

Programa:

1. Herramientas III: manejos de espectros (VOSPEC, SPLAT)
2. Herramientas IV: fotometría multirango y análisis más sofisticado (VOSED y VOSA)
3. Explicación del primer caso práctico

VOSED

- Combinar espectros y fotometría
- Cálculo de parámetros físicos
- Capacidad multi-objeto

The screenshot shows the SVO SED Builder & Fitting Tool search form. At the top, there is a blue header with the SVO logo, the text "Spanish Virtual Observatory", and logos for the Spanish Ministry of Education and Science and INTA. Below the header is a blue bar with the text "SED Builder & Fitting Tool: Search Form". The search form includes an "Object:" input field with a "Submit Query" button and a "Reset" link. Below this are "Examples: HD 142666, V* V1026 Sco, 18:27:45.79 +34:36:18.77". There is a "Search radius:" input field with the value "0.00138" and the text "(decimal degrees)". Below that is a "Redshift:" input field. A horizontal line separates the search form from the "Data Services:" section. Under "Data Services:", there is a link for "Spectroscopic Data" and a "Mark all" checkbox which is checked. Below this is a table of data services with checkboxes in the first column and URLs in the second column.

Service	URL
<input checked="" type="checkbox"/> Hubble Space Telescope Faint Object Spectrograph	http://archive.eso.org/bin/fos_ssap.pl?
<input checked="" type="checkbox"/> Hubble Space Telescope Spectra	http://archive.stsci.edu/ssap/search.php?id=HST&
<input checked="" type="checkbox"/> Hopkins Ultraviolet Telescope	http://archive.stsci.edu/ssap/search.php?id=HUT&
<input checked="" type="checkbox"/> Wisconsin Ultraviolet Photo-Polarimeter Experiment	http://archive.stsci.edu/ssap/search.php?id=WUPPE&
<input checked="" type="checkbox"/> Extreme Ultraviolet Explorer Merged Spectra	http://archive.stsci.edu/ssap/search.php?id=EUVE&
<input checked="" type="checkbox"/> Wisconsin Halfwave Spectropolarimeter	http://archive.stsci.edu/ssap/search.php?id=HPOL&
<input checked="" type="checkbox"/> HyperLeda FITS Archive Simple Spectrum Data Access(HFA SSA)	http://leda.univ-lyon1.fr/G.cgi?c=ssa&n=fassa&
<input checked="" type="checkbox"/> ELODIE archive	http://atlas.obs-hp.fr/elodie/E.cgi?a=t&c=ssa&n=ssa&



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SED Builder & Fitting Tool: Search Form

Object:

[Reset](#)

Examples: HD 142666, V* V1026 Sco, 18:27:45.79 +34:36:18.77

Search radius: (decimal degrees)

Redshift:

Data Services:

[Spectroscopic Data](#)

Mark all

<input checked="" type="checkbox"/>	Hubble Space Telescope Faint Object Spectrograph	http://archive.eso.org/bin/fos_ssap.pl?
<input checked="" type="checkbox"/>	Hubble Space Telescope Spectra	http://archive.stsci.edu/ssap/search.php?id=HST&
<input checked="" type="checkbox"/>	Hopkins Ultraviolet Telescope	http://archive.stsci.edu/ssap/search.php?id=HUT&
<input checked="" type="checkbox"/>	Wisconsin Ultraviolet Photo-Polarimeter Experiment	http://archive.stsci.edu/ssap/search.php?id=WUPPE&
<input checked="" type="checkbox"/>	Extreme Ultraviolet Explorer Merged Spectra	http://archive.stsci.edu/ssap/search.php?id=EUVE&
<input checked="" type="checkbox"/>	Wisconsin Halfwave Spectropolarimeter	http://archive.stsci.edu/ssap/search.php?id=HPOL&
<input checked="" type="checkbox"/>	HyperLeda FITS Archive Simple Spectrum Data Access(HFA SSA)	http://leda.univ-lyon1.fr/G.cgi?c=ssa&n=fassa&
<input checked="" type="checkbox"/>	ELODIE archive	http://atlas.obs-hp.fr/elodie/E.cgi?a=t&c=ssa&n=ssa&
<input checked="" type="checkbox"/>	VVDS-F02 DEEP spectra	http://obelix.lambrate.inaf.it/vodb/SSA?CAT=VVDS_F02_DEEP&
<input checked="" type="checkbox"/>	Photometry of Class 0 sources	http://www.laeff.inta.es/projects/svo/stars/class0/html/ssap.php
<input checked="" type="checkbox"/>	INES: The IUE Newly Extracted Spectra	http://sdc.laeff.inta.es/ines/jsp/ssap.jsp?
<input checked="" type="checkbox"/>	CENCOS-VVDS_DEEP SSA (VVDS Deep survey) (Service not working)	http://lamwww.oamp.fr/DAL/SSA/CENCOS-vvds_deep.do? (Ser
<input checked="" type="checkbox"/>	De Star Spectra SSAP	http://hubble.stsci.edu/ssi/high-res/DEEP-4-0-10

<input checked="" type="checkbox"/>	Epic Spectra SSAP of the SSC Interface for the 2XMMi Catalogue	http://xcatdb.u-strasbg.fr/2xmmi/ssa?collection=[EPIC(EpicObs
<input checked="" type="checkbox"/>	HiG - Simple Spectral Access to HI (21cm) Spectra of Galaxies	http://vo.obspm.fr/cgi-bin/siap/ssapHIGI.pl?
<input checked="" type="checkbox"/>	Galaxy Evolution Explorer	http://galex.stsci.edu/gxWS/SSAP/gxSSAP.aspx?
<input checked="" type="checkbox"/>	Far Ultraviolet Spectroscopic Explorer	http://archive.stsci.edu/ssap/search2.php?id=FUSE&

[Photometric Data](#)

Mark all

- 2XMMi
- Stromgren
- 2MASS (PSC)
- SDSS (DR6)
- Tycho2
- IRAS PSC
- IRAS FSC
- FIRST
- WENSS

[Fitting to theoretical data](#)

	Value	Error
T _{eff}	<input type="text"/> *	<input type="text"/>
log g	<input type="text"/>	<input type="text"/>
M/H	<input type="text"/>	<input type="text"/>
E(B-V)	<input type="text"/>	<input type="text"/>

* Compulsory field to perform theoretical model fitting.

Bayesian Inference.

User's Data:

- Epic Spectra SSAP of the SSC Interface for the 2XMMi Catalogue [http://xcatdb.u-strasbg.fr/2xmmi/ssa?collection=\[EPIC\(EpicObs](http://xcatdb.u-strasbg.fr/2xmmi/ssa?collection=[EPIC(EpicObs)
- HiG - Simple Spectral Access to HI (21cm) Spectra of Galaxies <http://vo.obspm.fr/cgi-bin/siap/ssapHIGI.pl?>
- Galaxy Evolution Explorer <http://galaxy.stsci.edu/uv/SSAP/uvSSAP.com?>
- Far Ultraviolet Spectroscopic Explorer

[Photometric Data](#)

Mark all

- 2XMMi
- Stromgren
- 2MASS (PSC)
- SDSS (DR6)
- Tycho2
- IRAS PSC
- IRAS FSC
- FIRST
- WENSS

[Fitting to theoretical data](#)

	Value	Error
T _{eff}	<input type="text"/>	<input type="text"/>
log g	<input type="text"/>	<input type="text"/>
M/H	<input type="text"/>	<input type="text"/>
E(B-V)	<input type="text"/>	<input type="text"/>

* Compulsory field to perform theoretical model fitting.

Bayesian Inference.

User's Data:

LAEFF VOSED - Upload file - Moz _ □ X

SVO <http://sdc.laeff.inta.es/vosed/jsp/upload.jsp> ☆

Spanish
Virtual Observatory

File Description:

File Type:

Wave Column Name:

Wave Unit:

Wave Dimeq:

Wave Scaleq:

Flux Column Name:

Flux Unit:

Flux Dimeq:

Terminado



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SED Builder & Fitting Tool: Results

Resolved Object		Equivalent Names			
Search Name	hd 141569	HD 141569	BD-03 3833	CCDM J15500-0355A	CSI-03 3833 1
SIMBAD Name	hd 141569	EM* CDS 887	GC 21274	GSC 05026-00042	HD 141569A
Type	pr*	HIC 77542	HIP 77542	IDS 15447-0337 A	IRAS 15473-0346
RA	237.49062	2MASS J15495775-0355162	PDS 398	PPM 198989	SAO 140789
DEC	-3.92121	SKY# 28618	TD1 18598	TYC 5026-42-1	uvby98 100141569 ABC
		YZ 93 5502	[DML87] 382		

Products found matching your criteria	
POS = 237.49062 , -3.921211 SIZE = 0.001389	
INES: The IUE Newly Extracted Spectra	9
Infrared Space Observatory Simple Spectrum Data Access	3
ESO Science Archive Spectrum Service	3
Far Ultraviolet Spectroscopic Explorer	1
Stromgren photometry	1
2MASS (PSC) photometry	1
Tycho2 photometry	1
IRAS PSC photometry	1

Stellar Physical Parameters				
	Calculated		Adopted	
	Value	Error	Value	Error
T_{eff} (IR)	8227	131	10206	
T_{eff} (Strömgen)	10206			
log g	4.07		4.070000	
M/H				
E(B-V)	0.0	0.0	0.0	0.0
Flags	021122			
Strömgen Dist. (pc)	168.2			
χ^2	0.059			

