: 100 | Size: 202MB (Flat)
Explore RSG
Download
STAGGER
Based on STAGGER 3D RHD model atmospheres and OPTIM3D spectral synthesis
VIS, IR and UV ranges
Teff ∈ [3899K; 7000K] | Logg ∈ [1.5; 5]
[Fe/H] ∈ [-4; 0.5] | [alpha/Fe] = 0.4; 0.2; 0
Resolution = 20 000
Produced by A. Chiavassa
(OCA, CNRS)
Number of spectra: 5915 | Total size: 2GB (Flat)
Explore STAGGER
Download
STAGGER-RVS
Based on STAGGER 3D RHD model atmospheres
Gaia RVS optical range (8395 to 8905 AA)
Teff ∈ [3899K; 7000K] | Logg ∈ [1.5; 5]
[Fe/H] ∈ [-4; 0.5] | [alpha/Fe] = 0.4; 0.2; 0
Resolution = 300 000
Produced by A. Chiavassa
(OCA, CNRS)
Number of spectra: 122 | Size: 20MB(Flat)
Explore STAGGER-RVS
Download

POLLUX 2.0



EXPLORE BY STELLAR PARAMETERS

General parameters:

Spectra type: Synthetic Spectra | SED

Collection: AMBRE | BT-Dusty | CMFGEN | CMFGEN-WR | RSG | STAGGER | STAGGER-RVS

Spectral domain: UV | VIS | IR

Model type: 1-D: Plane Parallel (p) | Spherical (s); 3-D: 3D RHD

Search

Spectra variables:

Spectrum parameters	Lowest	Lower	Equal	Upper	Highest
Effective temperature (*K*)	3500				8000
Gravity log_{10} (*cgs*)	0.5				5.5
Microturbulent velocity ξ_t (*km/s*)	1				1
Metallicity *[Fe/H]*	-5				1
Specific Abundances					
Alpha elements *[alpha/Fe]*	-0.4				0.8
Oxygen *[O/Fe]*	-0.4				0.8

There are **12927 synthetic spectra (SPEC)** corresponding to these parameters:

Add all results to "MY SPECTRA"

Display 20 spectra per page

Collection	Model	Range	Type	Specs	Teff	Logg	ξ_t	[Fe/H]	[a/Fe]	[O/Fe]
AMBRE	marcs	VIS	p	90900002	7750	4.5	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	s	90900002	5000	2	2	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	p	90900012	3500	4	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	p	90900002	8000	3.5	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	s	90900002	5000	2.5	2	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	p	90900012	3500	4.5	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	p	90900002	8000	4	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	s	90900002	5250	0.5	2	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	p	90900002	8000	4.5	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	s	90900002	5000	3	2	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	p	90900012	3500	5	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	p	90900002	8000	5	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	s	90900012	3500	0	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	p	90900012	3700	3.5	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	s	90900002	5250	1.5	2	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	s	90900002	5250	2	2	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	p	90900012	3700	4	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	s	90900012	3500	0.5	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	s	90900012	3500	1	1	-0.25	-0.1	-0.1
AMBRE	marcs	VIS	s	90900002	5250	2.5	2	-0.25	-0.1	-0.1

