GAlaxy photometric redshifts (Z) & physical PARameters

User manual GAZPAR v2.2, March 2019

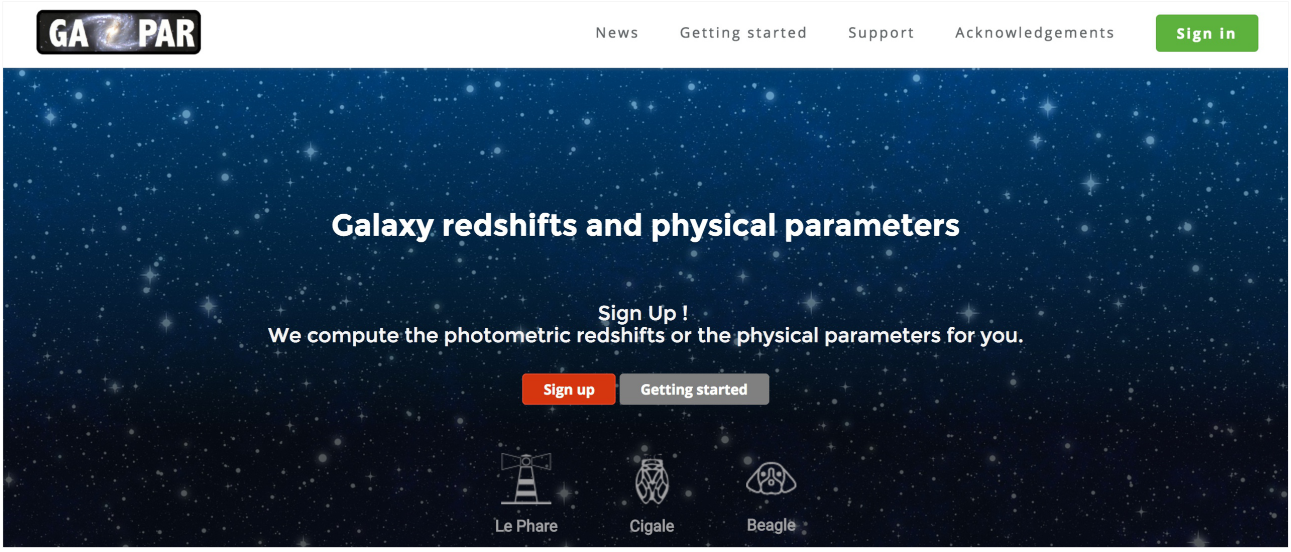
http://gazpar.lam.fr

1 . General description of the GAZPAR interface

We can measure the photo-z and the physical parameters for you. **Of course, the information that you provide remains confidential.**

1.1 Principle

1. You upload your multi-color catalogue and associate each column to a filter at https://gazpar.lam.fr/dashboard-catalogue
2. You define the kind of job you need in https://gazpar.lam.fr/dashboard-request
   a. **LPZ** Le Phare photometric redshifts
   b. **LPP** Le Phare physical parameters
   c. **CIG** physical parameters with CIGALE
   d. **BEA** BEAGLE
3. Depending on the job, we offer several possible options in the interface (e.g. the cosmology);
4. You send your request and we give you an estimate of the time needed to get your results;
5. We send you an email when your request is executed. You could download your results;



1.2 The advantage of using the interface

1. We run the code for you and you save time;
2. We will tune the parametrization of the code to fit your scientific purpose;
3. We will provide you numerous quality tests;
4. We provide you the parametrization file and the commands we used, which is a good start to use the code yourself.

If you have an extensive need of running BEAGLE, Le Phare or CIGALE with complicated options, you will need to install and use the public version of the codes. But using the interface is anyway a good way to start.

1.3 Decide which code you need

When you create a new request, we propose 3 types of jobs. We describe here their own specificities to help you in the choice.

LPZ Le Phare photometric redshifts

Code: http://cesam.lam.fr/lephare/lephare.html
Version for GAZPAR: http://cesam.oamp.fr/scientistdata/ilbert/GAZPAR/

The photometric redshift is a distance measurement based on the galaxy colors. The accuracy of the measurement will depend on the number of bands you are using and their depth. Le Phare is a template-fitting code used in many deep imaging surveys. We propose two well-tested configurations of Le Phare corresponding to the following papers : Ilbert et al. (2006) and Ilbert et al. (2009).

LPP Le Phare physical parameters

Code: http://cesam.lam.fr/lephare/lephare.html
Version for GAZPAR: http://cesam.oamp.fr/scientistdata/ilbert/GAZPAR/

When the redshift is known, you can use the multi-color data to establish the physical parameters of the galaxy. We obtain the physical parameters by fitting the stellar component of the Spectral Energy Distribution (SED). Such estimate relies heavily on the assumptions used to create the models. For Le Phare, we propose a single tuning that we used in numerous studies and described in Ilbert et al. (2013, 2015), Laigle et al. (2016, 2019). We advice to use this tool when you have large catalogues or if you want to compare your physical parameters with some already published in the literature with similar assumptions.

CIG physical parameters with CIGALE

code: http://cigale.lam.fr

CIGALE is also a template-fitting code. However, it has the following specificities:

- the fit could be done using FIR data;
- the energy balance between the stellar light absorbed by dust and the one reemitted in FIR is conserved (except for a modified black body for which it is optional);
- an AGN component is included;
- we leave a lot of freedom in the library templates that you can create on the interface (e.g. BC03, M05 templates, SFH, etc).

