Advanced VOSA

Miriam Cortés

Centro de Astrobiología (INTA-CSIC).
Spanish Virtual Observatory, Madrid. Spain.

object	RA	DEC	dis	Av	filter	flux	error	pntopts	objopts
...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...

```
TYC_5273-16-1 --- --- 52
TYC_9023-815-1 --- ---
TYC_9083-198-1 --- ---
TYC_9241-249-1 --- ---
TYC_50_1383_1 --- ---
```

```
TYC_5273-16-1 --- --- 52+-4
TYC_9023-815-1 --- ---
TYC_9083-198-1 --- ---
TYC_9241-249-1 --- ---
TYC_50_1383_1 --- ---
```

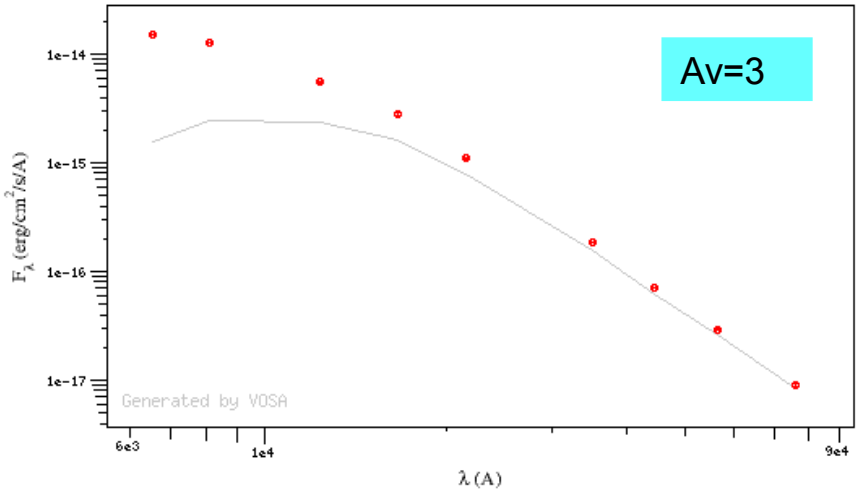
The role of extinction

Object	RA	DEC	D (pc)	Model	A_V	ΔA_V	T_{eff}	ΔT_{eff}	logg	Δlogg	Meta.	ΔMeta.
HD302505	151.33561042	-58.73908361	10	Kurucz	---	---	6250	125	4.00	0.25	-0.50	0.25

Basic data :

HD 302505 -- Star

Other object types:	* (HD,ALS,...), I
ICRS coord. *(ep=J2000) :*	151.3356104 -58.7
FK5 coord. *(ep=J2000 eq=2000) :*	10 05 20.547 -58
FK4 coord. *(ep=B1950 eq=1950) :*	10 03 39.75 -58 2
Gal coord. *(ep=J2000) :*	282.7896 -02.522
Proper motions *mas/yr* :	-6.6 3.6 [2.4 2.3
Spectral type:	B2 I 1995A&AS..1
Fluxes (6) :	U 9.41 [~] D 200
	B 9.90 [~] C ~
	V 9.60 [~] C ~
	J 8.537 [0.020]
	H 8.438 [0.051]
	K 8.349 [0.021]



The role of extinction

I: Av provided by the user

object	RA	DEC	dis	Av	filter	flux	error	pntopts	objopts
...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...

II: Av found in VO services

Files | Objects | Build SEDs | Analyse SEDs | HR Diag. | Results | Help

Stars and brown dwarfs (Change) **File: vosa_input.txt** (info) (Change)

Coordinates | Distances | Extinction

Extinction properties

.

The main goal here is to set final values both for

- Av (that will be used to deredden the SED)
- the Av range (that, if set, will be used in the model fit as a free parameter).

In order to do this, among other options, this panel allows to query VO services in order to search for estimated extinction properties in the line of sight of the objects coordinates.

Take a look to the corresponding Help Section and Credits Page for more information. See a brief inline help about how using the form.

