VOSA

A VO Spectral Energy Distribution Analyzer
The case of the young cluster Collinder 69

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Outline

Introduction

VOSA (VO Sed Analyzer)

- a web tool: http://svo.laeff.inta.es/theory/vosa
- designed to automatically determine physical parameters. of stellar objects from comparison with collections of theoretical models.
- for several objects at the same time.

- A difficult task without using the VO.
- Much easier using VO tools.

Workflow

1. Read user photometry-tables.
   Query VO photometry catalogs to improve/complete the observed SED.
2. Fit observed data with theoretical spectra models from the VO and estimate physical parameters for the objects. (Chi-square test)
3. Generate a Hertzsprung-Russel diagram using the estimated parameters and obtaining isochrones and evolutionary tracks from the VO.
4. Save results as VOTable, ASCII, png...

A science case: Collinder 69

The case of the young cluster Collinder 69
(Bayo et al, 2008 A&A, *in press*)

- IRAC photometry for 167 candidate members of C69.
- VO archival data research (multi-wavelength range).
- Four different collections of theoretical models (with TSAP and S3).
- Determination of the best physical parameters for the objects and the association ($T_{\rm eff}$, gravity, mass and age)

- A difficult task without using the VO.
- Much easier using VO tools.

User and VO data.

1. **User and VO photometry data.**
   - Upload user photometry data.
   - Query several photometry catalogs accessible through VO services
     (increases the wavelength coverage of the data to be analyzed).

Spanish Virtual Observatory - *Theoretical models*

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VOSA

Sessions	Upload files	Coordinates	VO Phot.	Model Fit	HR Diag.	Save Results	Help	Logout

Upload your own data file (max size=500Kb)
It must comply with the required data format
Please, include a description for your file, it is **compulsory**

File to upload:	Examinar...
Description:	
File type:	Fluxes / Magnitudes

Upload

Uploaded files

Date	Filename	Descrip	Action
07/10 17:57:13	ejemplo.dat	example 1	Show | Retrieve | Delete |
07/10 18:34:03	fichero_VOSA_no_OM.txt	C69	Show | Retrieve | Delete |

LOri001

Position: (83.446583,9.9273611) Distance: 400. pc A_V: 0.36209598

Filter:	CFHT_R	CFHT_I	2MASS_J	2MASS_H	2MASS_Ks	IRAC_I1	IRAC_I2	IRAC_I3	IRAC_I4
λ_{med}:	6582	8228	12518	16504	21539	35634	45110	57593	79594
Flux:	1.447193e-14	1.345174e-14	1.048069e-14	7.563327e-15	3.061005e-15	5.502778e-16	2.128458e-16	8.649135e-17	2.543987e-17
ΔF:	0.000000e+00	0.000000e+00	9.223010e-17	6.655728e-17	2.571244e-17	6.603333e-19	3.405533e-19	3.113689e-19	1.017595e-19

LOri002

Position: (84.043167,10.148583) Distance: 400. pc A_V: 0.36209598

Filter:	CFHT_R	CFHT_I	2MASS_J	2MASS_H	2MASS_Ks	IRAC_I1	IRAC_I2	IRAC_I3	IRAC_I4
λ_{med}:	6582	8228	12518	16504	21539	35634	45110	57593	79594
Flux:	1.170918e-14	1.204422e-14	1.114782e-14	9.663020e-15	4.178920e-15	7.207456e-16	2.589793e-16	1.123499e-16	3.434906e-17
ΔF:	0.000000e+00	0.000000e+00	1.070191e-16	8.889979e-17	3.175979e-17	8.648947e-19	3.107752e-19	4.044596e-19	1.099170e-19

LOri003

Position: (83.981000,9.9420833) Distance: 400. pc A_V: 0.36209598

Filter:	CFHT_R	CFHT_I	2MASS_J	2MASS_H	2MASS_Ks	IRAC_I1	IRAC_I2	IRAC_I3	IRAC_I4
λ_{med}:	6582	8228	12518	16504	21539	35634	45110	57593	79594

VOSA

Help and documentation

Available filters

These are the filters that are available for this application. If you would like to fit fotometric data corresponding to other filters, please, contact us and we will try to make them available too.