INES: The IUE Newly Extracted Spectra [^]

SSAP query: <http://sdc.laeff.inta.es/ines/jsp/ssap.jsp?POS=237.49062042,-3.92121111&SIZE=0.001388889>

Mark	Title	Image	Dispersion	Aperture	Object	RA	DEC
<input type="checkbox"/>	IUE/INES Spectrum: LWP12988RL, Target: HD 141569 A	12988	HIGH	LARGE	HD 141569 A	237.4904	-3.921
<input type="checkbox"/>	IUE/INES Spectrum: LWP12988HL, Target: HD 141569 A	12988	HIGH	LARGE	HD 141569 A	237.4904	-3.921
<input checked="" type="checkbox"/>	IUE/INES Spectrum: LWP20658RL, Target: HD 141569 A	20658	HIGH	LARGE	HD 141569 A	237.4903	-3.9207
<input type="checkbox"/>	IUE/INES Spectrum: LWP20658HL, Target: HD 141569 A	20658	HIGH	LARGE	HD 141569 A	237.4903	-3.9207
<input type="checkbox"/>	IUE/INES Spectrum: LWP30407RL, Target: HD 141569 A	30407	HIGH	LARGE	HD 141569 A	237.4904	-3.9218
<input type="checkbox"/>	IUE/INES Spectrum: LWP30407HL, Target: HD 141569 A	30407	HIGH	LARGE	HD 141569 A	237.4904	-3.9218
<input type="checkbox"/>	IUE/INES Spectrum: LWP30408LL, Target: HD 141569 A	30408	LOW	LARGE	HD 141569 A	237.4904	-3.9218
<input type="checkbox"/>	IUE/INES Spectrum: SWP33211LL, Target: HD 141569 A	33211	LOW	LARGE	HD 141569 A	237.4904	-3.921
<input checked="" type="checkbox"/>	IUE/INES Spectrum: SWP54330LL, Target: HD 141569 A	54330	LOW	LARGE	HD 141569 A	237.4904	-3.9218

Infrared Space Observatory Simple Spectrum Data Access [^]

SSAP query: <http://ida.esac.esa.int:8080/aio/jsp/siap.jsp?imageType=spectrum&POS=237.49062042,-3.92121111&SIZE=0.001388889>

Mark						
<input checked="" type="checkbox"/>	62701662	File	ISO PHT40 Spectrum Target: HD141569	1997-08-04 09:02:39.155	1997-08-04 09:06:35.155	237.490500000000
<input checked="" type="checkbox"/>	62701509	File	ISO LWS01 Spectrum Target: HD 141569	1997-08-04 08:01:27.155	1997-08-04 08:38:35.155	237.490005
<input checked="" type="checkbox"/>	62802937	File	ISO SWS01 Spectrum Target: HD 141569	1997-08-05 05:40:44.155	1997-08-05 06:12:36.155	237.48999

ESO Science Archive Spectrum Service [^]

SSAP query: <http://archive.eso.org/apps/ssaserver/EsoProxySsap?POS=237.49062042,-3.92121111&SIZE=0.001388889>

Mark	Error	AcRef	Format	Ra	Dec	NGAS_ID
<input type="checkbox"/>	Not supported units for Flux: 1e-16 erg/s/cm^2/A. Data not included in the SED	File	text/csv	237.490594	-3.92121	UV_SFLX_190941_2005-03-25T08:42:33.383_BLUE437BL_1X1

Far Ultraviolet Spectroscopic Explorer [^]

SSAP query: <http://archive.stsci.edu/ssap/search2.php?id=FUSE&POS=237.49062042,-3.92121111&SIZE=0.001388889>

Mark	ra_obs	dec_obs	url	object	format	cr_ident
<input checked="" type="checkbox"/>	237.4904	-3.92111	File	HD141569	fits	q319010100000nvo4ttagfcal

Stromgren [^]

Mark	distance (arcmin)	_RAJ2000	_DEJ2000	_r	LID	m_LID	Vmag	e_Vmag	b-y	e_b-y	m1
<input checked="" type="checkbox"/>	0.03924	237.490	-3.921	0.0009	0100141569	ABC	7.152	0.028	0.071	0.004	0.13

2MASS (PSC) [^]

Mark	distance (arcmin)	_RAJ2000	_DEJ2000	_r	Jmag	e_Jmag	Qflg	Hmag	e_Hmag	Kmag	e_Kr
<input checked="" type="checkbox"/>	0.00280	237.49065	-03.92117	0.000047	6.872	0.027	AAA	6.861	0.040	6.821	0.0

Tycho2 [^]

Mark	distance (arcmin)	_RAJ2000	_DEJ2000	_r	BTmag	e_BTmag	VTmag	e_VTmag	TYC1	TYC2
<input checked="" type="checkbox"/>	0.00020	237.490619	-3.921208	0.000064	7.228	0.015	7.129	0.010	5026	42

IRAS PSC [^]

Mark	distance (arcmin)	_RAJ2000	_DEJ2000	_r	Fnu_12	e_Fnu_12	q_Fnu_12	Fnu_25	e_Fnu_25	q_F
<input checked="" type="checkbox"/>	0.02518	237.4902	-3.9212	0.00039	5.49e-01	7	3	1.87e+00	7	

Display SED

Retrieve Marked Data

Compute Theoretical Model

Far Ultraviolet Spectroscopic Explorer [^]

SSAP query: <http://archive.stsci.edu/ssap/search2.php?id=FUSE&POS=237.49062042,-3.92121111&SIZE=0.001388889>

Mark	ra_obs	dec_obs	url	object	format	cr_ident
<input checked="" type="checkbox"/>	237.4904	-3.92111	File	HD141569	fits	q319010100000nvo4ttagfcal

Stromgren [^]

Mark	distance (arcmin)	_RAJ2000	_DEJ2000	_r	LID	m_LID	Vmag	e_Vmag	b-y	e_b-y	m
<input checked="" type="checkbox"/>	0.03924	237.490	-3.921	0.0009	0100141569	ABC	7.152	0.028	0.071	0.004	0.13

2MASS (PSC) [^]

Mark	distance (arcmin)	_RAJ2000	_DEJ2000	_r	Jmag	e_Jmag	Qflg	Hmag	e_Hmag	Kmag	e_Kr
<input checked="" type="checkbox"/>	0.00280	237.49065	-03.92117	0.000047	6.872	0.027	AAA	6.861	0.040	6.821	0.0

Tycho2 [^]

Mark	distance (arcmin)	_RAJ2000	_DEJ2000	_r	BTmag	e_BTmag	VTmag	e_VTmag	TYC1	TYC2
<input checked="" type="checkbox"/>	0.00020	237.490619	-3.921208	0.000064	7.228	0.015	7.129	0.010	5026	42

IRAS PSC [^]

Mark	distance (arcmin)	_RAJ2000	_DEJ2000	_r	Fnu_12	e_Fnu_12	q_Fnu_12	Fnu_25	e_Fnu_25	q_Fnu_25
<input checked="" type="checkbox"/>	0.02518	237.4902	-3.9212	0.000	5.49e-01	7	3	1.87e+00	7	

Far Ultraviolet Spectroscopy

SSAP query: <http://arc.hawaii.edu/ssap/>
SIZE=0.001388889

Mark	ra_obs
<input checked="" type="checkbox"/>	237.4904

Stromgren

Mark	distance (arcmin)
<input checked="" type="checkbox"/>	0.03924

2MASS (PSC)

Mark	distance (arcmin)
<input checked="" type="checkbox"/>	0.00280

Tycho2

Mark	distance (arcmin)
<input checked="" type="checkbox"/>	0.00020

IRAS PSC

Mark	distance (arcmin)
<input checked="" type="checkbox"/>	0.02518

Display SED Retrieve

Version 1.3

VOSpec

esa VO Virtual Observatory

File Edit View Operations Plastic SAMP Help

Wave Unit: Log:

Flux Unit:

RedShift:

De-reddening:

λ_V :

Graphic Mode: Points

Target: Ra: Dec: Size: Query

VOSpec Spectral Analysis Tool

Flux (erg/cm2/s/A, logarithmic)

Wavelength (micron; logarithmic)

Spectra List

- SVO-VOSED
- SED

(1,6165E-1, 1,819E-16)

1 finished

RETRIEVE Unmark All Reset

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SED Builder & Fitting Tool: Search Form

Object List:

hd 141569
hd 142666
hd 25204

Submit Query

[Reset](#)

Examples: HD 142666 V* V1026 Sco, 18:27:45.79 +34:36:18.77

Obj. List File:

/home/raul/objetos.txt

Examinar...