|< < Page 1/647 > >|

POLLUX 2.0

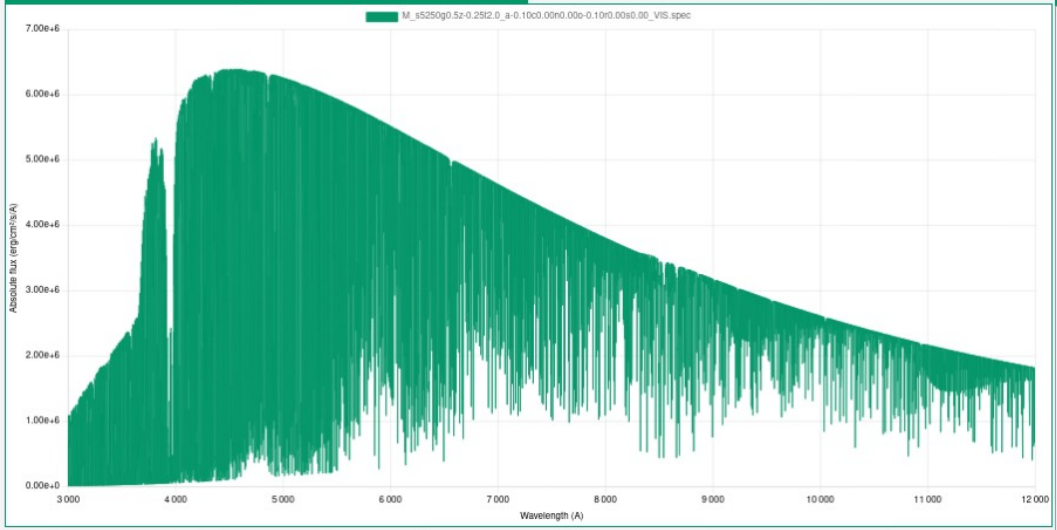
THE SYNTHETIC STELLAR SPECTRA DATABASE POLLUX

SPECTRA COLLECTIONS | STELLAR PARAMETERS | USER'S GUIDE | MY SPECTRA

STELLAR SPECTRUM M_s5250g0.5z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_VIS.spec