Label	λ_{eff}	F_0 (Jy)	A_l/A_V	Descrip	Reference
2MASS_H	16504	1115.71	0.19	2MASS H	Cohen 2003
2MASS_J	12518	1636.77	0.3	2MASS J	Cohen 2003
2MASS_Ks	21539	671.53	0.13	2MASS K	Cohen 2003
BUSCA_b	4658.27	4270.11	1.23	BUSCA b	BUSCA
BUSCA_u	3571.67	4764.38	1.59	BUSCA u	BUSCA
BUSCA_v	4123.49	4881.93	1.39	BUSCA v	BUSCA
BUSCA_y	5488.49	3703.7	1	BUSCA y	BUSCA
CFHT_G	4877.37	3952	1.17	CFHT G	Bessel 1979
CFHT_I	8228	2550	0.58	CFHT I	Bessel 1979
CFHT_R	6582	3080	0.8	CFHT R	Bessel 1979
CFHT_U	3823.29	2640	1.5	CFHT U	Bessel 1979
CFHT_Z	8827.98	2180	0.52	CFHT Z	Bessel 1979
DENIS_I	8044	2550	0.6	Denis I	
GAIA_BP	5439.39	0	1.02	GAIA BP	
GAIA_G	6716.07	0	0.78	GAIA G	
GAIA_GRVS	8605.93	0	0.54	GAIA GRVS	
GAIA_RP	8005.39	0	0.61	GAIA RP	
HIPPARCOS	5275.1	3748	1.06	HIPPARCOS	The HIPPARCOS and TYCHO catalogues
INGRID_H	16440	1115.71	0.19	INGRID H	INGRID
INGRID_J	12549	1636.77	0.3	INGRID J	INGRID
INGRID_Ks	21704	671.53	0.12	INGRID K	INGRID
IPHAS_gI	7746	6052	0.64	IPHAS Gunn I	González-Solares et al 2008
IPHAS_gR	6230.09	5056	0.87	IPHAS Gunn R	González-Solares et al 2008
IPHAS_Ha	6568.17	5808	0.81	IPHAS Halpha	González-Solares et al 2008
IRAC_I1	35634	280.9	0.07	IRAC Channel 1	Spitzer
IRAC_I2	45110	179.7	0.05	IRAC Channel 2	Spitzer
IRAC_I3	57593	115	0.04	IRAC Channel 3	Spitzer
IRAC_I4	79594	64.13	0.04	IRAC Channel 4	Spitzer
KPNO_b	4727.71	4270.11	1.21	KPNO b	KPNO
KPNO_u	3534.22	4764.38	1.61	KPNO u	KPNO
KPNO_v	4101.58	4881.93	1.4	KPNO v	KPNO
KPNO_y	5506.53	3703.7	1	KPNO y	KPNO
MIPS_M1	238442	7.17	0.02	MIPS 24um	Spitzer

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VO photometry

First select the VO services that you want to use

☑ **2MASS All-Sky Point Source Catalog**

2MASS has uniformly scanned the entire sky in three near-infrared bands to detect and characterize point sources brighter than about 1 mJy in each band, with signal-to-noise ratio (SNR) greater than 1. **More Info**.

Search radius: 5 arcsec

Filters: ☑ 2MASS_J ☑ 2MASS_H ☑ 2MASS_Ks

☑ **Tycho-2 Catalogue**

The Tycho-2 Catalogue is an astrometric reference catalogue containing positions and proper motions as well as two-colour photometric data for the 2.5 million brightest stars in the sky.. **More Info**.

Search radius: 5 arcsec

Filters: ☑ TYCHO_B ☑ TYCHO_V

☑ **Stromgren uvby-beta Catalogue (Hauck+ 1997)**

This catalogue is an updated version of the one published in 1990 (Hauck and Mermilliod, 1990) and contains data for more than 63,300 stars in the Galaxy and Magellanic Clouds.. **More Info**.

Search radius: 5 arcsec

Filters: ☑ STROMGREN_u ☑ STROMGREN_v ☑ STROMGREN_b ☑ STROMGREN_y

☑ **SDSS Catalogue**

The present catalog is a subset of the data release 6 of the Sloan Digital Sky Survey (SDSS), restricted to primary and secondary photo objects and some of the columns. **More Info**.

Search radius: 5 arcsec

Filters: ☑ SDSS_U ☑ SDSS_G ☑ SDSS_R ☑ SDSS_I ☑ SDSS_Z

☑ **IPHAS Catalogue**

IPHAS Initial data release.. **More Info**.

Search radius: 5 arcsec

Filters: ☑ IPHAS_gI ☑ IPHAS_gR ☑ IPHAS_Ha

Continue

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VO photometry

This is the photometry found in the VO for these objects.
Check the values and if you want to save them, click on the *Save Photometry* button

Save photometry

Dis: Distance from the object coordinates to those in the catalogue in arcsec.