You can search for extinction properties in VO catalogues if you want.

Search for Extinction properties

The role of extinction

First select what VO services you want to search for extinction properties.

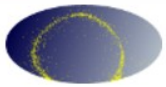
Mark All Unmark All

Search

☑ **UBV Photometry of O & B Stars in Vela (Denoyelle 1977)**

The Spatial Distribution of Young Stars in Vela
Info in catalogue: E(B-V)
More info
Search radius: 5 arcsec

☑ **Optically visible open clusters and Candidates (Dias+ 2002-2010)**

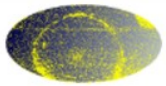


New catalog of optically visible open clusters and candidates (V3.0)
Info in catalogue: E(B-V)
More info
Search radius: 5 arcsec

☑ **SAI Open Clusters Catalog (Glushkova+, 2009)**

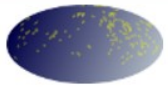
Automated search for star clusters in large multiband surveys. II. Discovery and investigation of open clusters in the Galactic plane
Info in catalogue: E(B-V)
More info
Search radius: 5 arcsec

☑ **Guarinos, 1992**



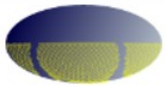
Interstellar matter in the Galactic Disk (Guarinos J., 1992)
Info in catalogue: A_V
More info
Search radius: 5 arcsec

☑ **Stellar Spectrophotometric Atlas**



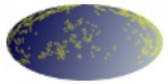
Stellar Spectrophotometric Atlas
Info in catalogue: A_V
More info
Search radius: 5 arcsec

☑ **6dF galaxy survey final redshift release (Jones+, 2009)**



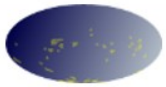
6dF galaxy survey final redshift release (Jones+, 2009)
Info in catalogue: A_V
More info
Search radius: 5 arcsec

☑ **Photometric Catalog of Northern Bright Galaxies (Kodaira+ 1992)**



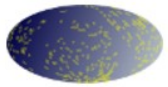
Photometric Catalog of Northern Bright Galaxies
Info in catalogue: A_V
More info
Search radius: 5 arcsec

☑ **Reddening and extinction at high galactic latitude (Larson+, 2005)**



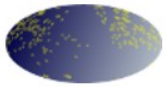
Reddening and the extinction law at high galactic latitude.
Info in catalogue: E(B-V)
More info
Search radius: 5 arcsec

☑ **RR Lyrae Metallicities (Layden 1994)**



RR Lyrae data II. The Metallicities and Kinematics of Local RR Lyrae
Info in catalogue: A_V
More info
Search radius: 5 arcsec

☑ **STELIB: A library of stellar spectra at R~2000 (Le Borgne+, 2003)**



STELIB: A library of stellar spectra at R~2000
Info in catalogue: A_V
More info
Search radius: 5 arcsec

The role of extinction

(Hide this form)

Add default user values

Here you can give "User" values for those objects where there is not a previous value defined. When you click the 'Add user values' button these values will be saved as user values (Final Av values will not be affected)

R_V:

E(B-V):

A_V:

A_V range: -

Only apply where there is not a previous user value

Add user values

Which values do you trust better?

Here you can set the "Final" value of Av for all the objects at the same time. Depending on the choices that you make, the changes will be done for all the objects in the file when you click the 'Save values' button.

Select values by ranking:

1: Morales 2: ---

(Your first option will be chosen for every object if there is a value available. For those objects with no value in the first option, the second option will be chosen. And so on). (If you don't mark this, User values will be selected first, then VO values in the same order that they are found, till a value for Av can be built).

Select only Av values in catalogues. Do not use Rv,E(B-V) to build a value for Av

Select Av values first if available. Then, if not, Rv,E(B-V) values to build a value for Av

Select any combination of values that permits that a value for Av can be built

Save values

Combine final value/range for Av

The main goal here is to set "Final" values both to Av and the Av range.
If, for some objects, you have set a value for one of the variables but not both, you can use this form to go further.