Download | Add to my spectra

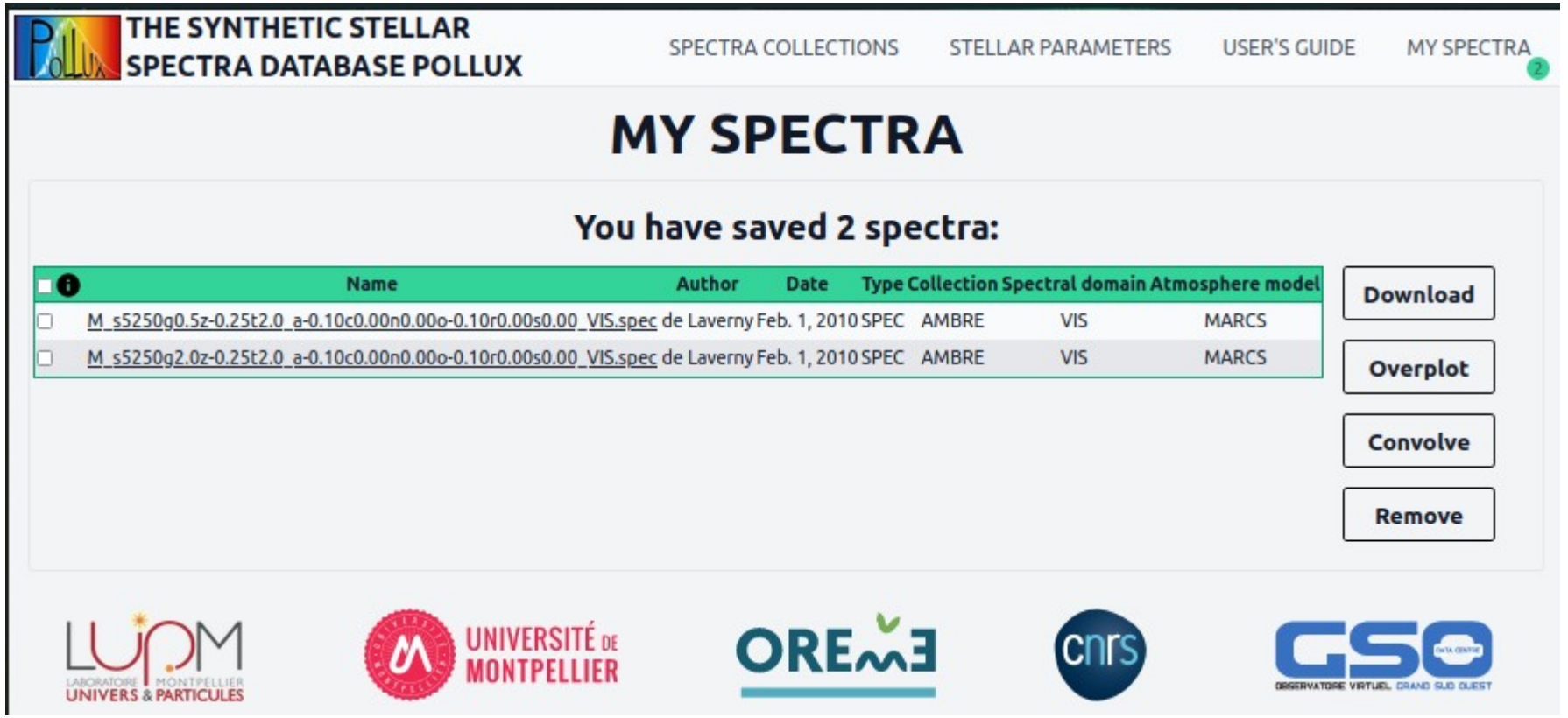
Spectrum | Normalized spectrum



From: To: Update chart | Reset zoom | Save to PNG

```
collection      ='AMBRE'                      / Data collection to which the spectrum belongs

header_name_SSHR = 'M_s5250g0.5z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_VIS.spec.txt'
short_name_SSHR  = 'M_s5250g0.5z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_VIS.spec'
Key_SSHR         = 'M_s5250g0.5z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_conva1.5convny8.0convy0.076convb0.5mt0.0mb0.0_VIS.spec'

codel           = 'marcs'                     / code for atmosphere model
version1        = '2008.5'                    / version of code for model atmosphere
ref_codel        = '2008A&A...486..951G'      / Reference Code 1
type            = 's'                         / type of model atmosphere (Spherical/Parallel)
filename        = 's5250_g0.50_m1.0_t02_st_z-0.25_a+0.10_c+0.00_n+0.00_o+0.10_r+0.00_s+0.00.mod'  / model atmosphere filename
author_mod      = 'Marcs-team'                / model atmosphere creator name

Teff            = '5250'                      / effective temperature (K)     - model atmosphere data
logg            = ' 0.5'                       / log10(gravity) (cgs)         - model atmosphere data
ML_ref           = 'irrelevant'                / Model reference for mass and lum
mass            = '1.0'              / mass (solar mass)             - model atmosphere data
lum             = '3.773'              / luminosity (solar luminosity)  - model atmosphere data
turbvel         = '2.00'                      / microturbulent velocity (km/s) - model atmosphere data

conv_alpha      = '1.5'                       / convection parameter (conva)   - model atmosphere data
conv_ny         = '8.0'                       / convection parameter (convny)  - model atmosphere data
conv_y          = '0.076'                     / convection parameter (convy)   - model atmosphere data
conv_beta       = '0.5'                       / convection parameter (convb)   - model atmosphere data
macroturbvel    = '0.0'                       / macroturbulence parameter (mt) - model atmosphere data
macrobeta       = '0.0'                       / macroturbulence parameter (mb) - model atmosphere data

Mdot            = 'irrelevant'                / log10(mass loss) (solar mass/year) - model atmosphere data
Vinfty          = 'irrelevant'                / terminal velocity (km/s)           - model atmosphere data
beta            = 'irrelevant'                / velocity law parameter             - model atmosphere data
finfty          = 'irrelevant'                / 1st clumping law parameter         - model atmosphere data
vcl             = 'irrelevant'                / 2nd clumping law parameter (km/s)  - model atmosphere data

metallic_mod    = '-0.25'                     / metallicity ([Fe/H])
alpha_mod       = ' +0.1'                     / [alpha/Fe]
r_process_mod   = '0.000'                     / [r elements/Fe]
s_process_mod   = '0.000'                     / [s elements/Fe]

nsolar_abund      = '1'                         / Number of solar references
solar_abund1      = 'GAS2007'                   / solar abundance reference
solar_abund_ref1  = '10.1007/s11214-007-9173-7'   / solar abundance DOI
Abu_01          = ' 12.000'                   / H  abundance
Abu_02          = ' 10.930'                   / He abundance
Abu_03          = '  0.880'                   / Li abundance
Abu_04          = '  1.130'                   / Be abundance
Abu_05          = '  2.450'                   / B  abundance
Abu_06          = '  8.140'                   / C  abundance
```