Object			2MASS All-Sky Point Source Catalog						
Label	RA	DEC	Save	Dis.	RA	DEC	J	H	Ks
LOri001	83.446583	9.9273611	☑	0.49	083.44672	+09.92736	11.297±0.022	10.595±0.022	10.426±0.021
LOri002	84.043167	10.148583	☑	0.06	084.04316	+10.14857	11.230±0.024	10.329±0.023	10.088±0.019
LOri003	83.981000	9.9420833	☑	0.65	083.98095	+09.94191	11.416±0.023	10.725±0.022	10.524±0.023
LOri004	83.948125	9.7640278	☑	0.63	083.94823	+09.76389	11.359±0.022	10.780±0.023	10.548±0.021
LOri005	83.473542	9.7188889	☑	0.42	083.47357	+09.71900	11.378±0.022	10.549±0.022	10.354±0.023
LOri006	83.817750	9.9216111	☑	0.87	083.81761	+09.92181	11.542±0.026	10.859±0.026	10.648±0.021
LOri007	83.623125	9.8163056	☑	0.51	083.62305	+09.81619	11.698±0.027	11.101±0.024	10.895±0.030
LOri008	83.991542	9.9091111	☑	0.16	083.99159	+09.90912	11.548±0.029	10.859±0.023	10.651±0.024
LOri009	83.693083	10.109889	☑	0.27	083.69311	+10.10996	11.843±0.024	11.109±0.024	10.923±0.023
LOri010	83.637333	10.144750	☑	0.12	083.63736	+10.14477	11.880±0.026	11.219±0.026	11.041±0.023
LOri011	83.686083	9.8993056	☑	0.51	083.68610	+09.89945	11.604±0.026	10.784±0.024	10.554±0.024
LOri012	83.774792	9.8688333	☑	0.28	083.77485	+09.86888	11.816±0.026	10.971±0.024	10.795±0.023
LOri013	83.484792	9.8990833	☑	0.26	083.48474	+09.89913	11.656±0.022	10.918±0.022	10.719±0.023
LOri014	84.079292	10.064111	☑	0.13	084.07932	+10.06413	11.941±0.024	11.278±0.027	11.092±0.023
LOri015	83.591000	10.070694	☑	0.45	083.59093	+10.07080	11.870±0.024	11.127±0.024	10.912±0.019
LOri016	83.806250	9.9234722	☑	0.98	083.80610	+09.92370	11.958±0.024	11.284±0.027	11.053±0.024
LOri017	84.085375	9.8720278	☑	0.35	084.08547	+09.87200	12.188±0.024	11.482±0.023	11.323±0.021
LOri018	84.069125	9.8468889	☑	0.52	084.06923	+09.84679	11.991±0.024	11.284±0.022	11.090±0.023
LOri019	83.807042	9.9413333	☑	1.56	083.80688	+09.94093	12.019±0.026	11.316±0.024	11.067±0.021
LOri020	83.739875	9.7687500	☑	0.26	083.73986	+09.76868	11.856±0.028	11.214±0.026	11.025±0.027
LOri021	83.778917	9.8160556	☑	0.35	083.77891	+09.81596	12.258±0.027	11.560±0.026	11.296±0.021
LOri022	83.963958	9.9196667	☑	0.49	083.96390	+09.91979	12.102±0.023	11.411±0.022	11.156±0.019

VOSA

Sessions | Upload files | Coordinates | **VO Phot.** | Model Fit | HR Diag. | Save Results | Help | Logout

VO photometry

Please, select the data file that you want to use

Date	Filename	Descrip	Action
07/10 17:57:13	ejemplo.dat	example 1	See VOPhot | Delete
07/10 18:34:03	fichero_VOSA_no_OM.txt	C69	See VOPhot | Delete

fichero_VOSA_no_OM.txt

Object	Filter	Flux	Error
LOri001	2MASS_J	1.04806926503E-14	2.12367642615E-16
LOri001	2MASS_H	7.56332732239E-15	1.53253801764E-16
LOri001	2MASS_Ks	3.06100503115E-15	5.92050862562E-17
LOri002	2MASS_J	1.11478209664E-14	2.46420541215E-16
LOri002	2MASS_H	9.66302039139E-15	2.046993257E-16
LOri002	2MASS_Ks	4.17891986718E-15	7.31296212916E-17
LOri003	2MASS_J	9.39268992201E-15	1.98972703737E-16
LOri003	2MASS_H	6.70985130507E-15	1.35960031603E-16
LOri003	2MASS_Ks	2.79681695276E-15	5.9247163014E-17
LOri004	2MASS_J	9.8989694819E-15	2.00580332172E-16
LOri004	2MASS_H	6.37841681532E-15	1.35118996778E-16
LOri004	2MASS_Ks	2.73567211359E-15	5.29125897557E-17
LOri005	2MASS_J	9.72724792874E-15	1.97100781474E-16
LOri005	2MASS_H	7.89065210569E-15	1.5988630163E-16
LOri005	2MASS_Ks	3.27087572305E-15	6.92895210646E-17
LOri006	2MASS_J	8.3635370538E-15	2.00280659746E-16
LOri006	2MASS_H	5.93079477137E-15	1.42024060154E-16
LOri006	2MASS_Ks	2.49496262052E-15	4.82568553956E-17
LOri007	2MASS_J	7.24419255064E-15	1.80147993601E-16
LOri007	2MASS_H	4.74583785349E-15	1.04905876754E-16
LOri007	2MASS_Ks	1.98730279533E-15	5.49112055014E-17
LOri008	2MASS_J	8.31744591184E-15	2.22158872833E-16
LOri008	2MASS_H	5.93079477137E-15	1.25636668597E-16

Fit

2

Fit observed data with theoretical models.

- Query VO-compliant theoretical models (spectra) and calculate their synthetic photometry.
- Determine which model reproduces best the observed data.
- Use the best-fit model to estimate, for each object:
  - Values for T_{eff}, Logg, metallicity
  - Bolometric luminosity, using the model as a correction to the observed data

VOSA

Model fit

First select the models that you want to use for the fit

☑ **NextGen**
The NextGen Model Atmosphere grid for Teff between 3000 and 10,000K; Hauschildt, P.H., Allard, F., Baron, E., Schweitzer, A., ApJ 312, 377, 1999

☑ **DUSTY00**
The DUSTY00 Model Atmosphere grid. Allard et al. 2001, ApJ, 556, 357

☑ **COND00**
The COND00 Model Atmosphere grid. Chabrier et al. 2000, ApJ, 542,464

☑ **Kurucz**
ODFNEW/NOVER models. Newly computed ODFs with better opacities and better abundances have been used. (The convective treatment is described in Castelli et al. 1997, AA 318, 841)

Continue

Acknowledging VOSA in publications:
Please include the following in any published material that makes use of VOSA:

This publication makes use of VOSA, developed under the Spanish Virtual Observatory project supported from the Spanish MICINN through grant AyA2008-02156.

