Présentation rapide de CIGALE

Atelier base de données POLLUX et données de spectroscopie en astrophysique

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Introduction

Principes du *SED-fitting*

- Jeu de spectres théoriques de galaxies

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- Jeu de spectres théoriques de galaxies
- Catalogue d’observations photométriques de galaxies
- Calcul de la photométrie théorique dans les mêmes bandes
- Comparaison et analyse statistique pour *inférer* des paramètres physiques

Particularités de CIGALE

- Construction des spectres théoriques à partir de modules (SFH, SSP, atténuation, *etc.*) ≠ jeu de *templates*

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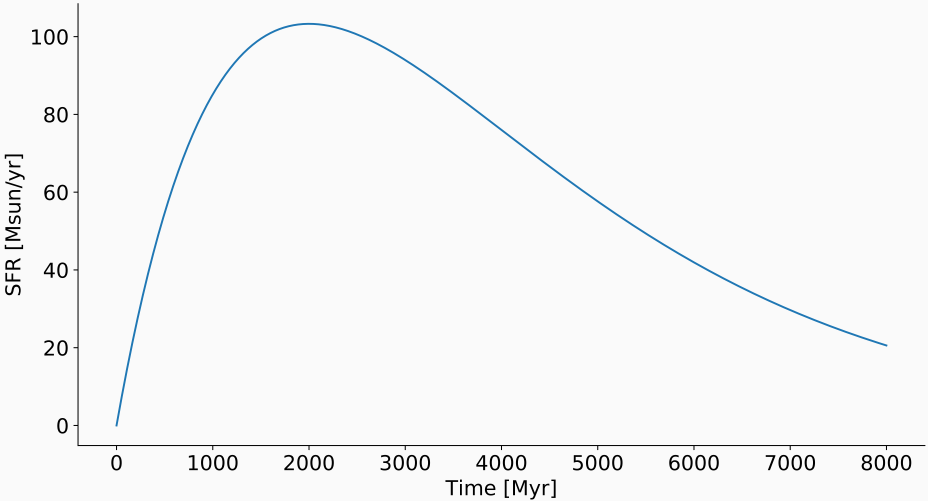
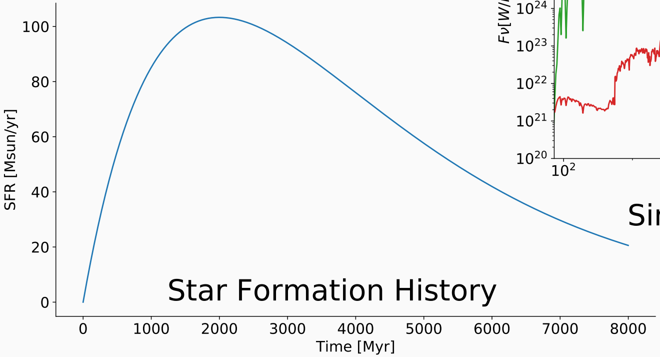
- Respect de l'équilibre énergétique (*energy balance*)
- Code Python organisé pour faciliter l'ajout de nouveaux modules

Exemple de création de SED

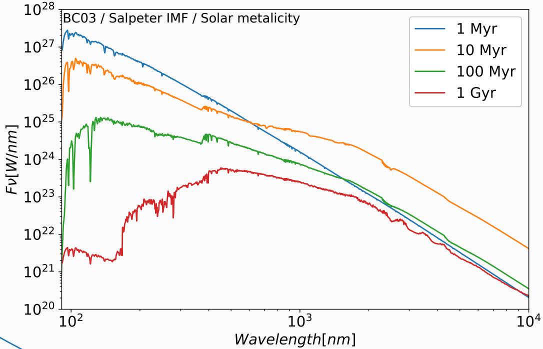
Histoire de formation stellaire (SFH)



Convolution avec un modèle de population stellaire (SSP)