Search radius: 0.00138 (decimal degrees)

Data Services:

[Spectroscopic Data](#)

Mark all

<input checked="" type="checkbox"/>	Hubble Space Telescope Faint Object Spectrograph	http://archive.eso.org/bin/fos_ssap.pl?
<input checked="" type="checkbox"/>	Hubble Space Telescope Spectra	http://archive.stsci.edu/ssap/search.php?id=HST&

VOSA: VO SED analyzer

- ★ Expande el rango de longitud de onda
- ★ Ajuste automático de SEDs
- ★ Detecta exceso infra-rojo
- ★ Completa gríd de modelos para baja y alta masa
- ★ Métodos estadísticos más robustos:
 - ★ Minimización de χ^2
 - ★ Análisis de Bayes de los parámetros

Theoretical model services Documents Models Services

SVO Spanish Virtual Observatory

VOSA: VO Sed Analyzer
VO SED Analyzer


INTA
MINISTERIO DE CIENCIA E INNOVACIÓN

Services: VOSA Filters TSAP S3if My data LogOut


VOSA

VOSA allows to analyze both stellar and galactic data but, given that the physics involved is not the same, there are some important differences between both cases.

Please, select first what type of objects you want to work with in this session.



Stars and brown dwarfs



Galaxies

Warning!

This is the beta version (still under testing) of VOSA 2.0

If you have any comment or suggestion, please, let us now.

Take a look to the [Changelog](#) for a brief description of the new features.

The old version of VOSA will be available for a time.

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

makes use of VOSA:
please include the following in any published material that
acknowledging VOSA in publications:



VOSA: VO Sed Analyzer

VO SED Analyzer

Services: [VOSA](#) [Filters](#) [TSAP](#) [S3if](#)

[My data](#) [LogOut](#)

VOSA

Sessions	Files	Objects	VO Phot.	SED	Model Fit	Bayes Analysis	Template fit	HR Diag.	Save Results	Help	Logout
Stars and brown dwarfs (Change)											
Session: Collinder LOrI members tests (info) (Change)			File: LOri... tests (info) (Change)								

Upload your own data file (max size=500Kb)
 It must comply with the [required data format](#)
 (A small utility is available to help you to convert an original file in [ascii \(csv\)](#) or [votable](#) to VOSA input format)

Please, include a description for your file, it is **compulsory**

File to upload:

Description:

File type: Fluxes Magnitudes

Uploaded files

Date	Filename	Descrip
2010-04-28 23:38:59	fichero_input_final_all_errors_corrected.ascii	LOri... tests

LOri001

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

Filter:	SDSS_R	CFHT_R	CFHT_I	2MASS_J	2MASS_H	2MASS_Ks	IRAC_I1	IRAC_I2	IRAC_I3	IRAC_I4
λ_{med} :	6261	6582	8228	12350	16620	21590	35634	45110	57593	79594
Flux:	1.321348e-14	1.447193e-14	1.345174e-14	1.052144e-14	6.845070e-15	3.025102e-15	5.502778e-16	2.128458e-16	8.649135e-17	2.543987e-17
ΔF :	3.285918e-16	1.332914e-16	1.238951e-16	2.131932e-16	1.386999e-16	5.851066e-17	1.520474e-18	7.841528e-19	7.169533e-19	2.343098e-19

LOri002

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

Filter:	SDSS_R	CFHT_R	CFHT_I	2MASS_J	2MASS_H	2MASS_Ks	IRAC_I1	IRAC_I2	IRAC_I3	IRAC_I4
λ_{med} :	6261	6582	8228	12350	16620	21590	35634	45110	57593	79594
Flux:	8.754217e-15	1.170918e-14	1.204422e-14	1.119116e-14	8.745365e-15	4.129904e-15	7.207456e-16	2.589793e-16	1.123499e-16	3.434906e-17
ΔF :	2.015733e-16	1.078455e-16	1.109313e-16	2.473785e-16	1.852599e-16	7.227187e-17	1.991494e-18	7.155862e-19	9.313027e-19	2.530932e-19

LOri003

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



VOSA: VO Sed Analyzer

VO SED Analyzer

Services: **VOSA** Filters TSAP S3if

My data LogOut

VOSA

Sessions	Files	Objects	VO Phot.	SED	Model Fit	Bayes Analysis	Template fit	HR Diag.	Save Results	Help	Logout
Stars and brown dwarfs (Change)			Session: Collinder LOrI members tests (info) (Change)					File: LOrI... tests (info) (Change)			

Coordinates Distances Extinction

Object coordinates

This option allows you to query Sesame VO service to search for object coordinates using the object name.

Take a look to the corresponding [Help Section](#) and [Credits Page](#) for more information.

Search for Obj. Coordinates

Object	Final		User Data		Sesame	
	RA (deg)	DEC (deg)	RA (deg)	DEC (deg)	RA (deg)	DEC (deg)
LOrI001	83.446583	9.9273611	??	??	??	??
LOrI002	84.043167	10.148583	??	??	??	??
LOrI003	83.981000	9.9420833	??	??	??	??
LOrI004	83.948125	9.7640278	??	??	??	??
LOrI005	83.473542	9.7188889	??	??	??	??
LOrI006	83.817750	9.9216111	??	??	??	??
LOrI007	83.623125	9.8163056	??	??	??	??
LOrI008	83.991542	9.9091111	??	??	??	??
LOrI009	83.693083	10.109889	??	??	??	??
LOrI010	83.637333	10.144750	??	??	??	??
LOrI011	83.686083	9.8993056	??	??	??	??
LOrI012	83.774792	9.8688333	??	??	??	??
LOrI013	83.484792	9.8990833	??	??	??	??
LOrI014	84.079292	10.064111	??	??	??	??
LOrI015	83.591000	10.070694	??	??	??	??
LOrI016	83.806250	9.9234722	??	??	??	??
LOrI017	84.085375	9.8720278	??	??	??	??
LOrI018	84.069125	9.8468889	??	??	??	??
LOrI019	83.807042	9.9413333	??	??	??	??
LOrI020	83.739875	9.7687500	??	??	??	??
LOrI021	83.778917	9.8160556	??	??	??	??



VOSA: VO Sed Analyzer

VO SED Analyzer

VOSA

Sessions	Files	Objects	VO Phot.	SED	Model Fit	Bayes Analysis	Template fit	HR Diag.	Save Results	Help	Logout
----------	-------	---------	-----------------	-----	-----------	----------------	--------------	----------	--------------	------	--------

Stars and brown dwarfs (Change)

Session: Collinder LOrI members tests (info) (Change)

File: LOrI... tests (info) (Change)

VO photometry

This option allows you to increase the wavelength coverage of the SEDs of your objects adding photometry from VO catalogues.
 Take a look to the corresponding [Help Section](#) and [Credits Page](#) for more information.

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.](#)
 Filters: 2MASS_J 2MASS_H 2MASS_Ks
 Search radius: arcsec
[Show magnitude limits](#)
- 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.](#)
 Filters: TYCHO_B TYCHO_V
 Search radius: arcsec
[Show magnitude limits](#)
- CMC-14**
 The full CMC-14 catalog (around 95.85million source in the region -30 to +50°).. [More Info.](#)
 Filters: SDSS_R
 Search radius: arcsec
[Show magnitude limits](#)
- 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.](#)



VOSA: VO Sed Analyzer

VO SED Analyzer

Services: VOSA Filters TSAP S3if

My data Logout

VOSA

Sessions	Files	Objects	VO Phot.	SED	Model Fit	Bayes Analysis	Template fit	HR Diag.	Save Results	Help	Logout
Stars and brown dwarfs (Change)			Session: Collinder LOrI members tests (info) (Change)				File: LOrI... tests (info) (Change)				

Object data

- LOrI001
- LOrI002
- LOrI003
- LOrI004
- LOrI005
- LOrI006
- LOrI007
- LOrI008
- LOrI009
- LOrI010
- LOrI011
- LOrI012
- LOrI013
- LOrI014
- LOrI015
- LOrI016
- LOrI017
- LOrI018
- LOrI019
- LOrI020
- LOrI021
- LOrI022
- LOrI023
- LOrI024
- LOrI025
- LOrI026
- LOrI027
- LOrI028

LOrI029

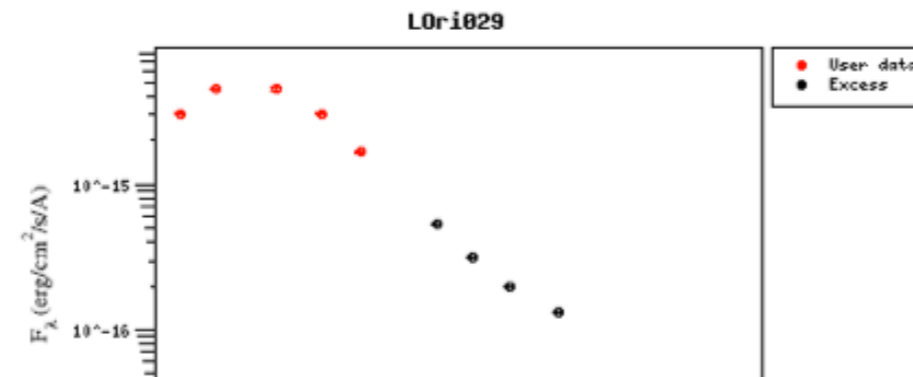
Position: (83.855667,10.144083) Distance: 400. pc A_v : 0.36209598

Data for this object:

Filter	λ_{med}	Final		User		VO		
		Flux	ΔF	Flux	ΔF	Flux	ΔF	
CFHT_R	6582	3.079827e-15	2.836626e-17	3.079827e-15	2.836626e-17	---	---	Delete
CFHT_I	8228	4.579084e-15	4.217492e-17	4.579084e-15	4.217492e-17	---	---	Delete
2MASS_J	12350	4.538110e-15	1.086736e-16	4.538110e-15	1.086736e-16	---	---	Delete
2MASS_H	16620	3.085872e-15	7.673922e-17	3.085872e-15	7.673922e-17	---	---	Delete
2MASS_Ks	21590	1.670090e-15	2.922599e-17	1.670090e-15	2.922599e-17	---	---	Delete
IRAC_I1	35634	5.347884e-16	1.477675e-18	5.347884e-16	1.477675e-18	---	---	Delete
IRAC_I2	45110	3.148220e-16	8.698853e-19	3.148220e-16	8.698853e-19	---	---	Delete
IRAC_I3	57593	1.968669e-16	1.087927e-18	1.968669e-16	1.087927e-18	---	---	Delete
IRAC_I4	79594	1.322863e-16	3.655205e-19	1.322863e-16	3.655205e-19	---	---	Delete
MIPS_M1	238442	2.027081e-17	1.306907e-19	2.027081e-17	1.306907e-19	---	---	Delete

Excess detected from **IRAC_I1**. Points with larger wavelength will not be considered in model fit. You can manually specify where excess starts.