Referencing VOSA in publications:
If your research benefits from the use of VOSA, we would appreciate if you could include the following reference in your publication:

Bayo, A., Rodrigo, C., Barrado y Navascués, D., Solano, E., Gutiérrez, R., Morales-Calderón, M., Allard, F. 2008, A&A (in press).

Other services used in VOSA
VOSA uses some external services and theoretical models that you might want to cite or acknowledge if your science benefits from the use of this tool

See the complete credits page


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VOSA
Sessions
Upload files
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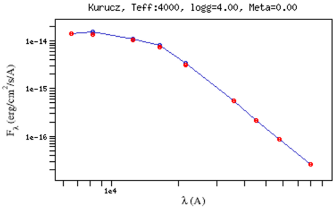
VO Phot.
Model Fit
HR Diag.
Save Results
Help
Logout
Model fit
Choose the parameter ranges that you want to use for the fit
NextGen
teff: 2500 - 3500 (Min/Max value for the effective temperature for the model. Temperatures are given in K)
logg: 3.5 - 4.5 (Min/Max value for Log(G) for the model.)
DUSTY00
teff: 1800 - 2500 (Min/Max value for the effective temperature for the model. Temperatures are given in K)
logg: 3.5 - 4.5 (Min/Max value for Log(G) for the model.)
COND00
teff: 100 - 1800 (Min/Max value for the effective temperature for the model. Temperatures are given in K)
logg: 3.5 - 4.5 (Min/Max value for Log(G) for the model.)
Kurucz
teff: 3500 - 10000 (Min/Max value for the effective temperature for the model. Temperatures are given in K)
logg: 3.50 - 4.50 (Min/Max value for Log(G) for the model.)
meta: 0.00 - 0.00 (Min/Max value for the Metallicity for the model.)
Continue

Model fit

Here you can see the best fits for each object.
For each object, the best fit is shown in bold face.
By default, the one with a smaller Chi2 is selected as **"Best"**.
To select a fitting different from that chosen by default, just click in the link **"Best"**.

LOri001

Model	T_{eff}	logg	Metallicity	χ^2	M_d	F_{tot}	ΔF_{tot}	F_{obs}/F_{tot}	D (pc)	L_{bol}/L_{sun}	$\Delta L_{bol}/L_{sun}$	λ_{last}	N_{fit}/N_{tot}	Action
Kurucz	**4000**	**4.00**	**0.00**	**2.17e+1**	**4.09e-1**	**1.93e-10**	**1.81e-12**	**0.48**	**4.00e+2**	**9.61e-1**	**9.02e-3**	**79594**	**9/9**	**Best** | **See** |
Kurucz	4000	3.50	0.00	3.81e+1	4.03e-1	1.91e-10	1.81e-12	0.48	4.00e+2	9.54e-1	9.02e-3	79594	9/9	Best | See |
Kurucz	4000	4.50	0.00	6.88e+1	4.15e-1	1.94e-10	1.81e-12	0.47	4.00e+2	9.68e-1	9.02e-3	79594	9/9	Best | See |
Kurucz	4250	4.50	0.00	1.15e+2	3.69e-1	2.09e-10	1.81e-12	0.44	4.00e+2	1.04e+0	9.02e-3	79594	9/9	Best | See |
Kurucz	3750	3.50	0.00	1.23e+2	4.61e-1	1.79e-10	1.81e-12	0.51	4.00e+2	8.94e-1	9.02e-3	79594	9/9	Best | See |
NextGen	3500	4.0	0	3.84e+2	1.56e-20	1.60e-10	1.81e-12	0.58	4.00e+2	7.99e-1	9.02e-3	79594	9/9	Best | See |
NextGen	3400	3.5	0	4.45e+2	1.62e-20	1.55e-10	1.81e-12	0.60	4.00e+2	7.71e-1	9.02e-3	79594	9/9	Best | See |
NextGen	3500	3.5	0	4.49e+2	1.53e-20	1.59e-10	1.81e-12	0.58	4.00e+2	7.95e-1	9.02e-3	79594	9/9	Best | See |
NextGen	3300	3.5	0	4.95e+2	1.71e-20	1.50e-10	1.81e-12	0.61	4.00e+2	7.50e-1	9.02e-3	79594	9/9	Best | See |
NextGen	3400	4.0	0	5.07e+2	1.64e-20	1.56e-10	1.81e-12	0.59	4.00e+2	7.76e-1	9.02e-3	79594	9/9	Best | See |
DUSTY00	2500	4.5	0	1.66e+3	3.73e-20	1.32e-10	1.81e-12	0.70	4.00e+2	6.57e-1	9.02e-3	79594	9/9	Best | See |
DUSTY00	2400	4.5	0	1.67e+3	4.11e-20	1.29e-10	1.81e-12	0.72	4.00e+2	6.41e-1	9.02e-3	79594	9/9	Best | See |
DUSTY00	2300	4.5	0	1.81e+3	4.49e-20	1.25e-10	1.81e-12	0.73	4.00e+2	6.26e-1	9.02e-3	79594	9/9	Best | See |
DUSTY00	2200	4.5	0	2.14e+3	4.86e-20	1.22e-10	1.81e-12	0.75	4.00e+2	6.11e-1	9.02e-3	79594	9/9	Best | See |
DUSTY00	2400	4.0	0	2.14e+3	4.05e-20	1.29e-10	1.81e-12	0.72	4.00e+2	6.42e-1	9.02e-3	79594	9/9	Best | See |
COND00	1800	3.5	0	2.41e+3	9.33e-20	1.16e-10	1.81e-12	0.80	4.00e+2	5.77e-1	9.02e-3	79594	9/9	Best | See |
COND00	1800	4.0	0	2.51e+3	9.46e-20	1.16e-10	1.81e-12	0.80	4.00e+2	5.78e-1	9.02e-3	79594	9/9	Best | See |
COND00	1800	4.5	0	2.77e+3	9.55e-20	1.16e-10	1.81e-12	0.79	4.00e+2	5.79e-1	9.02e-3	79594	9/9	Best | See |
COND00	1700	3.5	0	3.24e+3	1.08e-19	1.13e-10	1.81e-12	0.81	4.00e+2	5.64e-1	9.02e-3	79594	9/9	Best | See |
COND00	1700	4.0	0	3.57e+3	1.10e-19	1.14e-10	1.81e-12	0.81	4.00e+2	5.67e-1	9.02e-3	79594	9/9	Best | See |