POLLUX 2.0


THE SYNTHETIC STELLAR SPECTRA DATABASE POLLUX
SPECTRA COLLECTIONS
STELLAR PARAMETERS
USER'S GUIDE
MY SPECTRA
2
MY SPECTRA
You have saved 2 spectra:
Name
Author
Date
Type
Collection
Spectral domain
Atmosphere model
M_s5250g0.5z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_VIS.spec
de Laverny
Feb. 1, 2010
SPEC
AMBRE
VIS
MARCS
M_s5250g2.0z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_VIS.spec
de Laverny
Feb. 1, 2010
SPEC
AMBRE
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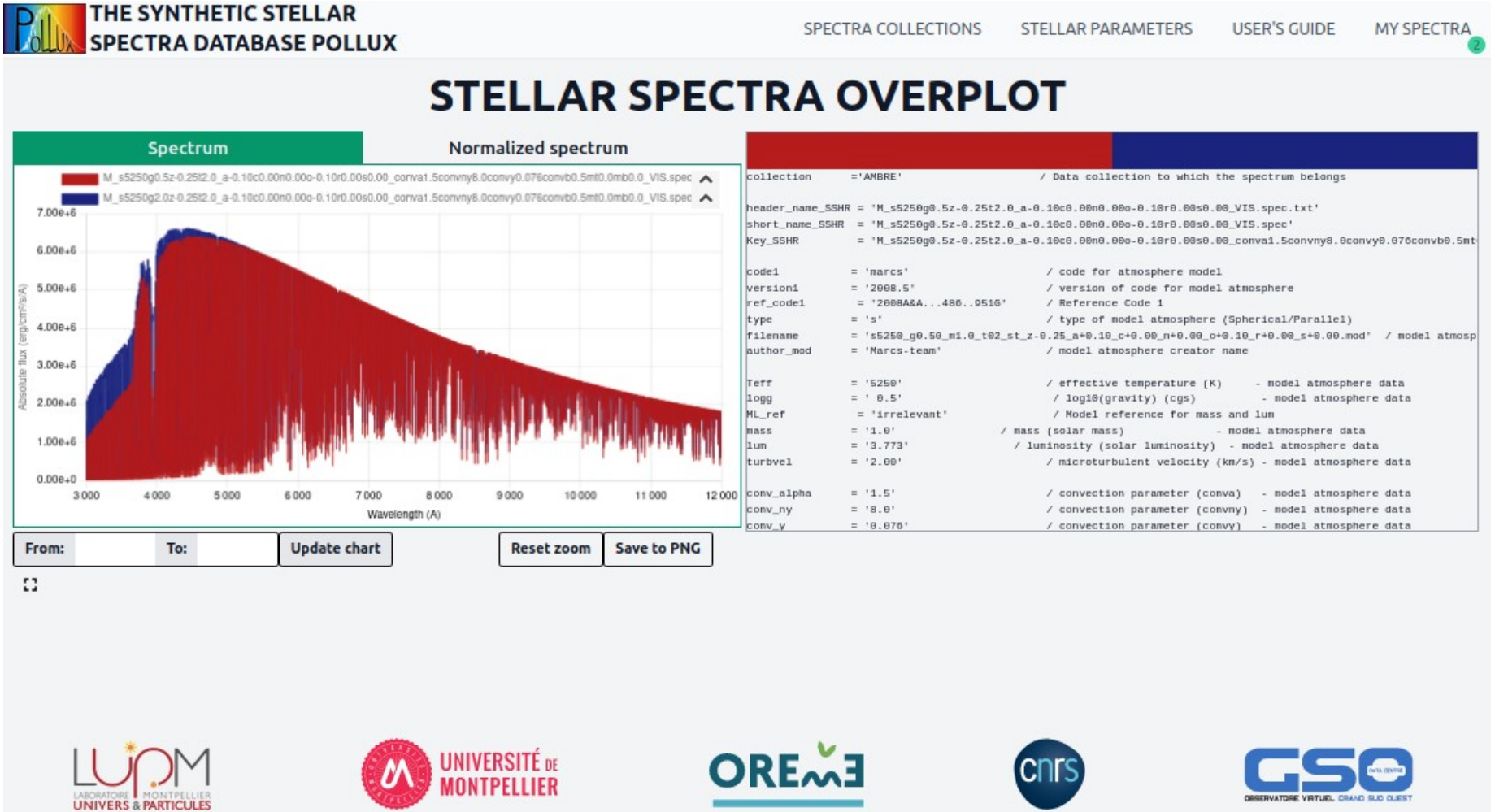
Download
Overplot
Convolve
Remove
LUPM
LABORATOIRE MONTPELLIER
UNIVERS & PARTICULES
UNIVERSITÉ DE MONTPELLIER
OREME
cnrs
GSO
OBSERVATOIRE VIRTUEL GRAND SUD OUEST