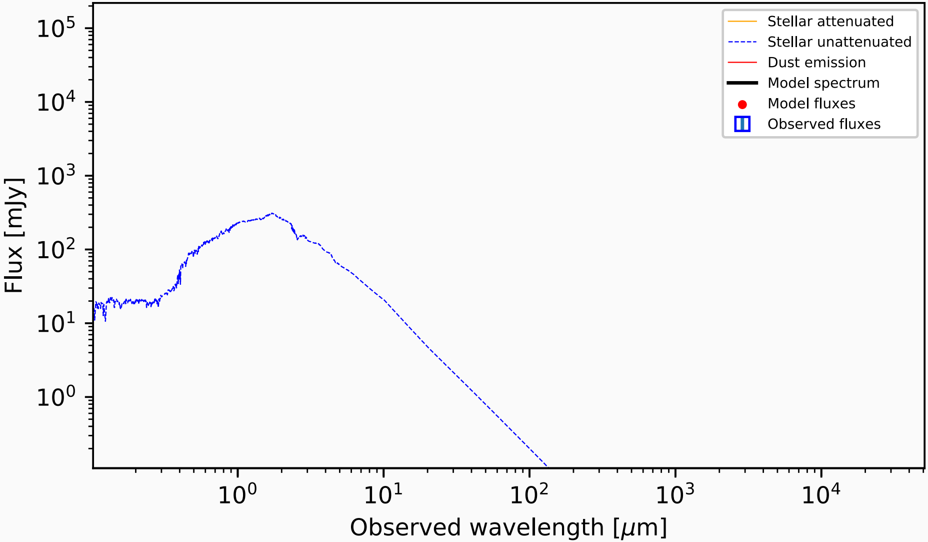


Star Formation History

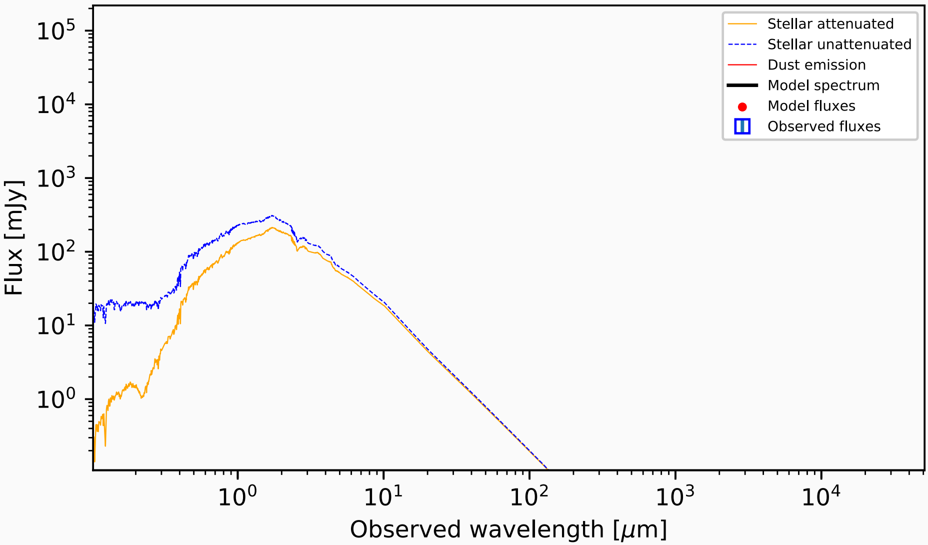


Single Stellar Population

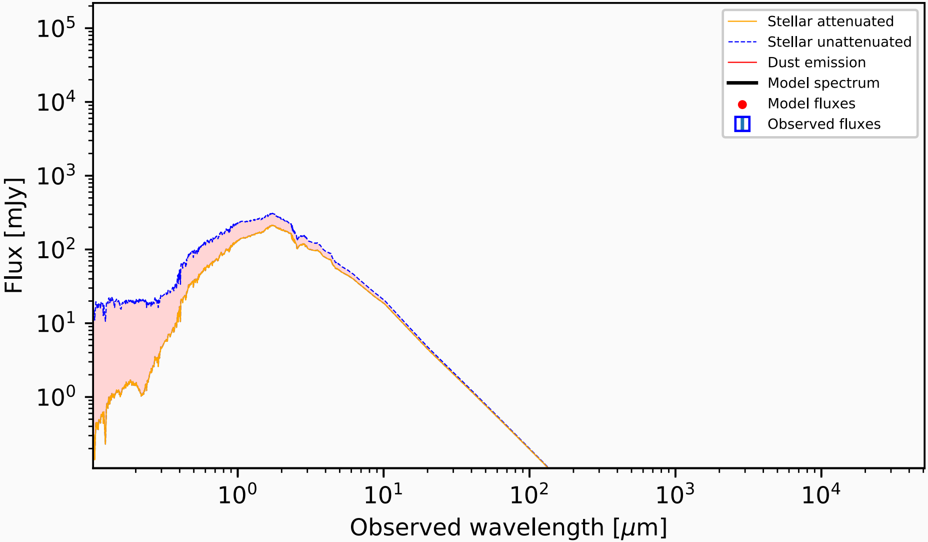
Émission stellaire



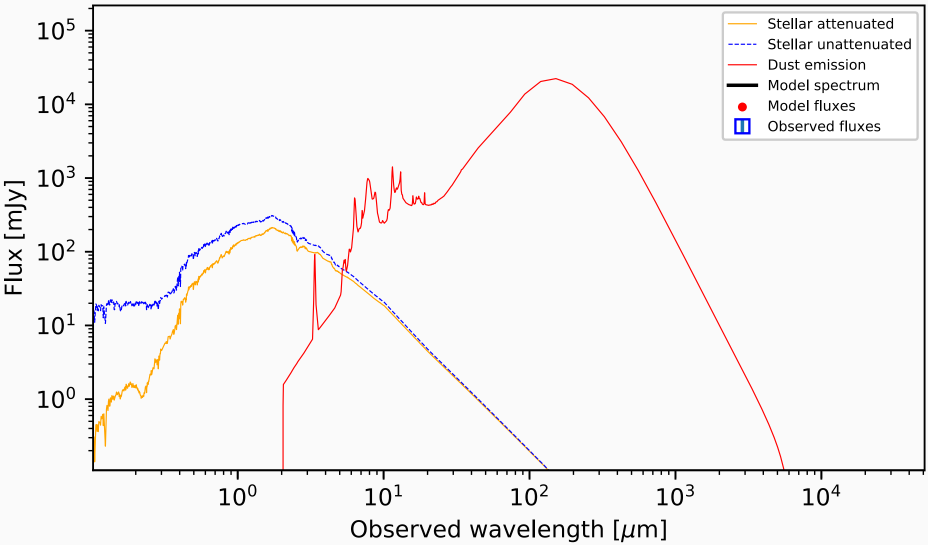
Attenuation



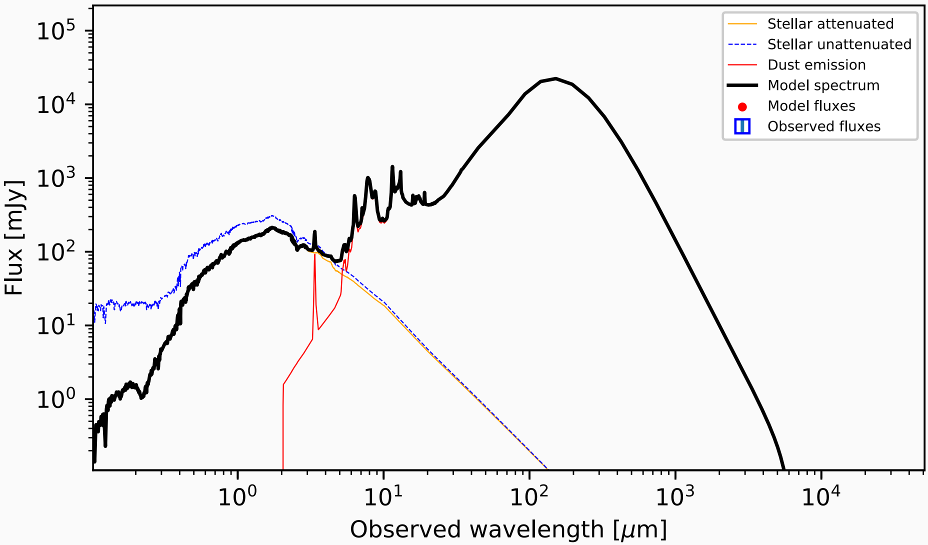
Énergie atténuée



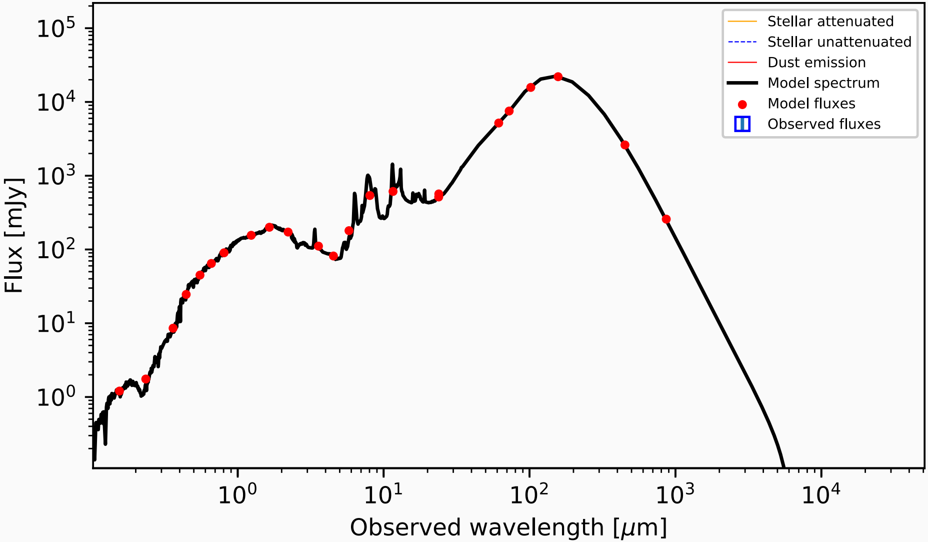
Ré-émission par les poussières



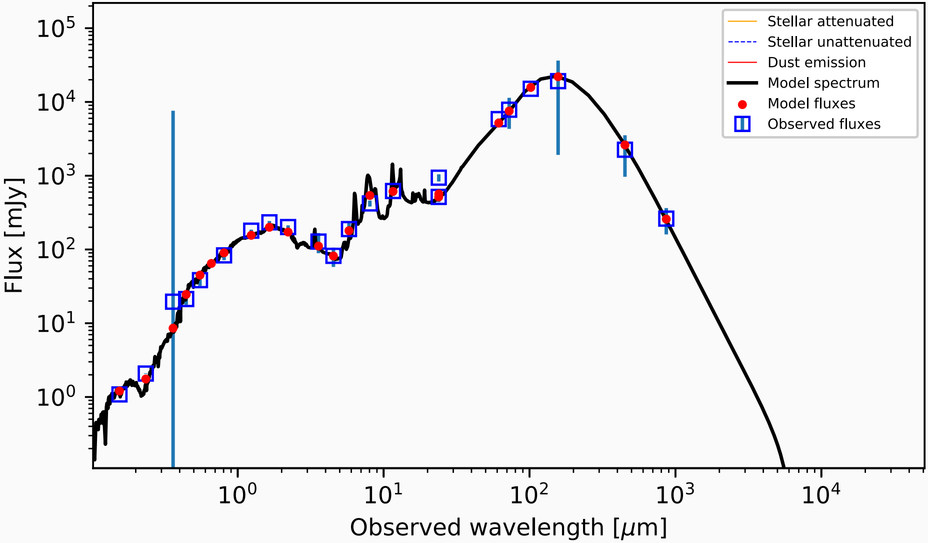
Spectre final