LOri002

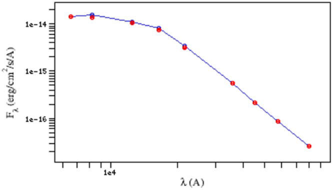
Model fit

Show Graphs

Object	Model	T_{eff}	logg	Metallicity	χ^2	M_d	F_{tot}	ΔF_{tot}	F_{obs}/F_{tot}	D (pc)	L_{bol}/L_{sun}	$\Delta L_{bol}/L_{sun}$	λ_{last}	N_{fit}/N_{tot}	Data VOtables
LOri001	Kurucz	4000	4.00	0.00	2.17e+1	4.09e-1	1.93e-10	1.81e-12	0.48	4.00e+2	9.61e-1	9.02e-3	79594	9/9	Synth.Spectrum
LOri002	NextGen	3500	3.5	0	2.64e+2	1.96e-20	1.84e-10	1.98e-12	0.53	4.00e+2	9.16e-1	9.86e-3	79594	9/9	Synth.Spectrum
LOri003	Kurucz	4000	3.50	0.00	6.17e+1	3.88e-1	1.78e-10	1.66e-12	0.46	4.00e+2	8.86e-1	8.29e-3	79594	9/9	Synth.Spectrum
LOri004	Kurucz	3750	4.00	0.00	9.24e+1	4.61e-1	1.66e-10	1.57e-12	0.47	4.00e+2	8.26e-1	7.81e-3	79594	9/9	Synth.Spectrum
LOri005	Kurucz	4000	3.50	0.00	2.04e+2	4.01e-1	1.85e-10	1.74e-12	0.47	4.00e+2	9.24e-1	8.67e-3	79594	9/9	Synth.Spectrum
LOri006	Kurucz	4000	4.50	0.00	7.04e+1	3.42e-1	1.57e-10	1.66e-12	0.46	4.00e+2	7.82e-1	8.27e-3	79594	9/9	Synth.Spectrum
LOri007	Kurucz	3750	4.00	0.00	7.99e+1	3.23e-1	1.24e-10	1.61e-12	0.51	4.00e+2	6.21e-1	8.03e-3	79594	9/9	Synth.Spectrum
LOri008	NextGen	3500	4.5	0	1.57e+2	1.26e-20	1.26e-10	1.73e-12	0.57	4.00e+2	6.30e-1	8.62e-3	79594	9/9	Synth.Spectrum
LOri009	Kurucz	4000	3.50	0.00	2.59e+1	2.31e-1	1.15e-10	1.26e-12	0.51	4.00e+2	5.75e-1	6.29e-3	79594	9/9	Synth.Spectrum
LOri010	Kurucz	4250	4.50	0.00	9.21e+0	1.96e-1	1.18e-10	1.30e-12	0.47	4.00e+2	5.87e-1	6.48e-3	45110	7/9	Synth.Spectrum
LOri011	NextGen	3500	3.5	0	3.56e+2	1.29e-20	1.23e-10	1.48e-12	0.54	4.00e+2	6.15e-1	7.39e-3	79594	9/9	Synth.Spectrum
LOri012	Kurucz	4000	3.50	0.00	2.58e+2	2.74e-1	1.27e-10	1.33e-12	0.47	4.00e+2	6.32e-1	6.66e-3	79594	9/9	Synth.Spectrum
LOri013	Kurucz	3750	3.50	0.00	9.05e+1	3.63e-1	1.29e-10	1.19e-12	0.47	4.00e+2	6.43e-1	5.91e-3	79594	9/9	Synth.Spectrum
LOri014	Kurucz	4000	4.50	0.00	1.81e+1	2.26e-1	1.08e-10	1.23e-12	0.49	4.00e+2	5.38e-1	6.14e-3	79594	9/9	Synth.Spectrum
LOri015	Kurucz	4000	3.50	0.00	7.20e+1	2.31e-1	1.12e-10	1.17e-12	0.49	4.00e+2	5.60e-1	5.83e-3	79594	9/9	Synth.Spectrum
LOri016	Kurucz	3750	3.50	0.00	4.03e+1	2.68e-1	9.96e-11	1.13e-12	0.48	4.00e+2	4.97e-1	5.63e-3	45110	7/9	Synth.Spectrum
LOri017	Kurucz	4250	4.00	0.00	1.51e+1	1.55e-1	9.26e-11	9.37e-13	0.47	4.00e+2	4.62e-1	4.67e-3	79594	9/9	Synth.Spectrum
LOri018	Kurucz	3750	3.50	0.00	8.47e+1	2.76e-1	9.90e-11	9.66e-13	0.47	4.00e+2	4.93e-1	4.82e-3	79594	9/9	Synth.Spectrum
LOri019	Kurucz	3750	3.50	0.00	3.94e+1	2.58e-1	9.35e-11	9.89e-13	0.48	4.00e+2	4.66e-1	4.93e-3	79594	9/9	Synth.Spectrum
LOri020	Kurucz	3500	3.50	0.00	8.05e+1	3.75e-1	1.00e-10	1.11e-12	0.47	4.00e+2	5.01e-1	5.52e-3	79594	9/9	Synth.Spectrum