Apply excess from



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VOSA

Files	Objects	VO Phot.	SED	Model Fit	Bayes Analysis	Template fit	HR Diag.	Save Results	Help
own dwarfs (Change)				Session: Collinder LOrI members tests (info) (Change)				File: LOrI... tests (info) (Change)	

Model fit

Best fit results

[Hide graphs](#) [Delete this fit](#)

Object	RA	DEC	D (pc)	Model	T _{eff}	logg	Meta.	more	χ ²	M _d	F _{tot}	ΔF _{tot}	F _{obs} /F _{tot}	L _{bol} /L _{sun}	ΔL _{bol} /L _{sun}	λ _{max}	N _{fit} /N _{tot}	Data
LOrI001	83.446583	9.9273611	400.000	COND00	4000	2.5	0.0	---	8.03e+1	1.30e-20	1.84e-10	1.26e-12	0.49	9.19e-1	6.26e-3	79594	9/9	Syn.S
LOrI002	84.043167	10.148583	400.000	Kurucz	3750	0.00	-1.50	---	6.46e+1	1.80e-20	1.96e-10	1.42e-12	0.49	9.77e-1	7.07e-3	79594	9/9	Syn.S
LOrI003	83.981000	9.9420833	400.000	Kurucz	4000	0.00	0.20	---	1.04e+1	1.09e-20	1.59e-10	1.11e-12	0.46	7.92e-1	5.56e-3	21590	5/9	Syn.S
LOrI004	83.948125	9.7640278	400.000	NextGen	3900	5.0	0.0	---	1.98e+1	1.17e-20	1.55e-10	1.07e-12	0.45	7.71e-1	5.32e-3	21590	5/9	Syn.S
LOrI005	83.473542	9.7188889	400.000	COND00	3900	2.5	0.0	---	9.39e+1	1.34e-20	1.73e-10	1.22e-12	0.49	8.61e-1	6.09e-3	79594	9/9	Syn.S
LOrI006	83.817750	9.9216111	400.000	Kurucz	4000	0.50	0.50	---	5.29e+0	9.78e-21	1.42e-10	1.07e-12	0.46	7.07e-1	5.32e-3	21590	5/9	Syn.S
LOrI007	83.623125	9.8163056	400.000	NextGen	4000	5.5	0.0	---	2.50e+0	8.76e-21	1.27e-10	9.46e-13	0.45	6.33e-1	4.72e-3	21590	5/9	Syn.S
LOrI008	83.991542	9.9091111	400.000	Kurucz	4000	0.50	-2.50	---	4.63e+1	1.00e-20	1.43e-10	1.10e-12	0.49	7.13e-1	5.49e-3	79594	9/9	Syn.S
LOrI009	83.693083	10.109889	400.000	NextGen	4000	3.5	0.0	---	1.32e+1	8.29e-21	1.18e-10	8.44e-13	0.48	5.90e-1	4.21e-3	79594	9/9	Syn.S
LOrI010	83.637333	10.144750	400.000	NextGen	4200	5.0	0.0	---	4.25e+1	6.54e-21	1.14e-10	8.37e-13	0.48	5.67e-1	4.17e-3	79594	9/9	Syn.S
LOrI011	83.686083	9.8993056	400.000	Kurucz	3750	0.00	-0.50	---	1.62e+1	1.20e-20	1.33e-10	1.04e-12	0.49	6.62e-1	5.19e-3	79594	9/9	Syn.S
LOrI012	83.774792	9.8688333	400.000	Kurucz	4000	2.50	0.50	---	6.91e+1	8.76e-21	1.23e-10	8.96e-13	0.47	6.12e-1	4.47e-3	79594	9/9	Syn.S
LOrI013	83.484792	9.8990833	400.000	NextGen	3900	4.5	0.0	---	2.10e+1	8.85e-21	1.18e-10	8.37e-13	0.45	5.86e-1	4.17e-3	21590	5/9	Syn.S
LOrI014	84.079292	10.064111	400.000	Kurucz	3750	4.00	-2.00	---	8.59e-1	9.25e-21	1.04e-10	7.53e-13	0.46	5.17e-1	3.75e-3	21590	5/9	Syn.S
LOrI015	83.591000	10.070694	400.000	Kurucz	4000	2.50	0.00	---	2.29e+1	7.61e-21	1.10e-10	7.93e-13	0.49	5.50e-1	3.95e-3	79594	9/9	Syn.S
LOrI016	83.806250	9.9234722	400.000	Kurucz	3500	2.50	-2.50	---	6.85e+0	1.12e-20	9.51e-11	7.21e-13	0.46	4.74e-1	3.60e-3	21590	5/9	Syn.S
LOrI017	84.085375	9.8720278	400.000	NextGen	4200	5.0	0.0	---	8.44e+0	5.13e-21	8.91e-11	6.13e-13	0.48	4.44e-1	3.06e-3	79594	9/9	Syn.S
LOrI018	84.069125	9.8468889	400.000	Kurucz	3500	2.00	-2.50	---	1.67e+1	1.04e-20	8.88e-11	6.49e-13	0.47	4.43e-1	3.24e-3	21590	5/9	Syn.S
LOrI019	83.807042	9.9413333	400.000	COND00	3900	2.5	0.0	---	1.49e+1	6.57e-21	8.64e-11	6.54e-13	0.46	4.31e-1	3.26e-3	21590	5/9	Syn.S
LOrI020	83.739875	9.7687500	400.000	NextGen	3600	5.0	0.0	---	1.34e+1	9.52e-21	9.16e-11	7.59e-13	0.44	4.57e-1	3.79e-3	21590	5/9	Syn.S
LOrI021	83.778917	9.8160556	400.000	Kurucz	3750	2.50	-2.50	---	1.92e+1	6.86e-21	7.69e-11	5.95e-13	0.50	3.83e-1	2.97e-3	79594	9/9	Syn.S
LOrI022	83.963958	9.9196667	400.000	NextGen	3800	5.0	0.0	---	2.89e+1	7.05e-21	8.31e-11	5.78e-13	0.48	4.15e-1	2.88e-3	57593	8/9	Syn.S
LOrI023	83.990208	9.7929444	400.000	NextGen	3900	5.0	0.0	---	2.63e+1	6.10e-21	7.86e-11	5.84e-13	0.48	3.92e-1	2.91e-3	79594	9/9	Syn.S
LOrI024	83.737958	9.9100278	400.000	COND00	3900	2.5	0.0	---	2.00e+1	5.86e-21	7.69e-11	6.48e-13	0.46	3.84e-1	3.23e-3	21590	5/9	Syn.S
LOrI025	84.084083	9.7338889	400.000	Kurucz	3500	1.50	-2.50	---	1.57e+1	9.26e-21	7.81e-11	9.72e-13	0.46	3.89e-1	4.85e-3	21590	5/9	Syn.S

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VOSA

Files	Objects	VO Phot.	SED	Model Fit	Bayes Analysis	Template fit	HR Diag.	Save Results	Help	
own dwarfs (Change)	Session: Collinder LOrI members tests (info) (Change)						File: LOrI... tests (info) (Change)			

Model fit

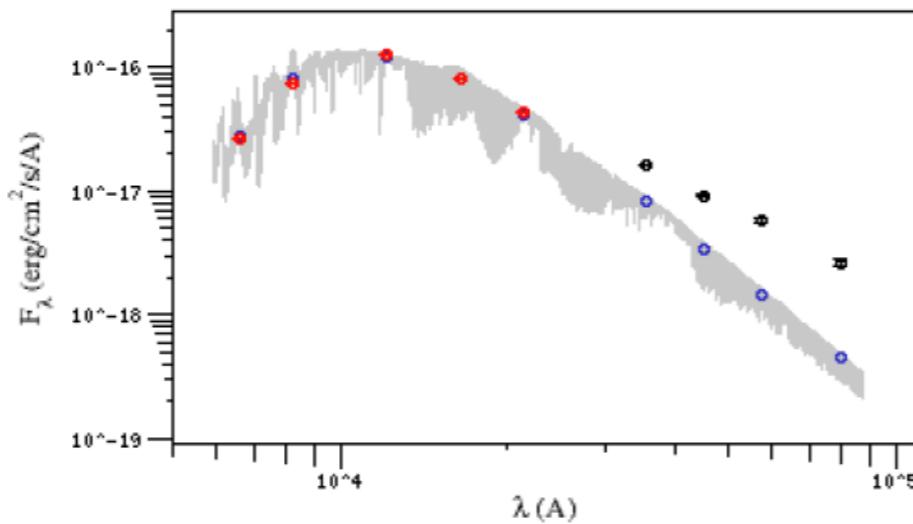
Best fit results

[Hide graphs](#) [Delete this fit](#)