Set the final Av value based on the final Av range (when the range is already set)
Av = Minimum Av range

Set the final Av range based on the Av final value (when the value is set)
Av range min = * Av
Av range max = * Av

Apply even if there is a previous value

Set final values

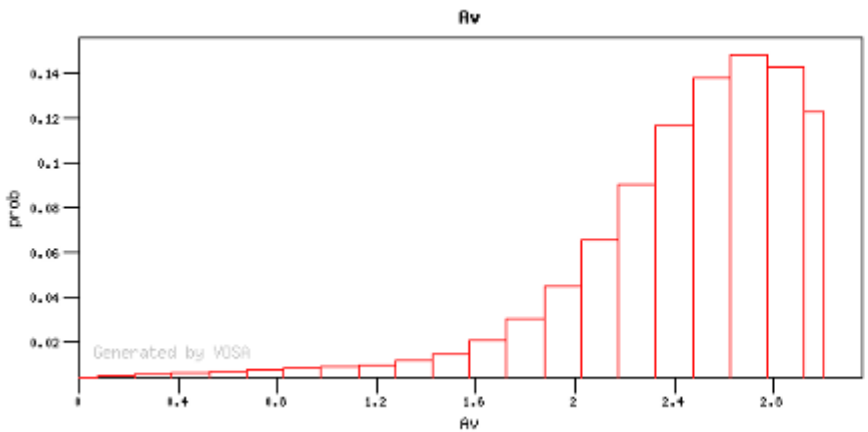
Object			Final		User					VO Data								
Name	RA (deg)	DEC (deg)	Av	Av range	Rv	E(B-V)	Av	Av range		Δ (arcsec)	RA (deg)	DEC (deg)	Rv	E(B-V)	Av	Av range		Source
HD302505	151.33561042	-58.73908361	2.32					0.0 - 3.0		0	151.335610416667	-58.7390836111111	3.214906	0.7225	2.32	---		Extinction map. Morales+, 2006 (?)
										0	151.33561042	-58.73908361	3.214906	0.7225		---		The Rv extinction factor, Morales+, 2006 (?)

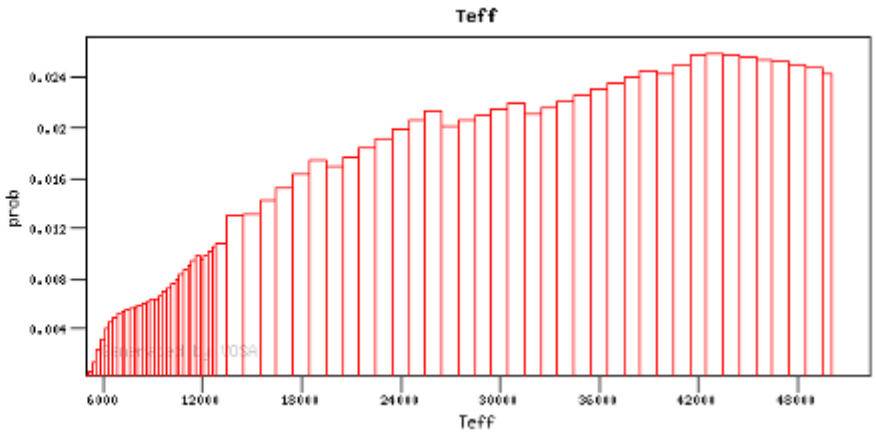
The role of extinction

III: Av as a free parameter

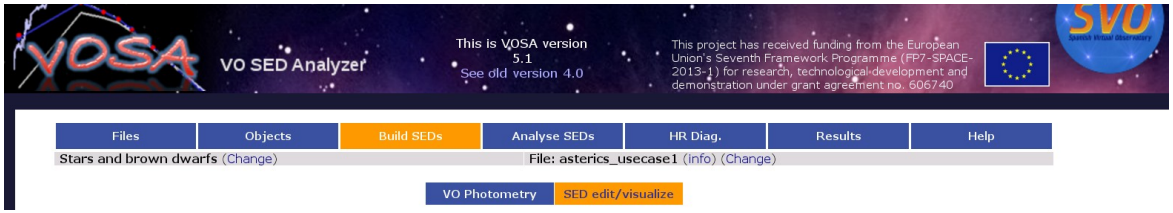
HD302505 --- --- --- --- --- --- --- --- Av:0.0/3.0

Av / Teff degeneracy.