LOri021	Kurucz	4000	4.50	0.00	2.90e+1	1.84e-1	8.43e-11	9.15e-13	0.46	4.00e+2	4.20e-1	4.56e-3	79594	9/9	Synth.Spectrum
LOri022	Kurucz	3750	4.00	0.00	3.88e+1	2.35e-1	8.58e-11	8.18e-13	0.48	4.00e+2	4.28e-1	4.08e-3	57593	8/9	Synth.Spectrum
LOri023	Kurucz	3750	3.50	0.00	6.09e+1	2.09e-1	7.81e-11	8.75e-13	0.49	4.00e+2	3.90e-1	4.36e-3	79594	9/9	Synth.Spectrum
LOri024	Kurucz	3750	3.50	0.00	2.93e+1	2.25e-1	8.24e-11	1.01e-12	0.48	4.00e+2	4.11e-1	5.05e-3	79594	9/9	Synth.Spectrum
LOri025	NextGen	3400	4.0	0	6.60e+1	1.11e-20	8.49e-11	1.71e-12	0.50	4.00e+2	4.23e-1	8.51e-3	79594	9/9	Synth.Spectrum
LOri026	Kurucz	3750	4.00	0.00	6.55e+1	2.66e-1	9.20e-11	9.69e-13	0.45	4.00e+2	4.59e-1	4.83e-3	79594	9/9	Synth.Spectrum
LOri027	Kurucz	4000	4.50	0.00	3.50e+1	1.56e-1	7.20e-11	7.56e-13	0.47	4.00e+2	3.59e-1	3.77e-3	79594	9/9	Synth.Spectrum
LOri028	Kurucz	3750	4.00	0.00	3.31e+1	1.58e-1	5.87e-11	6.00e-13	0.49	4.00e+2	2.93e-1	2.99e-3	79594	9/9	Synth.Spectrum
LOri029	COND00	1500	3.5	0	6.14e+2	1.79e-19	6.04e-11	7.95e-13	0.59	4.00e+2	3.01e-1	3.96e-3	35634	6/10	Synth.Spectrum
LOri030	NextGen	3500	4.5	0	5.02e+1	6.70e-21	5.97e-11	6.99e-13	0.51	4.00e+2	2.98e-1	3.49e-3	79594	9/9	Synth.Spectrum
LOri031	Kurucz	3750	3.50	0.00	4.30e+1	1.90e-1	6.69e-11	7.21e-13	0.46	4.00e+2	3.33e-1	3.60e-3	79594	9/9	Synth.Spectrum
LOri032	NextGen	3500	4.5	0	4.47e+1	6.35e-21	5.71e-11	6.85e-13	0.52	4.00e+2	2.85e-1	3.42e-3	79594	9/9	Synth.Spectrum
LOri033	NextGen	3500	4.5	0	2.99e+1	6.91e-21	5.96e-11	9.80e-13	0.50	4.00e+2	2.97e-1	4.89e-3	79594	9/9	Synth.Spectrum
LOri034	DUSTY00	1800	4.5	0	8.27e+2	7.89e-20	5.95e-11	6.51e-13	0.52	4.00e+2	2.97e-1	3.25e-3	35634	6/10	Synth.Spectrum
LOri035	NextGen	3500	4.5	0	3.68e+1	5.67e-21	5.04e-11	5.71e-13	0.51	4.00e+2	2.51e-1	2.85e-3	79594	9/9	Synth.Spectrum
LOri036	NextGen	3500	4.5	0	1.88e+1	5.54e-21	4.84e-11	4.95e-13	0.50	4.00e+2	2.41e-1	2.47e-3	79594	9/9	Synth.Spectrum
LOri037	NextGen	3500	4.5	0	4.61e+1	5.99e-21	5.34e-11	5.95e-13	0.51	4.00e+2	2.66e-1	2.97e-3	79594	9/9	Synth.Spectrum
LOri038	Kurucz	3750	3.50	0.00	6.48e+1	1.50e-1	5.25e-11	6.27e-13	0.44	4.00e+2	2.62e-1	3.13e-3	35634	6/10	Synth.Spectrum
LOri039	NextGen	3500	4.5	0	4.34e+1	4.89e-21	4.42e-11	5.54e-13	0.52	4.00e+2	2.20e-1	2.76e-3	79594	9/9	Synth.Spectrum
LOri040	NextGen	3500	4.5	0	3.37e+1	5.77e-21	4.99e-11	5.06e-13	0.50	4.00e+2	2.49e-1	2.52e-3	79594	9/9	Synth.Spectrum
LOri041	NextGen	3400	4.5	0	4.56e+1	6.73e-21	5.09e-11	5.37e-13	0.49	4.00e+2	2.54e-1	2.68e-3	79594	9/9	Synth.Spectrum
LOri042	Kurucz	3750	3.50	0.00	5.94e+1	1.30e-1	4.57e-11	4.88e-13	0.46	4.00e+2	2.28e-1	2.43e-3	79594	9/9	Synth.Spectrum