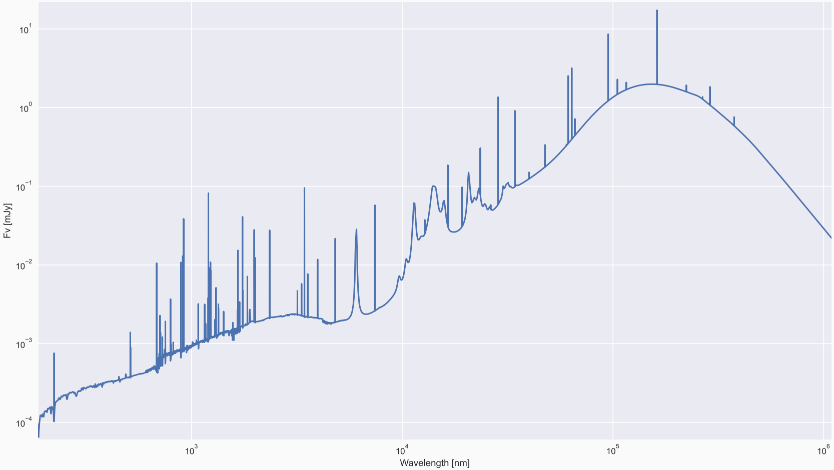
Photométrie du modèle



Comparaison à l'observation



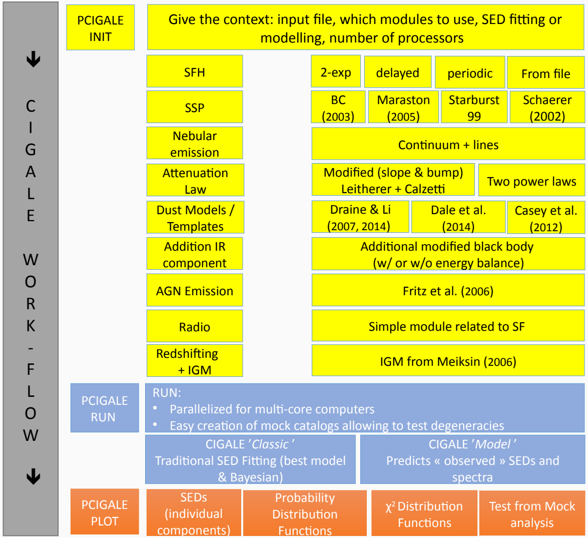
Note: nous avons aussi l’émission nébulaire



Exemple de spectre théorique ajusté sur des données COSMOS

Modularité de CIGALE

De nombreux modules disponibles *(liste de 2017)*



PCIGALE INIT: Give the context: input file, which modules to use, SED fitting or modelling, number of processors

SFH	2-exp delayed periodic From file
SSP	BC (2003) Maraston (2005) Starburst 99 Schaerer (2002)
Nebular emission	Continuum + lines
Attenuation Law	Modified (slope & bump) Leitherer + Calzetti Two power laws
Dust Models / Templates	Draine & Li (2007, 2014) Dale et al. (2014) Casey et al. (2012)
Addition IR component	Additional modified black body (w/ or w/o energy balance)
AGN Emission	Fritz et al. (2006)
Radio	Simple module related to SF
Redshifting + IGM	IGM from Meiksin (2006)