Reddening

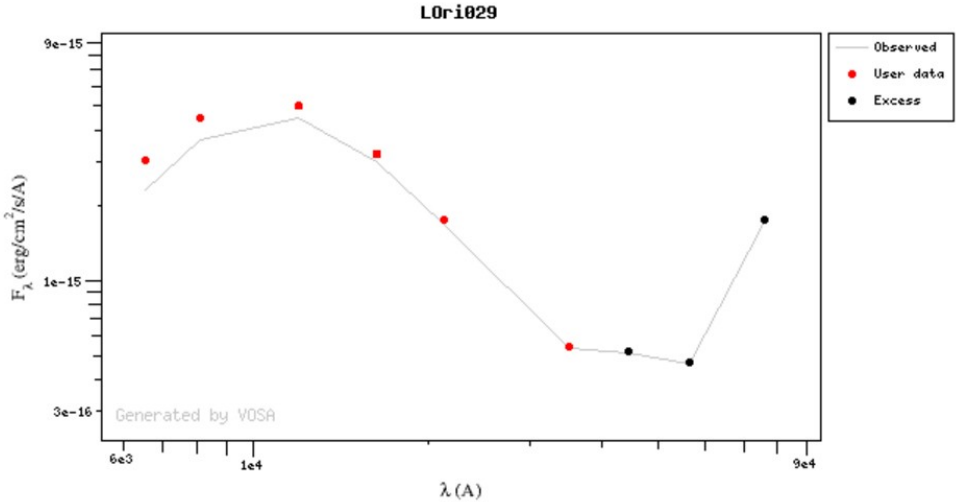


The Astronomical Journal, 131:1574–1607, 2006 March

SPITZER OBSERVATIONS OF IC 348: THE DISK POPULATION AT 2–3 MILLION YEARS

Charles J. Lada, August A. Muench, K. L. Luhman, Lori Allen, Lee Hartmann,
Tom Megeath, Philip Myers, and Giovanni Fazio

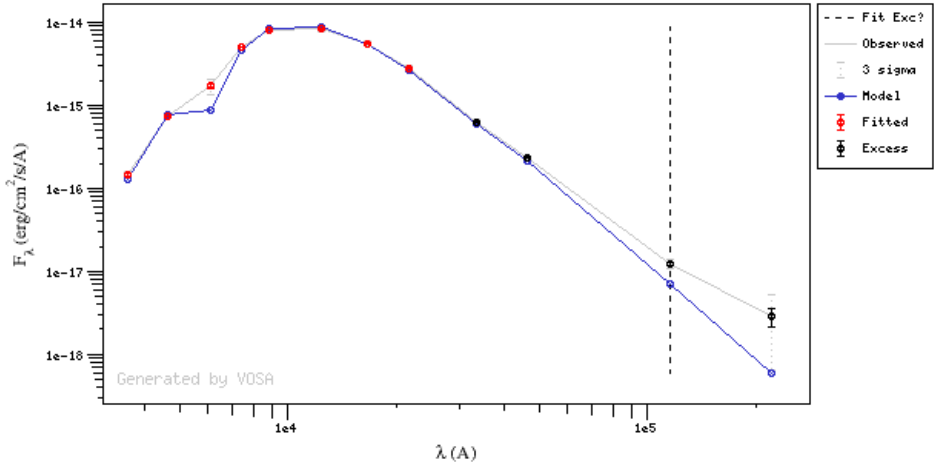
"we find that diskless stars (i.e., stellar photospheres) can be characterized by < 2.56"..