LOri001

Kurucz, Teff:4000, logg=4.00, Meta=0.00



LOri002

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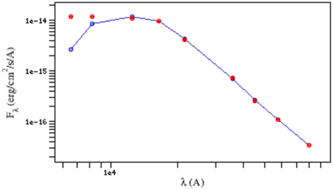

LOri003

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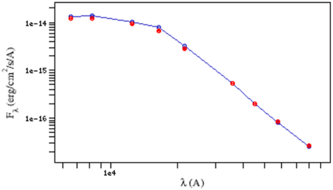

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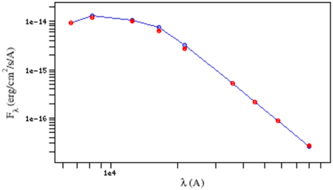

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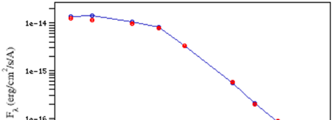

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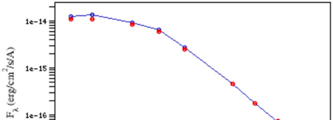

1e4 λ (A) 1e4 λ (A)

LOri047

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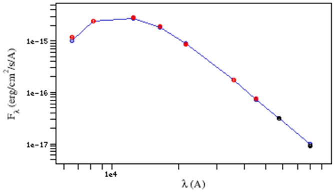

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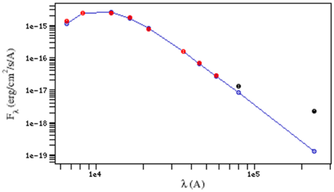

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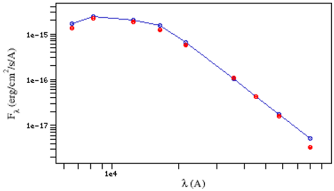

LOri050

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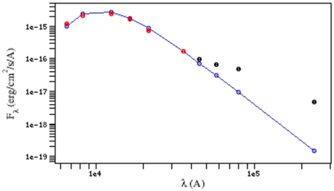

LOri051

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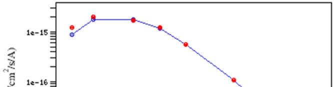

LOri052

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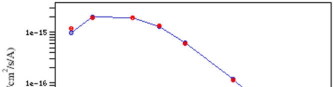


HR diagram

3 **Hertzsprung-Russel diagram.**

- Use the Luminosity and T_{eff} estimated in the fit.
- Obtain isochrones and evolutionary tracks from the VO.
- Interpolate them to estimate values for the Mass and Age of each object.

HR Diagram

Choose the parameter ranges that you want to use for the diagram

☑ **NextGen Isochrones**

Theoretical Evolutionary Tracks from Baraffe, Chabrier, Allard, Hauschildt, 1998, A&A, 337, 403 "Evolutionary models for solar metallicity low-mass stars: mass-magnitude relationships and color-magnitude diagrams" and Baraffe, Chabrier, Allard, Hauschildt, 2001, A&A, accepted "Evolutionary models for low-mass stars and brown dwarfs: uncertainties and limits at very young ages"

t: 0.00100 - 7.94328 (Min/Max value for the age of the star. Ages are given in Gyr)

☑ **NextGen Evolutionary Tracks**

Theoretical Evolutionary Tracks from Baraffe, Chabrier, Allard, Hauschildt, 1998, A&A, 337, 403 "Evolutionary models for solar metallicity low-mass stars: mass-magnitude relationships and color-magnitude diagrams" and Baraffe, Chabrier, Allard, Hauschildt, 2001, A&A, accepted "Evolutionary models for low-mass stars and brown dwarfs: uncertainties and limits at very young ages"

m: 0.020 - 1.400 (Min/Max value for the mass of the star. Masses are given in Msun)

☑ **DUSTY99 Isochrones**

Theoretical Evolutionary Tracks from Chabrier, Baraffe, Allard, Hauschildt, 2000, ApJ,542, 464 "Evolutionary models for very-low-mass stars and brown dwarfs with dusty atmospheres" and Baraffe, Chabrier, Allard, Hauschildt, 2002, A&A, 382, 563 "Evolutionary models for low-mass stars and brown dwarfs: uncertainties and limits at very young ages"

t: 0.001 - 10.000 (Min/Max value for the age of the star. Ages are given in Gyr)