Object	RA	DEC	D (pc)	Model	T _{eff}	logg	Meta.	more	χ ²	M _d	F _{tot}	ΔF _{tot}	F _{obs} /F _{tot}	L _{bol} /L _{sun}	ΔL _{bol} /L _{sun}	λ _{max}	N _{fit} /N _{tot}	Data
LOrI001	83.446583	9.9273611	400.000	COND00	4000	2.5	0.0	---	8.03e+1	1.30e-20	1.84e-10	1.26e-12	0.49	9.19e-1	6.26e-3	79594	9/9	Syn.S
LOrI002	84.043167	10.148583	400.000	Kurucz	3750	0.00	-1.50	---	6.46e+1	1.80e-20	1.96e-10	1.42e-12	0.49	9.77e-1	7.07e-3	79594	9/9	Syn.S
LOrI003	83.981000	9.9420833	400.000	Kurucz	4000	0.00	0.20	---	1.04e+1	1.09e-20	1.59e-10	1.11e-12	0.46	7.92e-1	5.56e-3	21590	5/9	Syn.S
LOrI004	83.944405	9.7640078	400.000	COND00	3800	5.0	0.0	---	4.00e+1	4.47e-20	4.55e-10	4.07e-12	0.45	7.74e-1	5.00e-3	21590	5/9	Syn.S
LOrI005	83.4																	Syn.S
LOrI006	83.8																	Syn.S
LOrI007	83.6																	Syn.S
LOrI008	83.9																	Syn.S
LOrI009	83.6																	Syn.S
LOrI010	83.6																	Syn.S
LOrI011	83.6																	Syn.S
LOrI012	83.7																	Syn.S
LOrI013	83.4																	Syn.S
LOrI014	84.0																	Syn.S
LOrI015	83.5																	Syn.S
LOrI016	83.8																	Syn.S
LOrI017	84.0																	Syn.S
LOrI018	84.0																	Syn.S
LOrI019	83.8																	Syn.S
LOrI020	83.7																	Syn.S
LOrI021	83.7																	Syn.S
LOrI022	83.963958	9.9196667	400.000	NextGen	3800	5.0	0.0	---	2.89e+1	7.05e-21	8.31e-11	5.78e-13	0.48	4.15e-1	2.88e-3	57593	8/9	Syn.S
LOrI023	83.990208	9.7929444	400.000	NextGen	3900	5.0	0.0	---	2.63e+1	6.10e-21	7.86e-11	5.84e-13	0.48	3.92e-1	2.91e-3	79594	9/9	Syn.S
LOrI024	83.737958	9.9100278	400.000	COND00	3900	2.5	0.0	---	2.00e+1	5.86e-21	7.69e-11	6.48e-13	0.46	3.84e-1	3.23e-3	21590	5/9	Syn.S
LOrI025	84.084083	9.7338889	400.000	Kurucz	3500	1.50	-2.50	---	1.57e+1	9.26e-21	7.81e-11	9.72e-13	0.46	3.89e-1	4.85e-3	21590	5/9	Syn.S

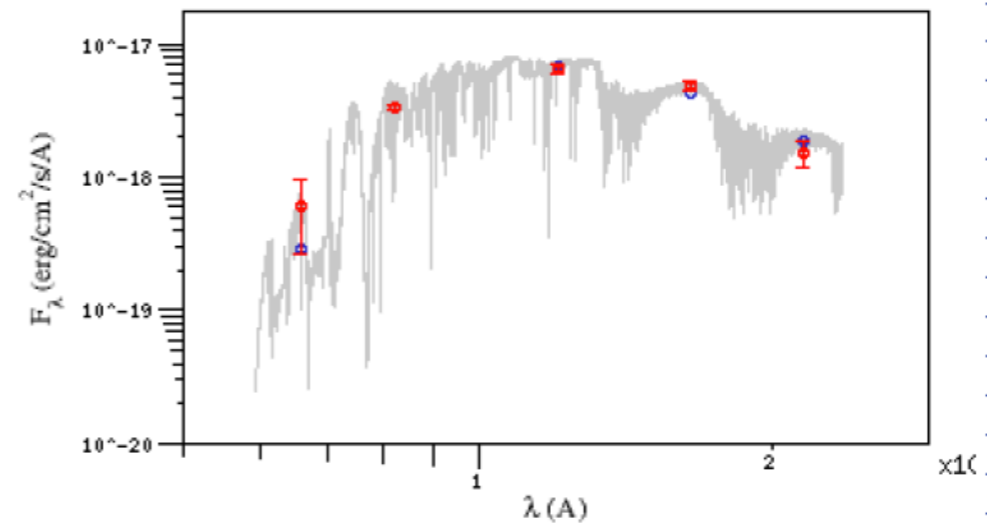
LOrI139

Model:NextGen, Teff:3100, logg:4.0, Meta.:0.0



LOrI168

Model:DUSTY00, Teff:2500, logg:6.0, Meta.:0.0



VOSA

Sessions	Files	Objects	VO Phot.	SED	Model Fit	Bayes Analysis	Template fit	HR Diag.	Save Results	Help	Logout
Stars and brown dwarfs (Change)			Session: Collinder L Ori members tests (info) (Change)				File: L Ori... tests (info) (Change)				

Model Bayes analysis

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 and using a Bayesian analysis to estimate the probability for each parameter value.

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 analysis

- The NextGen Model Atmosphere grid.**
*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*
- The DUSTY00 Model Atmosphere grid.**
*The DUSTY00 Model Atmosphere grid.
Allard et al. 2001, ApJ, 556, 357*
- The COND00 Model Atmosphere grid.**
*The COND00 Model Atmosphere grid.
Chabrier et al. 2000, ApJ, 542,464*
- Kurucz ATLAS9, ODFNEW /NOVER models**
*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)*
- Husfeld et al models for non-LTE Helium-rich stars**
*Husfeld et al models for non-LTE Helium-rich stars
Husfeld, D.; Butler, K.; Heber, U.; Drilling, J. S., 1989 A&A 222, 150*
- 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.
Lanz, T., Hubeny, I. 2003, ApJS, 146, 417
Lanz, T., Hubeny, I. 2007, ApJS, 169, 83*

VOSA

Sessions	Files	Objects	VO Phot.	SED	Model Fit	Bayes Analysis	Template fit	HR Diag.	Save Results	Help	Logout
Stars and brown dwarfs (Change)			Session: Collinder LOrI members tests (info) (Change)				File: LOrI... tests (info) (Change)				

Model Bayes analysis

The analysis process can take up to some minutes

The waiting time will depend on how many data you want to analyze, how many models you are using and if you have chosen to use a wide range of parameters or not.

Right now we are querying the model servers and performing the analysis.

Please, be patient.



Getting data for LOrI001. . . .
Getting data for LOrI002. . . .
Getting data for LOrI003. . . .
Getting data for LOrI004. . . .
Getting data for LOrI005. . . .
Getting data for LOrI006. . . .
Getting data for LOrI007. . . .
Getting data for LOrI008. . . .
Getting data for LOrI009. . . .
Getting data for LOrI010. . . .
Getting data for LOrI011. . . .
Getting data for LOrI012. . . .
Getting data for LOrI013. . . .
Getting data for LOrI014. . . .
Getting data for LOrI015. . . .



VOSA: VO Sed Analyzer

VO SED Analyzer



Services: [VOSA](#) [Filters](#) [TSAP](#) [S3if](#)

[My data](#) [LogOut](#)

VOSA

Sessions	Files	Objects	VO Phot.	SED	Model Fit	Bayes Analysis	Template fit	HR Diag.	Save Results	Help	Logout
Stars and brown dwarfs (Change)			Session: Collinder LOrI members tests (info) (Change)				File: LOrI... tests (info) (Change)				

Model Bayes analysis

- Bestfit
- L Ori001**
- L Ori002
- L Ori003
- L Ori004
- L Ori005
- L Ori006
- L Ori007
- L Ori008
- L Ori009
- L Ori010
- L Ori011
- L Ori012
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- L Ori014
- L Ori015
- L Ori016
- L Ori017
- L Ori018
- L Ori019
- L Ori020
- L Ori021
- L Ori022
- L Ori023
- L Ori024
- L Ori025
- L Ori026
- L Ori027

L Ori001

Here you can see, for each model, the relative probability found for each parameter. Only those with a probability higher than 1e-5 are shown.

The NextGen Model Atmosphere grid.

Meta.	Probability	logg	Probability	T _{eff}	Probability
0.0	1.000000	5.0	0.999242	4000	1.000000
		5.5	0.000756		

The DUSTY00 Model Atmosphere grid.

logg	Probability	T _{eff}	Probability
5.0	0.965784	3900	1.000000
5.5	0.034216		

The COND00 Model Atmosphere grid.

logg	Probability	T _{eff}	Probability
2.5	0.891237	4000	1.000000
3.0	0.108763		

Kurucz ATLAS9, ODFNEW /NOVER models

Meta.	Probability	logg	Probability	T _{eff}	Probability
-2.50	0.233853	0.50	0.000167	4000	1.000000
-2.00	0.657809	1.00	0.016678		
-1.50	0.103494	1.50	0.285839		
-1.00	0.004745	2.00	0.655479		
-0.50	0.000099	2.50	0.041791		
		3.00	0.000046		

Meta.