PCIGALE RUN

RUN:

- Parallelized for multi-core computers
- Easy creation of mock catalogs allowing to test degeneracies

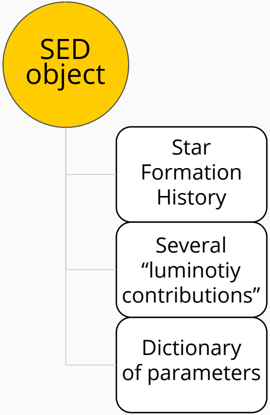
CIGALE *'Classic'*
Traditional SED Fitting (best model & Bayesian)

CIGALE *'Model'*
Predicts « observed » SEDs and spectra

PCIGALE PLOT

- SEDs (individual components)
- Probability Distribution Functions
- χ^2 Distribution Functions
- Test from Mock analysis

Conception modulaire (1)



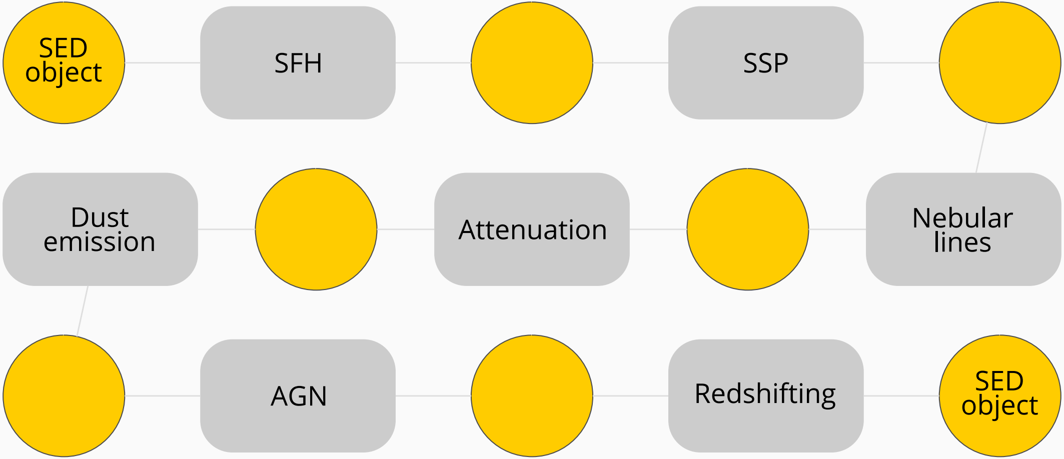
SED object

Star Formation History

Several “luminotiy contributions”

Dictionary of parameters

Conception modulaire (2)



SED object

SFH

SSP

Nebular lines

Attenuation

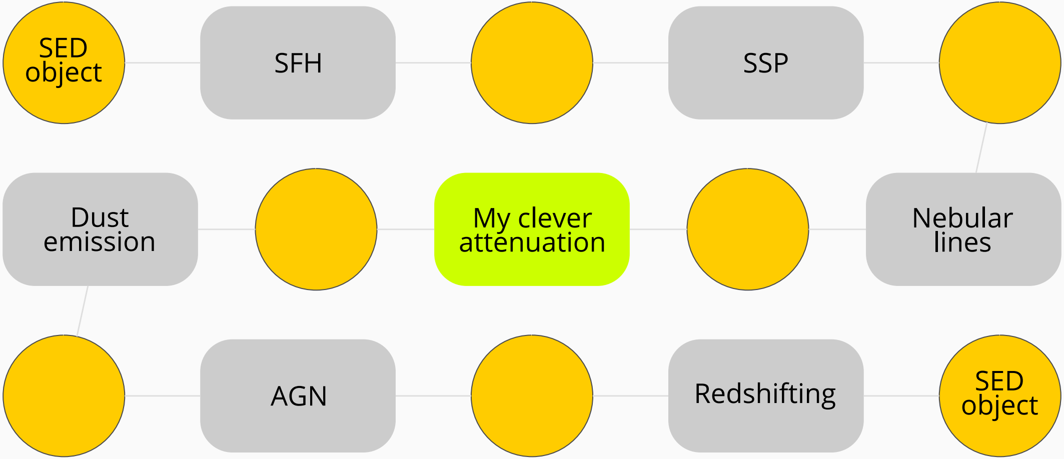
Dust emission

AGN

Redshifting

SED object

Conception modulaire (3)