☑ **DUSTY99 Evolutionary Tracks**

Theoretical Evolutionary Tracks from Chabrier, Baraffe, Allard, Hauschildt, 2000, ApJ,542, 464 "Evolutionary models for very-low-mass stars and brown dwarfs with dusty atmospheres" and Baraffe, Chabrier, Allard, Hauschildt, 2002, A&A, 382, 563 "Evolutionary models for low-mass stars and brown dwarfs: uncertainties and limits at very young ages"

m: 0.0010 - 0.1000 (Min/Max value for the mass of the star. Masses are given in Msun)

☑ **COND99 Isochrones**

Theoretical Isochrones from Baraffe, Chabrier, Barman, Allard, Hauschildt, 2003A&A...402..701B \n "Evolutionary models for cool brown dwarfs and extrasolar giant planets. The case of HD 209458"

HR Diagram

Models

Plot — Mark All — Unmark All

Models
NextGen t:0.00100
NextGen t:0.00125
NextGen t:0.00158
NextGen t:0.00199
NextGen t:0.00251
NextGen t:0.00316
NextGen t:0.00398
NextGen t:0.00501
NextGen t:0.00630
NextGen t:0.00794
NextGen t:0.00999
NextGen t:0.01258
NextGen t:0.01584
NextGen t:0.01995
NextGen t:0.02511
NextGen t:0.03162
NextGen t:0.03981
NextGen t:0.05011
NextGen t:0.06309
NextGen t:0.07943
NextGen t:0.10000
NextGen t:0.12589
NextGen t:0.15848
NextGen t:0.19952
NextGen t:0.25118

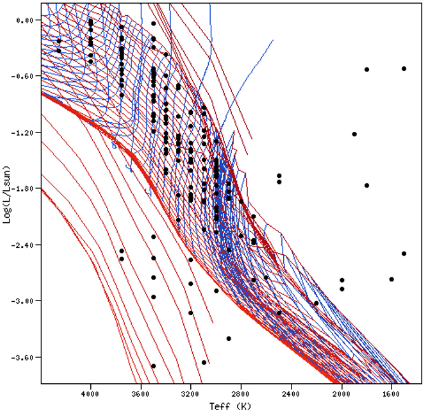
Objects

Show — Show All — Show None

Obj	Model	teff	logL	t		m	
LOri001	siess	4000	-0.0171	0.0017		0.6983	
LOri002	NextGen	3500	-0.0379	---	[4]	---	[4]
LOri003	siess	4000	-0.0526	0.0018		0.6993	
LOri004	siess	3750	-0.0828	0.0010		0.4987	
LOri005	siess	4000	-0.0341	0.0017		0.6988	
LOri006	siess	4000	-0.1066	0.0019		0.7000	
LOri007	siess	3750	-0.2071	0.0011		0.4993	
LOri008	NextGen	3500	-0.2009	0.0010		0.570:0.600	[3]
LOri009	siess	4000	-0.2407	0.0020	[1]	0.7026	
LOri010	siess	4250	-0.2315	0.0045		1.0005	
LOri011	NextGen	3500	-0.2113	0.0010		0.5766	
LOri012	siess	4000	-0.1990	0.0020		0.7005	
LOri013	siess	3750	-0.1919	0.0011		0.4993	
LOri014	siess	4000	-0.2692	0.0020		0.7044	
LOri015	siess	4000	-0.2522	0.0020		0.7032	
LOri016	siess	3750	-0.3039	0.0013		0.4996	
LOri017	siess	4250	-0.3355	0.0050		0.9932	
LOri018	siess	3750	-0.3067	0.0013		0.4996	
LOri019	siess	3750	-0.3312	0.0014		0.4999	
LOri020	siess	3500	-0.3003	0.0010		0.3702	
LOri021	siess	4000	-0.3765	0.0024		0.7255	
LOri022	siess	3750	-0.3689	0.0016		0.4996	
LOri023	siess	3750	-0.4093	0.0017		0.4997	
LOri024	siess	3750	-0.3864	0.0016		0.4997	
LOri025	NextGen	3400	-0.3732	0.0012		0.400:0.450	[3]

X ∈ 1362.5 - 4394.375 Flip: ☑ Plot

Y ∈ -3.88489451 - 0.17627178 Flip: ☐



Save results

4 **Save results.**

- VOTable, ASCII
- PNG for the images available.
- Download as tar file.

VOSA

Sessions | Upload files | Coordinates | VO Phot. | Model Fit | HR Diag. | Save Results | Help | Logout

Save Results

Please, select what you want to do.

Date	Filename	Descrip	Action
07/10 17:57:13	ejemplo.dat	example 1	Available Results
07/10 18:34:03	**fichero_VOSA_no_OM.txt**	**C69**	Available Results

Please, select what you want to retrieve.

Best Fit Results	VOT	Txt	Png
Best Fit Results	☑	☐	
Photometry (Observed)	☑	☐	--
Photometry (Obs+Mod)	☑	☐	☑
HR diagram	☑	☐	☑

Retrieve

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Referencing VOSA in publications:
If your research benefits from the use of VOSA, we would appreciate if you could include the following reference in your publication:

Bayo, A., Rodrigo, C., Barrado y Navascués, D., Solano, E., Gutiérrez, R., Morales-Calderón, M., Allard, F. 2008, A&A (in press).

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See the complete credits page

VOSA, version 1.0.1, September 5, 2008

Future improvements

The tool is done so that it is easy to

- Accept other filters
- Access more photometry catalogues in the VO.
- Use other theoretical model servers (spectra, isochrones and evolutionary tracks).

THANK YOU!