NextGen

Proyectos:

1. The Pleiades open cluster: <http://www.euro-vo.org/fc/workflows/Pleiades.html>
2. Collinder 69: characteristics of the latest census
3. Discovery of Brown Dwarfs mining the 2MASS and SDSS databases: <http://www.euro-vo.org/fc/workflows/BDs.html>
4. Searching for Data available for the bright galaxy M51: <http://www.euro-vo.org/fc/workflows/M51.html>
5. Search for ULX sources and X-ray binaries in nearby galaxies: <http://www.euro-vo.org/fc/workflows/ULX.html>
6. Confirmation of a Supernova candidate: <http://www.euro-vo.org/fc/workflows/SN.html>
7. The nature of a cluster of X-ray sources near the Chamaeleon star-forming region: <http://www.euro-vo.org/fc/workflows/Chamaeleon.html>

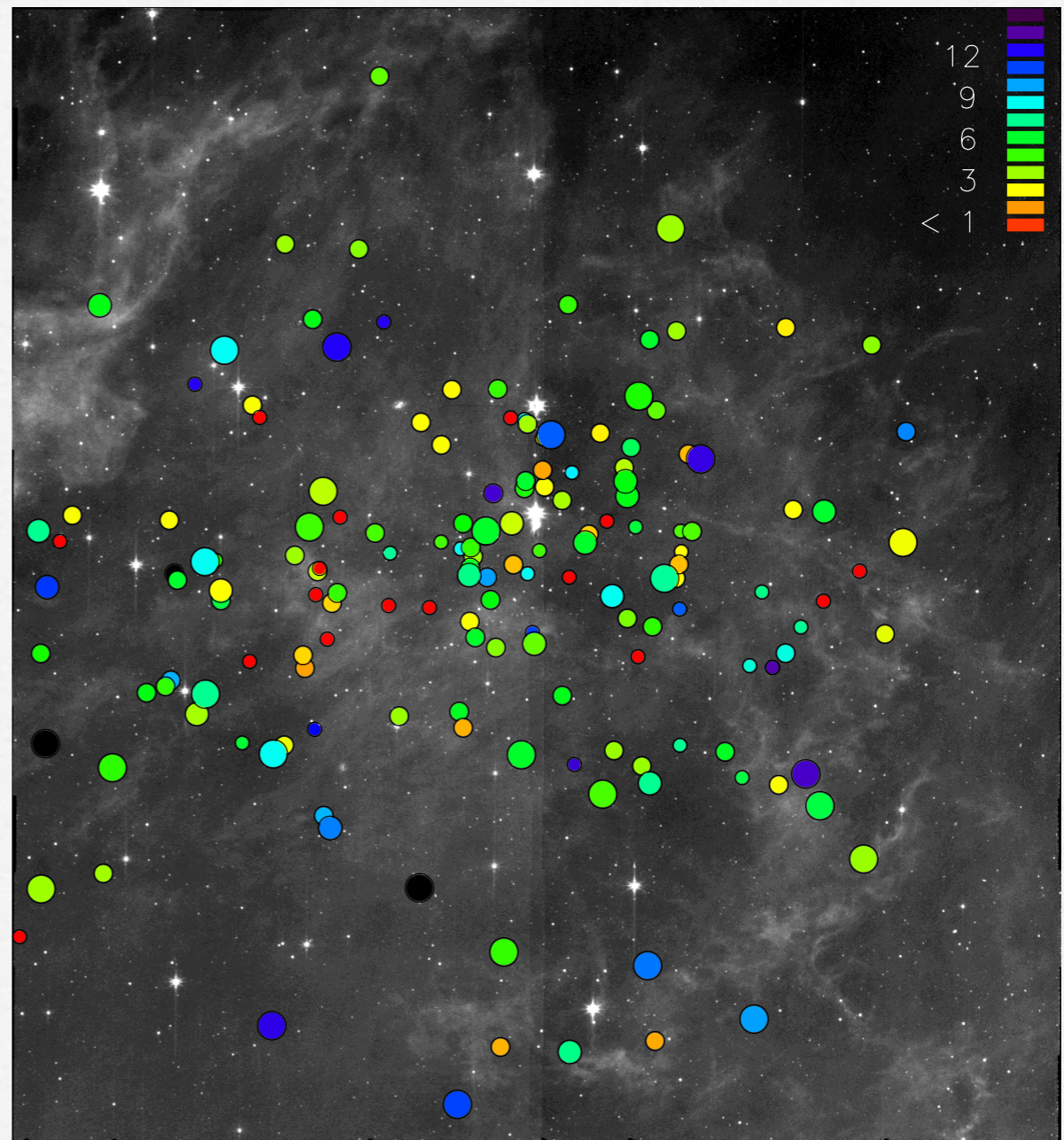
1. The Pleiades open cluster: <http://www.euro-vo.org/fc/workflows/Pleiades.html>

- ✓ Load a POSSII J image 6.5 x 6.5 degrees
- ✓ Retrieve Hipparcos, Tycho (I/239) with 5 degree rad.
- ✓ Get the catalogs in TOPCAT
- ✓ Histogram with the parallaxes
- ✓ Create a dereddened color (new synthetic column, $E(B-V) \sim 0.04$)
- ✓ Color-magnitude diagram (CMD: $(B-V)_0$ vs V)
- ✓ ppm diagram, see the resemblance in clustering?



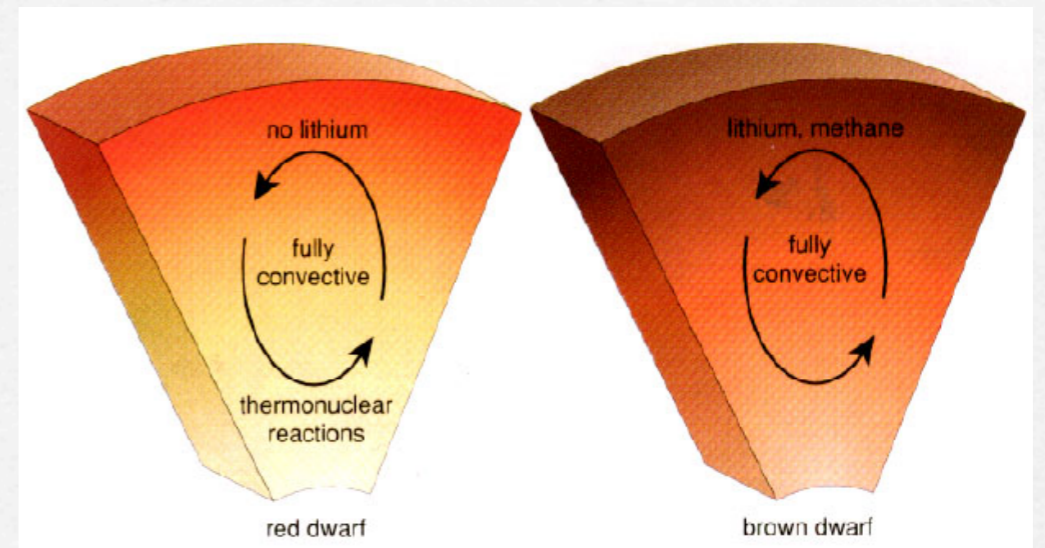
2. Collinder 69: characteristics of the latest census

- ✓ With starting point of Barrado et al (2007) and Bayo et al (2011) (TOPCAT)
- ✓ Build the SEDs of the confirmed members
- ✓ Obtain the estimation of the fundamental parameters (including age and mass)
- ✓ Look for mass segregation, general age of the cluster,...