POLLUX 2.0


THE SYNTHETIC STELLAR
SPECTRA DATABASE POLLUX
SPECTRA COLLECTIONS
STELLAR PARAMETERS
USER'S GUIDE
MY SPECTRA
2
STELLAR SPECTRA OVERPLOT
Spectrum
Normalized spectrum
M_s5250g0.5z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_conva1.5convny8.0convy0.076convb0.5mt0.0mb0.0_VIS.spec
M_s5250g2.0z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_conva1.5convny8.0convy0.076convb0.5mt0.0mb0.0_VIS.spec
Absolute flux (erg/cm²/s/A)
7.00e+6
6.00e+6
5.00e+6
4.00e+6
3.00e+6
2.00e+6
1.00e+6
0.00e+0
3 000
4 000
5 000
6 000
7 000
8 000
9 000
10 000
11 000
12 000
Wavelength (A)
From:
To:
Update chart
Reset zoom
Save to PNG
collection ='AMBRE' / Data collection to which the spectrum belongs
header_name_SSHR = 'M_s5250g0.5z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_VIS.spec.txt'
short_name_SSHR = 'M_s5250g0.5z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_VIS.spec'
Key_SSHR = 'M_s5250g0.5z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_conva1.5convny8.0convy0.076convb0.5mt
code1 = 'marcs' / code for atmosphere model
version1 = '2008.5' / version of code for model atmosphere
ref_code1 = '2008A&A...486..951G' / Reference Code 1
type = 's' / type of model atmosphere (Spherical/Parallel)
filename = 's5250_g0.50_m1.0_t02_st_z-0.25_a+0.10_c+0.00_n+0.00_o+0.10_r+0.00_s+0.00.mod' / model atmosp
author_mod = 'Marcs-team' / model atmosphere creator name
Teff = '5250' / effective temperature (K) - model atmosphere data
logg = ' 0.5' / log10(gravity) (cgs) - model atmosphere data
ML_ref = 'irrelevant' / Model reference for mass and lum