SED object

SFH

SSP

Nebular lines

My clever attenuation

Dust emission

AGN

Redshifting

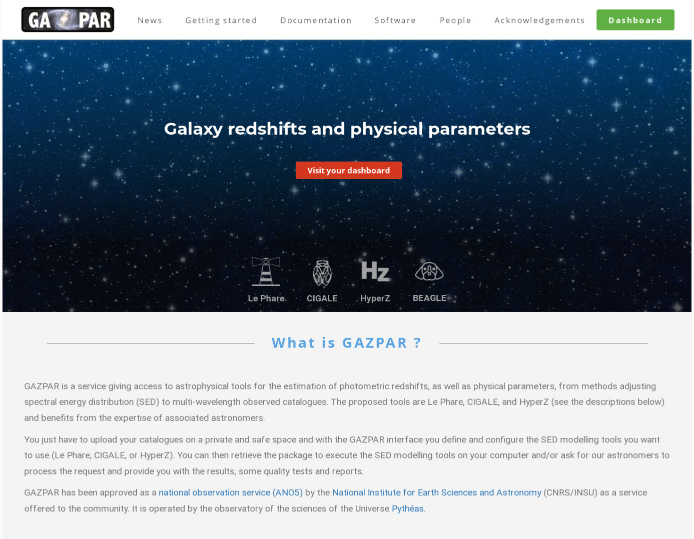
SED object

CIGALE dans le cadre du Centre d’Expertise Régional

Deux services dans la cadre de l'ANO 5

Gazpar	Exécution de codes à la demande CIGALE, LePhare, HyperZ, Beagle Responsable : Olivier Ilbert
ASPIC	Base de données de produits à valeur ajoutée Responsable : Vincent Lebrun

Galaxy redshift and physical parameters


GAZPAR
News
Getting started
Documentation
Software
People
Acknowledgements
Dashboard
Visit your dashboard
Le Phare
CIGALE
HyperZ
BEAGLE

Galaxy redshifts and physical parameters

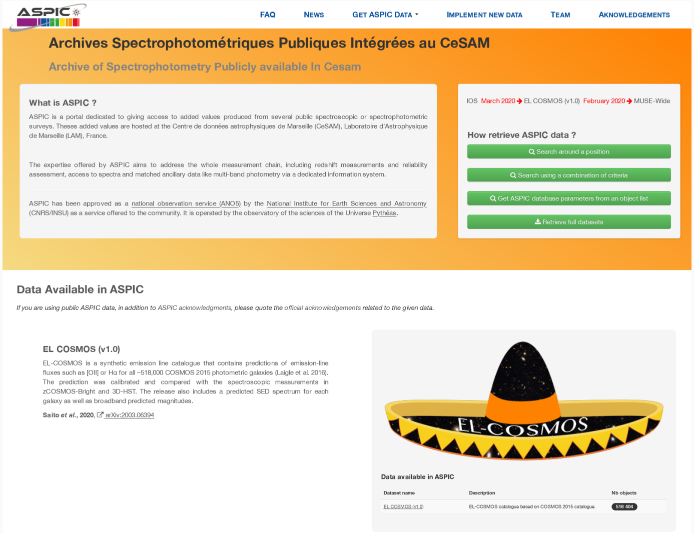
What is GAZPAR ?

GAZPAR is a service giving access to astrophysical tools for the estimation of photometric redshifts, as well as physical parameters, from methods adjusting spectral energy distribution (SED) to multi-wavelength observed catalogues. The proposed tools are Le Phare, CIGALE, and HyperZ (see the descriptions below) and benefits from the expertise of associated astronomers.

You just have to upload your catalogues on a private and safe space and with the GAZPAR interface you define and configure the SED modelling tools you want to use (Le Phare, CIGALE, or HyperZ). You can then retrieve the package to execute the SED modelling tools on your computer and/or ask for our astronomers to process the request and provide you with the results, some quality tests and reports.

GAZPAR has been approved as a national observation service (ANO5) by the National Institute for Earth Sciences and Astronomy (CNRS/INSU) as a service offered to the community. It is operated by the observatory of the sciences of the Universe Pythéas.

Archives Spectrophotométriques Publiques Intégrées au CeSAM


ASPIC
FAQ
NEWS
GET ASPIC DATA
IMPLEMENT NEW DATA
TEAM
AKNOWLEDGEMENTS
Search around a position
Search using a combination of criteria
Get ASPIC database parameters from an object list
Retrieve full datasets
EL-COSMOS

Archives Spectrophotométriques Publiques Intégrées au CeSAM

Archive of Spectrophotometry Publicly available In Cesam

What is ASPIC ?

ASPIC is a portal dedicated to giving access to added values produced from several public spectroscopic or spectrophotometric surveys. Theses added values are hosted at the Centre de données astrophysiques de Marseille (CeSAM), Laboratoire d'Astrophysique de Marseille (LAM), France.

The expertise offered by ASPIC aims to address the whole measurement chain, including redshift measurements and reliability assessment, access to spectra and matched ancillary data like multi-band photometry via a dedicated information system.