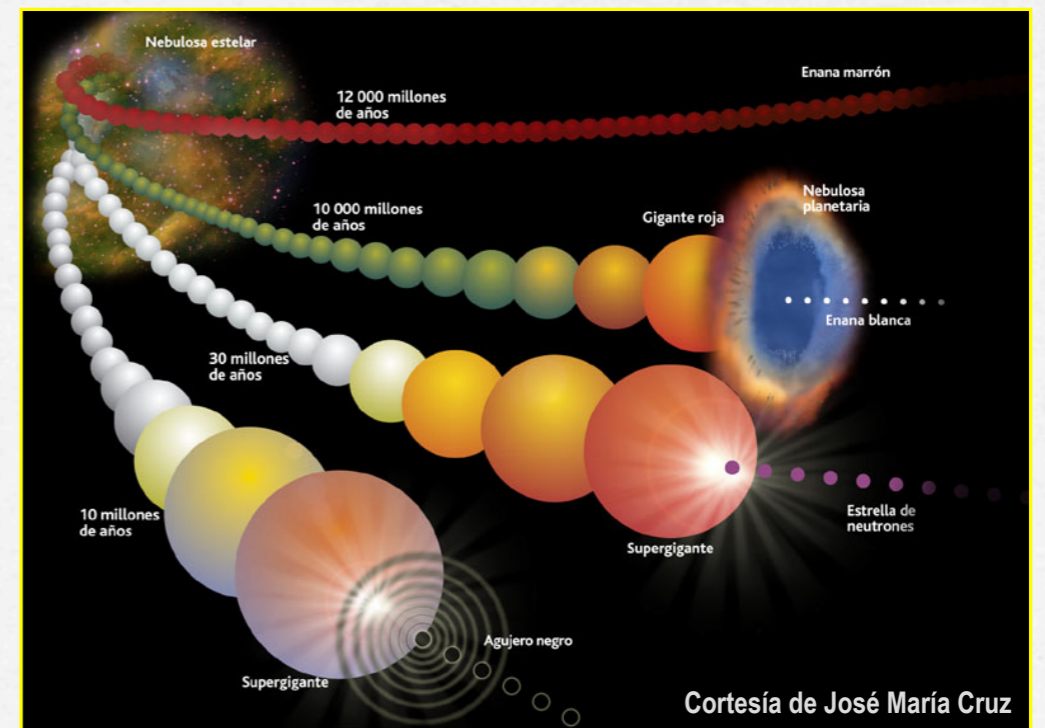
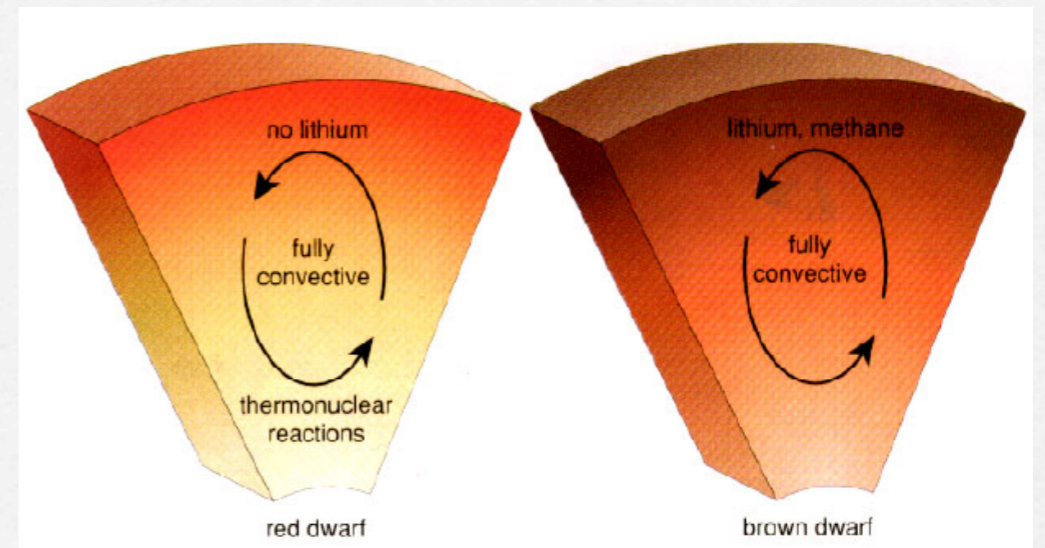
3. Discovery of Brown Dwarfs mining the 2MASS and SDSS databases: <http://www.euro-vo.org/fc/workflows/BDs.html>

- ✓ Perfect example for scripting in Aladin or TOPCAT
- ✓ Get 2MASS and SDSS (latest release) data within 14' around 08:30:00+01:30:00
- ✓ X-match (4" radius) and filter "stars" in SDSS (class 6)
- ✓ Looking for red sources -> filter to keep only non detections in u,g ($u_{\text{mag}} > 22.0$ & $g_{\text{mag}} > 22.2$)
- ✓ Impose IR colors of T dwarfs: $(J-K) < 0.3$ & $(H-K) < 0.3$
- ✓ Are there candidates? build their SEDs!



3. Discovery of Brown Dwarfs mining the 2MASS and SDSS databases: <http://www.euro-vo.org/fc/workflows/BDs.html>

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- ✓ Impose IR colors of T dwarfs: $(J-K) < 0.3$ & $(H-K) < 0.3$
- ✓ Are there candidates? build their SEDs!



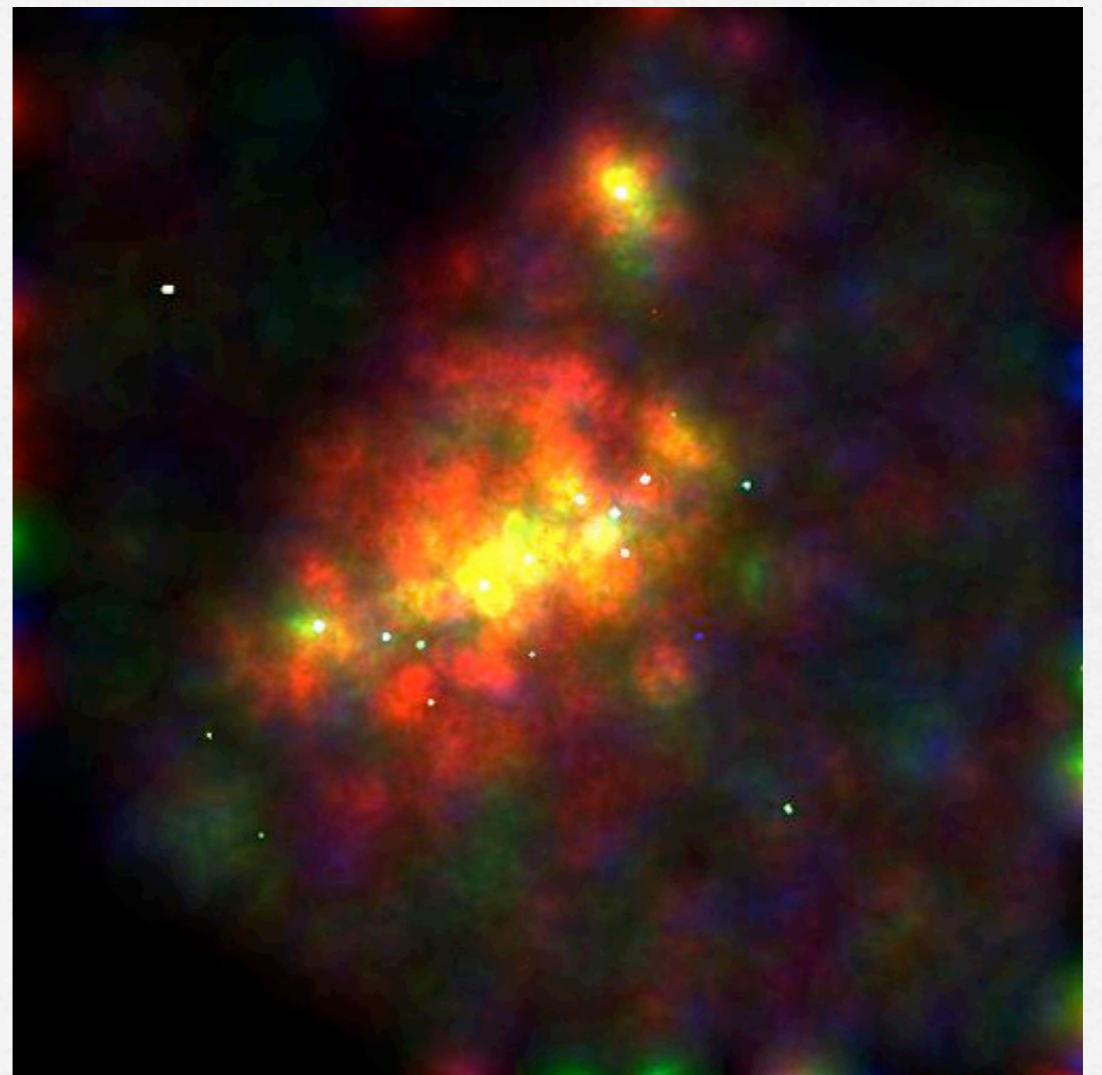
4. Searching for Data available for the bright galaxy M51: <http://www.euro-vo.org/fc/workflows/M51.html>

- ✓ `java -Xmx512M -jar Aladin.jar`
- ✓ Check available images and select POSSII F-DSS2 image at 0.658um with `OBS_ID=270`
- ✓ Load also VLA First 1.4GHz, H-ALPHA COMP and VLSS and switch to the 4 frames view (match)
- ✓ Load Sloan images also (all bands) and create an RGB image
- ✓ What kinds of sources are there in Simbad? (use the default filter). Broadcast to TOPCAT
- ✓ Search for HII regions. Get spectra for them with VOSpec