mass = '1.0' / mass (solar mass) - model atmosphere data
lum = '3.773' / luminosity (solar luminosity) - model atmosphere data
turbvel = '2.00' / microturbulent velocity (km/s) - model atmosphere data
conv_alpha = '1.5' / convection parameter (conva) - model atmosphere data
conv_ny = '8.0' / convection parameter (convny) - model atmosphere data
conv_y = '0.076' / convection parameter (convy) - model atmosphere data
LUPM
LABORATOIRE MONTPELLIER
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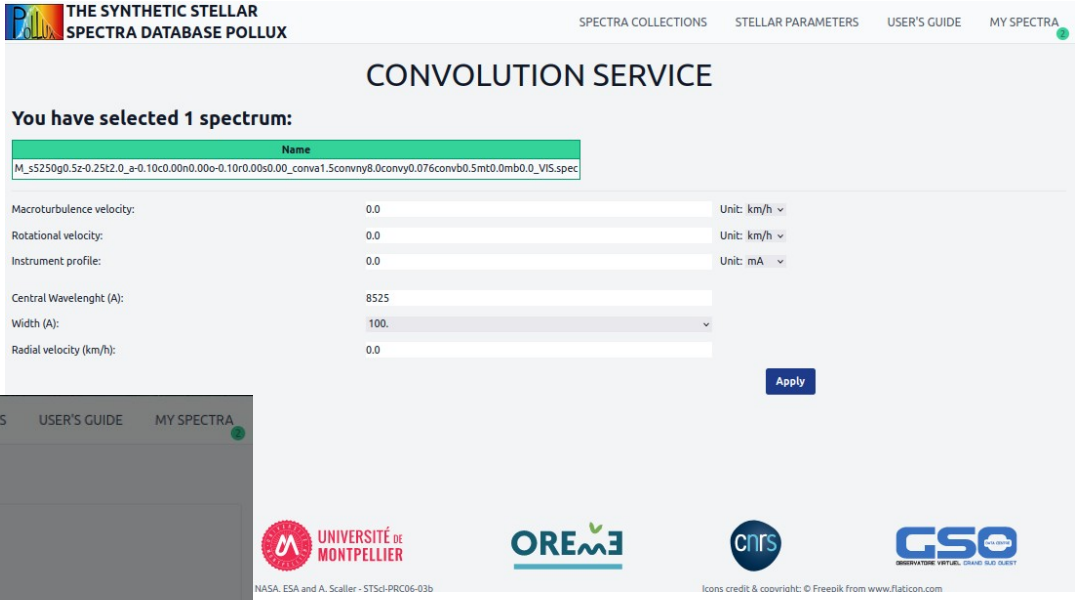
THE SYNTHETIC STELLAR SPECTRA DATABASE POLLUX
SPECTRA COLLECTIONS
STELLAR PARAMETERS
USER'S GUIDE
MY SPECTRA
CONVOLUTION SERVICE
You have selected 1 spectrum:
Name
M_s5250g0.5z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_conva1.5convny8.0convy0.076convb0.5mt0.0mb0.0_VIS.spec
Macroturbulence velocity:
0.0
Unit: km/h
Rotational velocity:
0.0
Unit: km/h
Instrument profile:
0.0
Unit: mA
Central Wavelenght (A):
8525
Width (A):
100.
Radial velocity (km/h):
0.0
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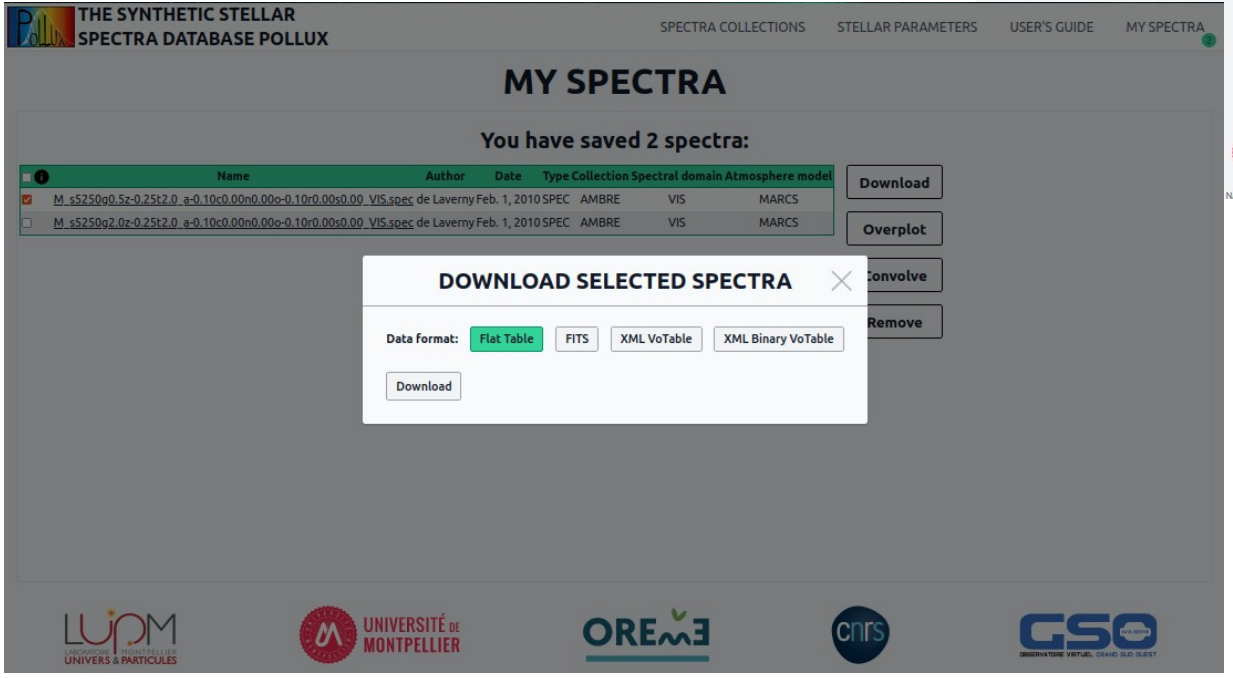
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STELLAR PARAMETERS
USER'S GUIDE
MY SPECTRA
MY SPECTRA
You have saved 2 spectra:
Name
Author
Date
Type
Collection
Spectral domain
Atmosphere model
M_s5250g0.5z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_VIS.spec de Laverny Feb. 1, 2010 SPEC AMBRE VIS MARCS
M_s5250g2.0z-0.25t2.0_a-0.10c0.00n0.00o-0.10r0.00s0.00_VIS.spec de Laverny Feb. 1, 2010 SPEC AMBRE VIS MARCS
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