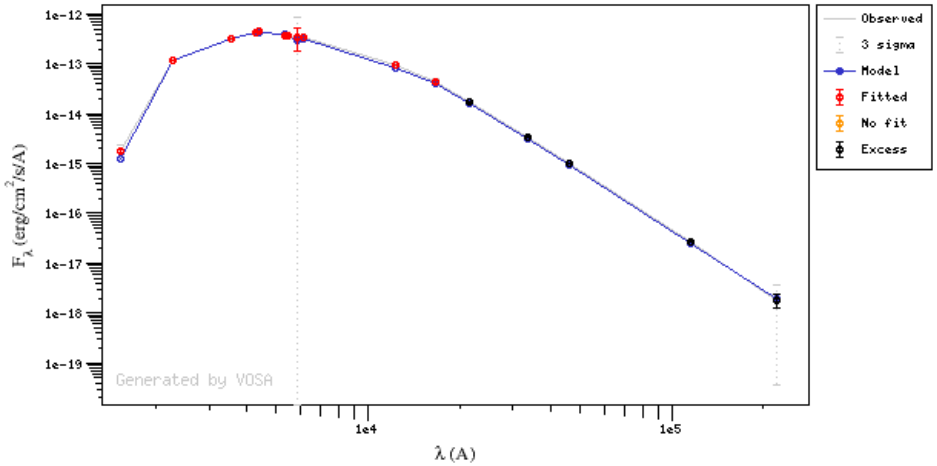


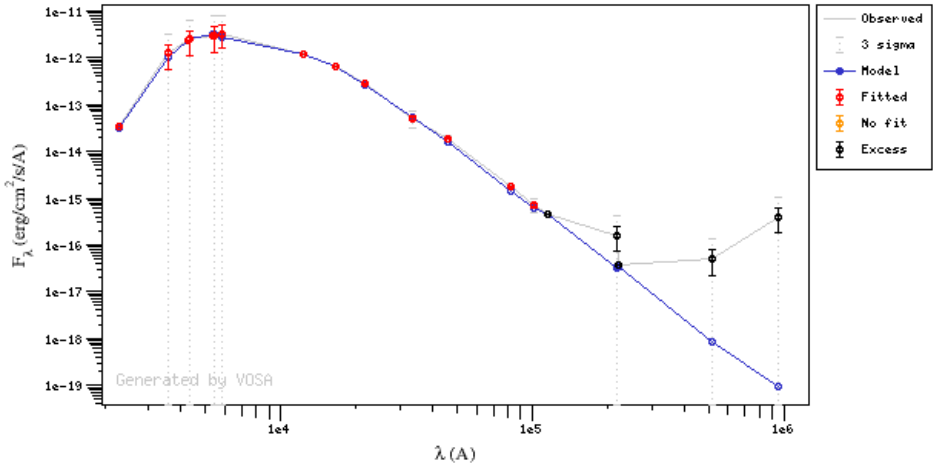
Reddening: Refinement

$$\frac{F_{obs} - F_{mod}}{\Delta F_{obs}} > 3$$

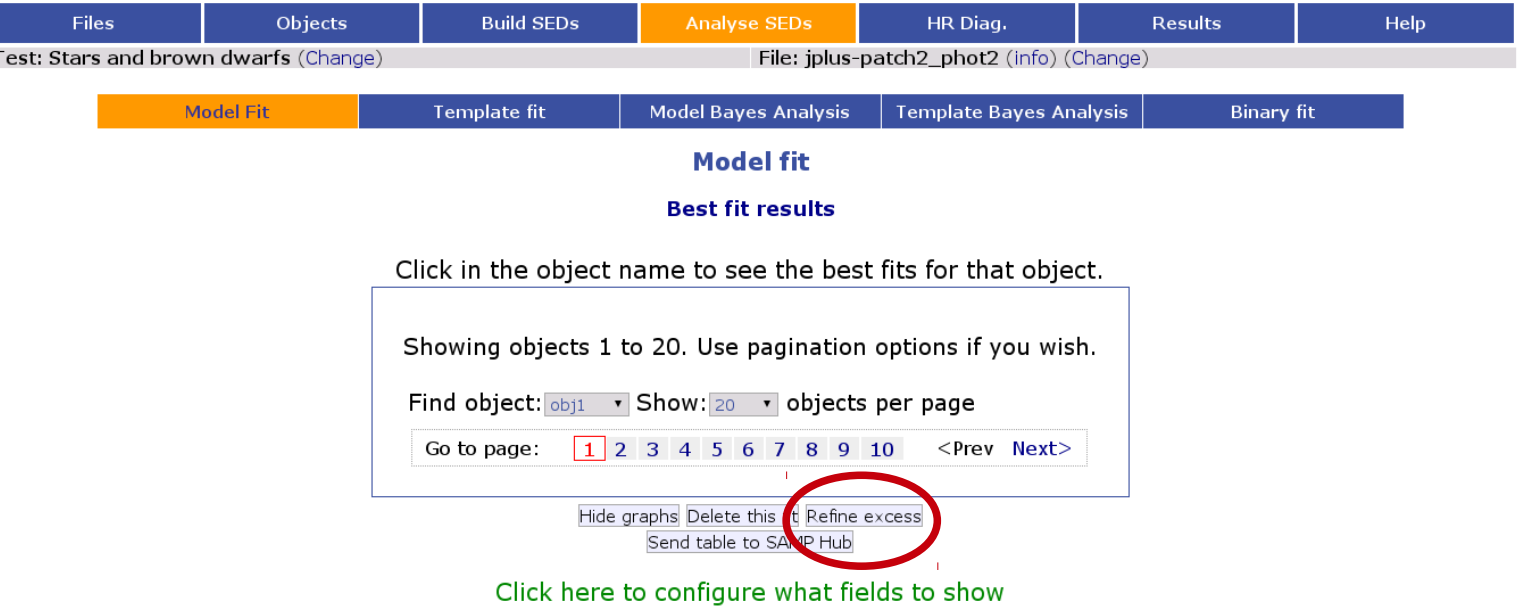
$$\frac{F_{obs} - F_{mod}}{F_{mod}} > 0.2$$







Reddening: Refinement



Object	RA	DEC	D (pc)	Model	A_V	T_{eff}	logg	Meta.	more	χ^2	M_d	F_{obs}/F_{tot}	L_{bol}/L_{sun}	$\Delta L_{bol}/L_{sun}$	N_{fit}/N_{tot}	Data VOtables
obj1	117.590198605	41.5662259062	10	BT-Settl CIFIST	---	2900	5.5	0	---	1.521e+1	1.029e-21	0.49	1.311e-5	1.353e-6	8/13	Syn.Spec.
obj10	120.626683896	38.1414616059	10	BT-Settl CIFIST	---	3100	5.5	0	---	2.217e+1	2.498e-22	0.53	4.082e-6	6.100e-7	9/13	Syn.Spec.

Model fit: Include upper limits

Files | Objects | Build SEDs | Analyse SEDs | HR Diag. | Results | Help

Test: Stars and brown dwarfs (Change) File: jplus-patch2_phot2 (info) (Change)

Model Fit | Template fit | Model Bayes Analysis | Template Bayes Analysis

Model fit

GRAMS (Grid of Red supergiant and Asymptotic giant ModelS) is a grid of radiative transfer (RT) models for dust shells around red supergiant (RSG) and asymptotic giant branch (AGB) stars. This is the model grid for Carbon-rich stars
Note that no IR excess is considered when fitting with these models.

GRAMS (Grid of Red supergiant and Asymptotic giant ModelS) is a grid of radiative transfer (RT) models for dust shells around red supergiant (RSG) and asymptotic giant branch (AGB) stars. This is the model grid for Oxygen-rich stars
Note that no IR excess is considered when fitting with these models.