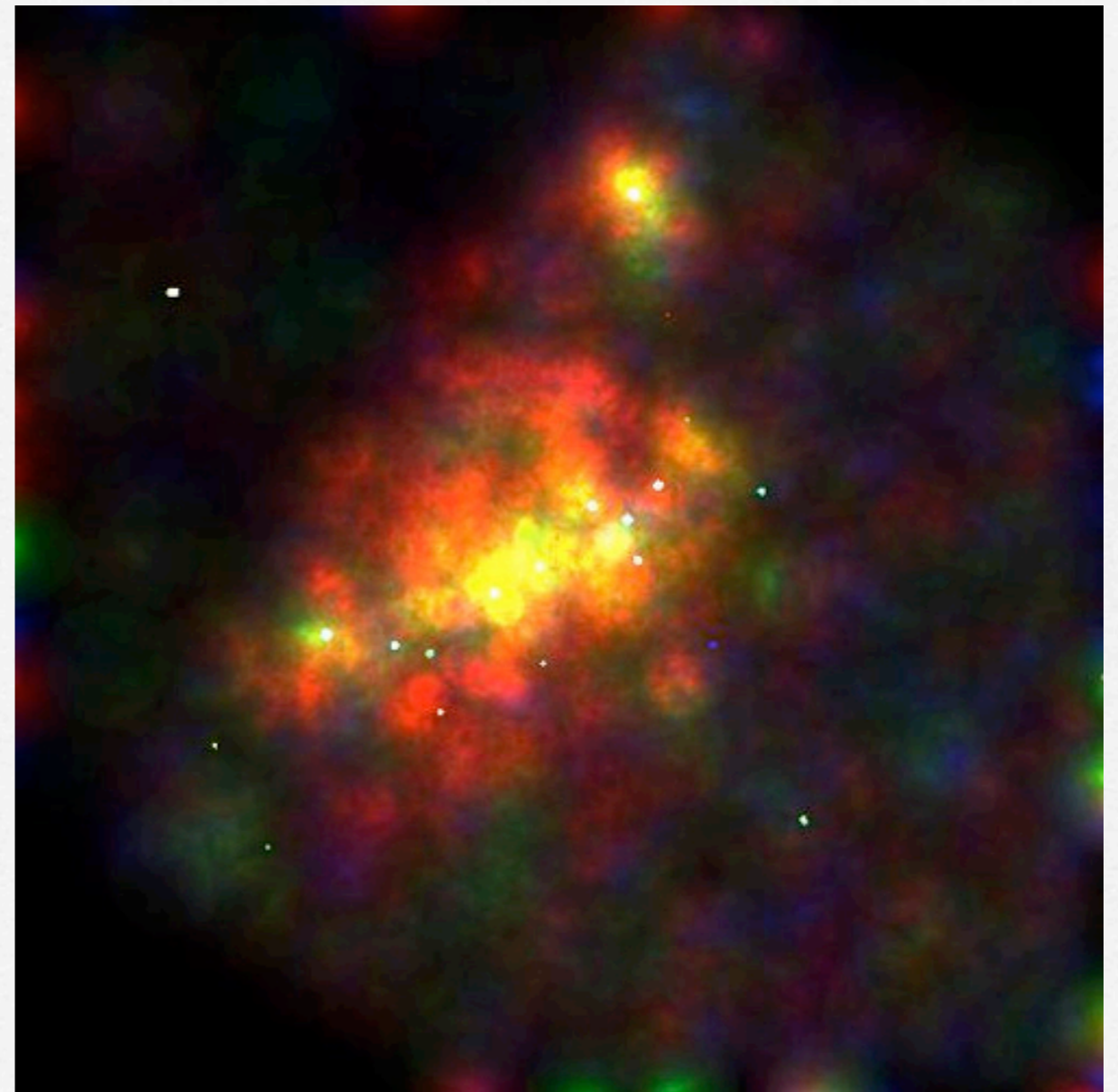
5. Search for ULX sources and X-ray binaries in nearby galaxies: <http://www.euro-vo.org/fc/workflows/ULX.html>

- ✓ X-ray sources less luminous than AGN but more than stellar process ($L_x > 10^{39}$ erg/sec)
- ✓ `java -Xmx512M -jar topcat-full.jar`
- ✓ In TOPCAT, load the NED-1D galaxy catalogue (linked)
- ✓ Play with sky coordinates (convert formats, etc.)
- ✓ Get rid of duplicated entries (internal match)
- ✓ filter in distance (e.g. $D < 10$ Mpc)
- ✓ Load hyperLeda catalog: (VII/237)
- ✓ Xmatch (5")



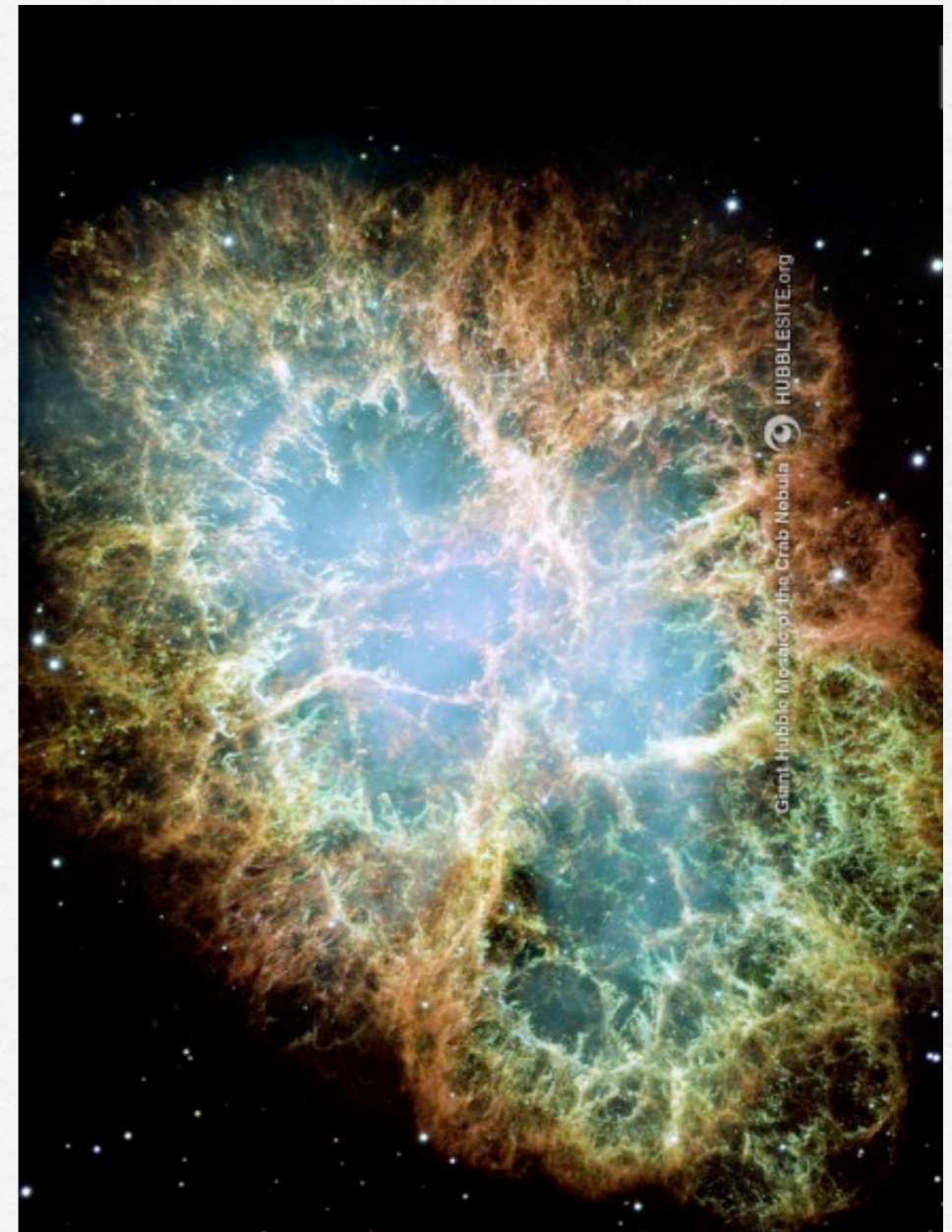
5. Search for ULX sources and X-ray binaries in nearby galaxies: <http://www.euro-vo.org/fc/workflows/ULX.html>

- ✓ New column: radius, in arcmin:
 $\text{pow}(10, \$\text{diameter_column}) * 0.1 / 2$
- ✓ Load the 2XMMi catalogue (IX/41, calibrated X-ray fluxes in various bands)
- ✓ Find X-ray sources that lie within the galaxies (Xmatch ePos as errors)
- ✓ Compute X-ray luminosity from the calibrated flux in the 0.2-12 keV band and distance:
$$L_x = 4 * \pi * D^2 * f_x \quad \Rightarrow$$
$$50.078 + 2 * \log_{10}(\$distance_column) + \log_{10}(\$fx_column)$$
- ✓ filter $L_x \geq 10^{39}$ erg/s (these will be the ULX candidates)



6. Confirmation of a Supernova candidate: <http://www.euro-vo.org/fc/workflows/SN.html>

- ✓ load in Aladin the local image (ngc6946.fit, taken with CROSS)
- ✓ Do the astrometric calibration (get a survey calibrated image, a catalog and calibrate “matching by stars”)
- ✓ Now compare with a calibrated image blinking (for example POSSII): see the supernova?
- ✓ Measure the distance from the centre of the galaxy
- ✓ Check for more SNe and other interesting objects loading Simbad from the Server Selector



7. The nature of a cluster of X-ray sources near the Chamaeleon star-forming region: <http://www.eurovo.org/fc/workflows/Chamaeleon.html>

- ✓ Pre-main sequence stars are detected in X-rays
- ✓ Download ROSAT All-Sky Survey: around Chamaeleon with 6deg. radius
- ✓ What kind of sources are there? (Simbad)
- ✓ Locate them on a RGB image of Chamaleon
- ✓ Produce CMD, where are these objects?
- ✓ Get ppms and look for different populations