ASPIC has been approved as a national observation service (ANO5) by the National Institute for Earth Sciences and Astronomy (CNRS/INSU) as a service offered to the community. It is operated by the observatory of the sciences of the Universe Pythéas.

IOS March 2020 → EL COSMOS (v1.0) February 2020 → MUSE-Wide

How retrieve ASPIC data ?

Data Available in ASPIC

If you are using public ASPIC data, in addition to ASPIC acknowledgments, please quote the official acknowledgements related to the given data.

EL COSMOS (v1.0)

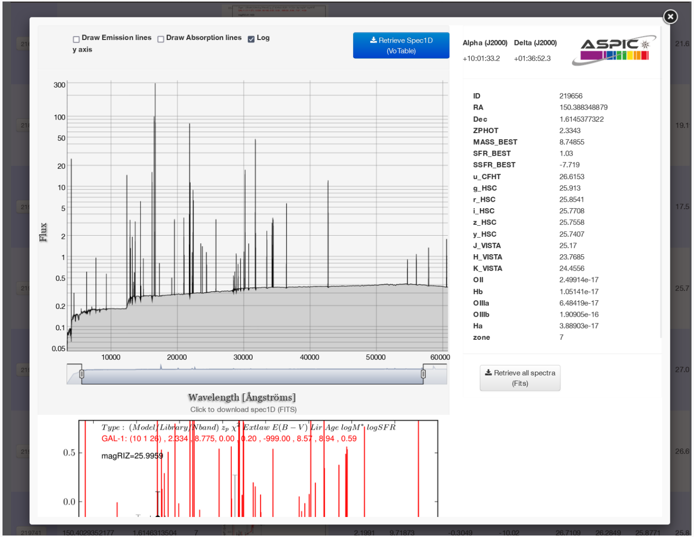
EL-COSMOS is a synthetic emission line catalogue that contains predictions of emission-line fluxes such as [OII] or Hα for all ~518,000 COSMOS 2015 photometric galaxies (Laigle et al. 2016). The prediction was calibrated and compared with the spectroscopic measurements in zCOSMOS-Bright and 3D-HST. The release also includes a predicted SED spectrum for each galaxy as well as broadband predicted magnitudes.

Saito *et al.*, 2020, arXiv:2003.06394

Data available in ASPIC

Dataset name	Description	Nb objects
EL COSMOS (v1.0)	EL-COSMOS catalogue based on COSMOS 2015 catalogue.	518 404

ASPIC: Spectres théoriques de LePhare


☐ Draw Emission lines ☐ Draw Absorption lines ☑ Log y axis
Retrieve Spec1D (VoTable)
Flux
300
100
50
20
10
5
2
1
0.5
0.2
0.1
0.05
10000
20000
30000
40000
50000
60000
Wavelength [Ångströms]
Click to download spec1D (FITS)
0.5
0.0
Retrieve all spectra (Fits)

Alpha (J2000)	Delta (J2000)
+10:01:33.2	+01:36:52.3

ID	219656
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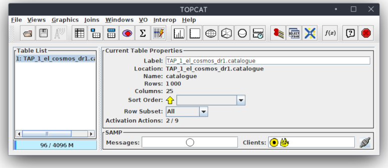
Dec	1.6145377322
ZPHOT	2.3343
MASS_BEST	8.74855
SFR_BEST	1.03
SSFR_BEST	-7.719
u_CFHT	26.6153
g_HSC	25.913
r_HSC	25.8541
i_HSC	25.7708
z_HSC	25.7558
y_HSC	25.7407
J_VISTA	25.17
H_VISTA	23.7685
K_VISTA	24.4556
OII	2.49914e-17
Hb	1.05141e-17
OIIIa	6.48419e-17
OIIIb	1.90905e-16
Ha	3.88903e-17
zone	7

$Type: (Model/Library/Nband)\ z_p\ \chi^2\ Extlaw\ E(B-V)\ Lir\ Age\ logM^*\ logSFR$

GAL-1: (10 1 26) , 2.334 , 8.775, 0.00 , 0.20 , -999.00 , 8.57 , 8.94 , 0.59

magRIZ=25.9959

ASPIC: distribution dans l'Observatoire Virtuel


TOPCAT
File Views Graphics Joins Windows VO Interop Help
Table List
Current Table Properties
SAMP

1: TAP_1_el_cosmos_dr1.ca

96 / 4096 M

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Columns: 25
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Row Subset: All
Activation Actions: 2 / 9

Messages:
Clients:

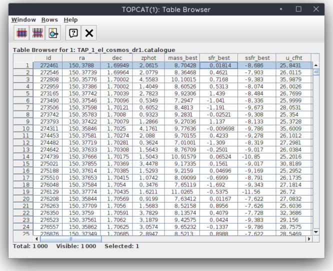
TOPCAT(1): Table Browser
Window Rows Help