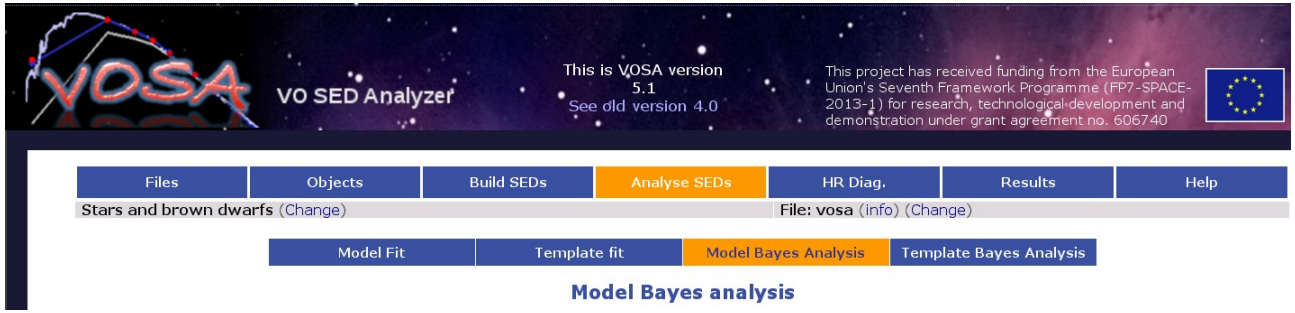
TLUSTY OSTAR2002+BSTAR2006
TLUSTY OSTAR2002+BSTAR2006 Grid, The merged files use the BSTAR2006 models for effective temperatures up to 30,000 K and the OSTAR2002 models for higher temperatures.

Options for this fit

- Include model spectrum in fit plots? *(The fit process will be slower, because getting the spectra from the VO can take some time)*
- Estimate fit parameter uncertainties using a statistical approach, performing a 100 iteration monte carlo simulation*(The fit process will be slower)*
- Use chi2 instead of the reduced chi2.
- Do not use upper limits in the fit.

$$\mathrm{Flx} = 0$$

$$\Delta\mathrm{Flx} = \mathrm{F}_{uplim}$$



- Then we assign a relative probability for each model as:

$$W_i = \exp(-\chi_i^2/2)$$

- Using this, the probability corresponding to a given parameter value α_j is given by:

$$P(\alpha_j) = \sum_i W_i$$

where the sum is performed over all the models with that value for that parameter.

- We finally normalize these probabilities, for each parameter, dividing by the total probability (the sum of the probilities obtained for each value).