Table Browser for 1: TAP_1_el_cosmos_dr1.catalogue

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1	272461	150,3788	1,69949	2,0615	8,70428	0,01814	-8,686	25,8431
2	272546	150,37739	1,69964	2,0779	8,36468	0,4621	-7,903	26,0115
3	272808	150,35776	1,70002	4,5583	10,10015	0,7168	-9,383	35,9879
4	272959	150,37386	1,70002	1,4049	8,60526	0,5313	-8,074	26,0026
5	273165	150,37742	1,70039	2,7823	9,92306	1,439	-8,484	26,7699
6	273490	150,37546	1,70096	0,5349	7,2947	-1,041	-8,336	25,9999
7	273506	150,37598	1,70121	0,6052	8,4813	-1,191	-9,673	28,0531
8	273742	150,35783	1,7008	0,9323	9,2831	-0,02521	-9,308	25,354
9	273793	150,37422	1,70079	1,2866	9,27036	1,137	-8,133	25,3728
10	274311	150,35846	1,7025	4,1761	9,77636	-0,009698	-9,786	35,6009
11	274453	150,37581	1,70274	2,088	9,70155	0,4233	-9,278	26,1012
12	274482	150,37719	1,70281	0,3624	7,01001	-1,309	-8,319	27,2981
13	274642	150,37633	1,70308	1,5643	8,76709	-0,2501	-9,017	26,0384
14	274739	150,37666	1,70175	1,5043	10,91579	0,06524	-10,85	25,2016
15	275021	150,37855	1,70369	3,4478	9,17335	0,1561	-9,017	30,8189
16	275188	150,37614	1,70385	1,5293	9,2159	0,04696	-9,169	25,2952
17	275510	150,37653	1,70415	1,0742	8,09099	-0,6999	-8,791	26,1735
18	276048	150,37584	1,7054	0,3476	7,65119	-1,692	-9,343	27,1814
19	276129	150,37774	1,70435	1,6211	11,0265	-0,5375	-11,56	26,72
20	276208	150,35844	1,70569	0,9199	7,63412	0,01167	-7,622	27,0832
21	276263	150,37709	1,7056	1,5683	8,52158	0,8956	-7,626	25,6036
22	276350	150,3759	1,70591	3,7829	8,13574	0,4079	-7,728	32,3686
23	276523	150,37561	1,7062	3,1879	9,42575	0,0424	-9,383	29,156
24	276557	150,35862	1,70625	3,0574	9,65232	-0,1337	-9,786	28,7575
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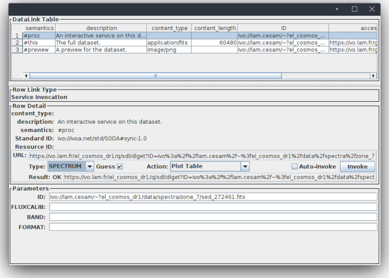
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Row Detail
Parameters
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2	#this	The full dataset.	application/fits	60480	ivo://lam.cesam/~?el_cosmos_...	https://vo.lam.fr/g
3	#preview	A preview for the dataset.	image/png		ivo://lam.cesam/~?el_cosmos_...	https://vo.lam.fr/g

Service Invocation

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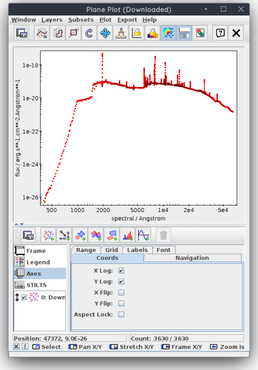
semantics: #proc
Standard ID: ivo://ivoa.net/std/SODA#sync-1.0
Resource ID:
URL: https://vo.lam.fr/el_cosmos_dr1/q/sdl/dlget?ID=ivo%3a%2f%2flam.cesam%2f~%3fel_cosmos_dr1%2fdata%2fspectra%2fzone_7
Type: SPECTRUM Guess ☑ Action: Plot Table ☐ Auto-Invoke
Result: OK https://vo.lam.fr/el_cosmos_dr1/q/sdl/dlget?ID=ivo%3a%2f%2flam.cesam%2f~%3fel_cosmos_dr1%2fdata%2fspect

ID: ivo://lam.cesam/~?el_cosmos_dr1/data/spectra/zone_7/sed_272461.fits
FLUXCALIB:
BAND:
FORMAT:


Plane Plot (Downloaded)
Window Layers Subsets Plot Export Help
1e-18
1e-20
1e-22
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X Log: ☑
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Y Flip: ☐
Aspect Lock: ☐

Position: 47372, 9.0E-26
Count: 3630 / 3630

Liens

- CIGALE : `https://cigale.lam.fr`
- Gazpar : `https://gazpar.lam.fr`
- ASPIC : `http://cesam.lam.fr/aspic/`