$$P'(\alpha_j) = \frac{P(\alpha_j)}{\sum_i P(\alpha_i)}$$

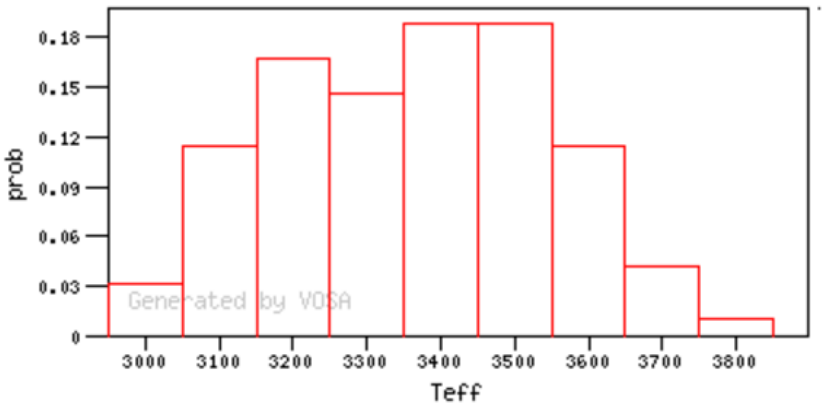
T_{eff}

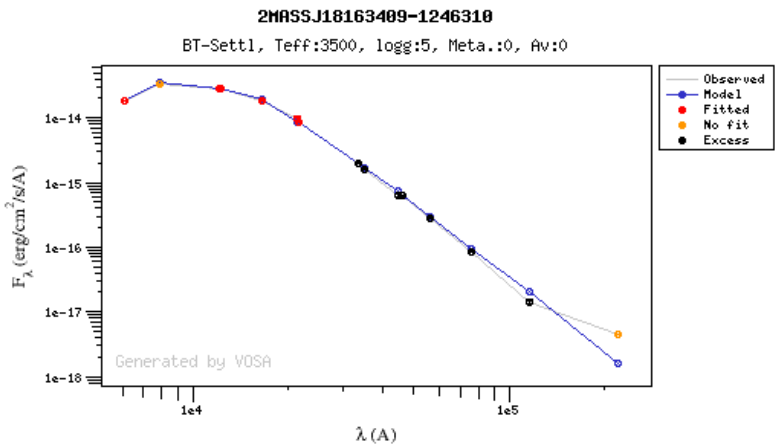
Statistics

Average	3363.54
Std. Dev (σ)	185.313
Mode	3400/3500
Median	3322.22
Skewness	0.0140213
Kurtosis	2.18994
μ2	34341
μ3	89229.3
μ4	2.58261e+9
Q1	3162.5
Q2	3322.22
Q3	3455.56
68%CL-Min	3108.5
68%CL--Max	3505.82
96%CL-Min	3000
96%CL-Max	3677
Norm_min	0.75
Norm_max	0.9

Value distribution

T_{eff}	ΔT_{eff}	min	max	prob
3000	50	2950	3050	0.03125
3100	50	3050	3150	0.114583
3200	50	3150	3250	0.166667
3300	50	3250	3350	0.145833
3400	50	3350	3450	0.1875
3500	50	3450	3550	0.1875
3600	50	3550	3650	0.114583
3700	50	3650	3750	0.0416667
3800	50	3750	3850	0.0104167





VOSA for galaxies

VOSA VO SED Analyzer

This is OLD VOSA version 4.0
See new version 5.0

Files	Coordinates	VO Phot.	SED	Model Fit	Bayes Analysis	Save Results	Log	Help	Logout

Galaxies (Change) File: RA:---, DEC:--- (info) (Change)

Model fit+

This option allows you to estimate some physical properties (such as effective temperature, surface gravity and luminosity) for each object comparing its SED with those derived from theoretical spectra obtained from VO services.

Take a look to the corresponding Help Section and Credits Page for more information.

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

Mark All Unmark All

Next: Select model params

- [x] **POPSTAR with Chabrier IMF**
  PopStar Evolutionary synthesis models. Using IMF from Chabrier (2003). This grid of Single Stellar Populations covers a wide range in both, age and metallicity. The models use the most recent evolutionary tracks together with the use of new NLTE atmosphere models.

- [x] **POPSTAR with Ferrini IMF**
  PopStar Evolutionary synthesis models. Using IMF from Ferrini, Penco, Palla (1990). This grid of Single Stellar Populations covers a wide range in both, age and metallicity. The models use the most recent evolutionary tracks together with the use of new NLTE atmosphere models.

- [x] **POPSTAR with Kroupa IMF**
  PopStar Evolutionary synthesis models. Using IMF from Kroupa (2002). This grid of Single Stellar Populations covers a wide range in both, age and metallicity. The models use the most recent evolutionary tracks together with the use of new NLTE atmosphere models.

- [x] **POPSTAR with Salpeter IMF (1)**
  PopStar Evolutionary synthesis models. Using IMF from Salpeter (1955) with m= (0.85-120)Msun. This grid of Single Stellar Populations covers a wide range in both, age and metallicity. The models use the most recent evolutionary tracks together with the use of new NLTE atmosphere models.

- [x] **POPSTAR with Salpeter IMF (2)**
  PopStar Evolutionary synthesis models. Using IMF from Salpeter (1955) with m= (0.15-100)Msun. This grid of Single Stellar Populations covers a wide range in both, age and metallicity. The models use the most recent evolutionary tracks together with the use of new NLTE atmosphere models.