So, if AGN contribute to the SED or if you use far-IR data, you need to use CIGALE.

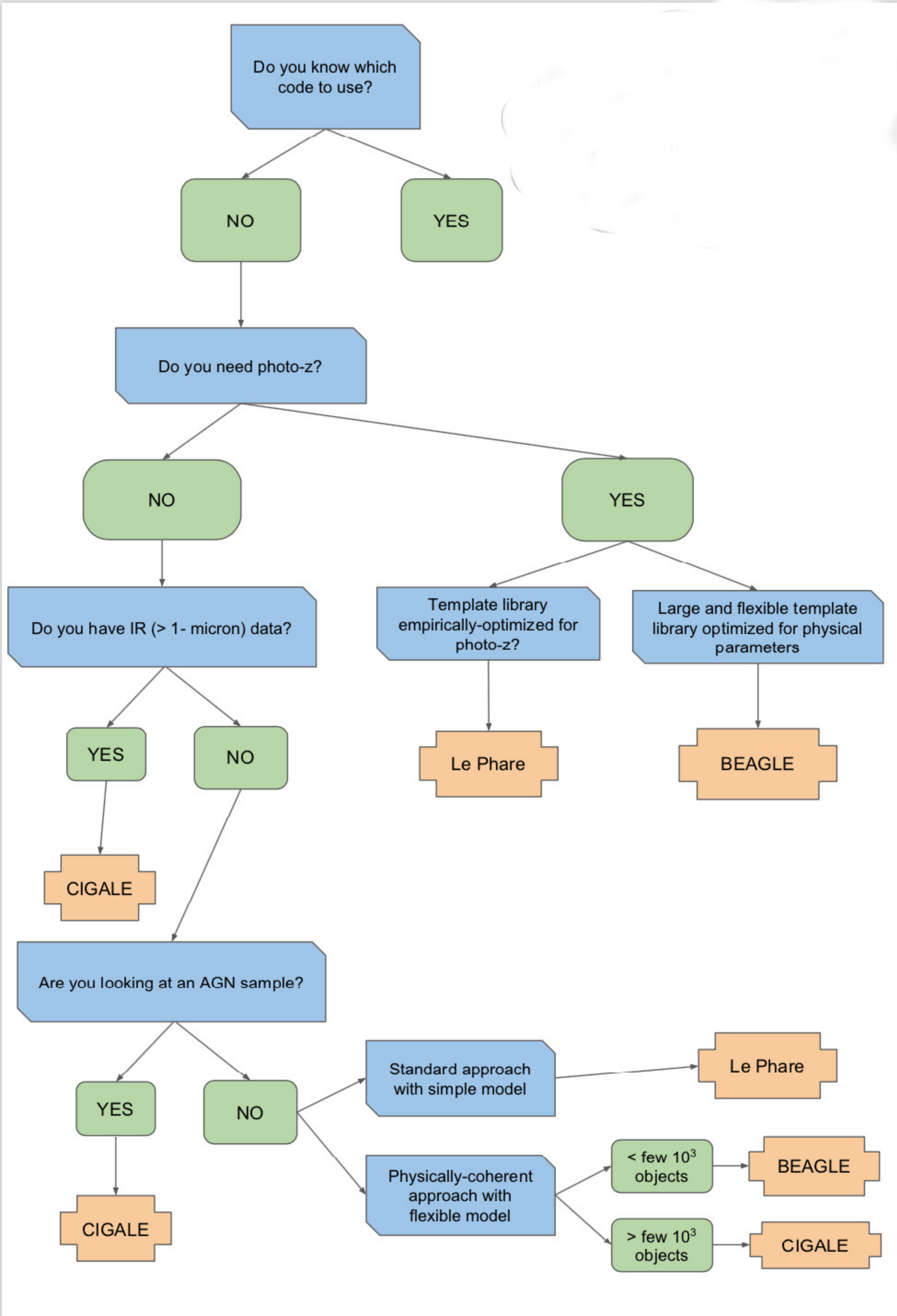
BEA physical parameters with BEAGLE
code: http://www.jacopochevallard.org/beagle/

BEAGLE is a new-generation tool to model and interpret galaxy SEDs, which incorporates the consistent modeling of stellar radiation and its transfer through the interstellar and intergalactic media. The specificities of BEAGLE over the other codes proposed in GAZPAR are the following:

- an approach which is more physically motivated;
- an extensive characterization of the studied sources;
- a fully Bayesian approach.

However, we can only propose this tool for samples with a limited size (maximum of a few hundreds of sources) given the amount of information in output.

We propose below a decision tree helping you to decide which code is the most suitable for your need.



Do you know which code to use?
NO
YES
Do you need photo-z?
NO
YES
Do you have IR (> 1- micron) data?
Template library empirically-optimized for photo-z?
Large and flexible template library optimized for physical parameters
YES
NO
Le Phare
BEAGLE
CIGALE
Are you looking at an AGN sample?
YES
NO
Standard approach with simple model
Le Phare
Physically-coherent approach with flexible model
< few 10^3 objects
BEAGLE
> few 10^3 objects
CIGALE
CIGALE

1.4 Customize the run

We will customize the run to fit your scientific needs. That is why we ask you to provide a short description of your scientific project in the interface.

So, some of the options your entered could be changed if we think that they are not appropriated.

Also, you can ask us a specific configuration if you think it's required. We will see if it is possible.

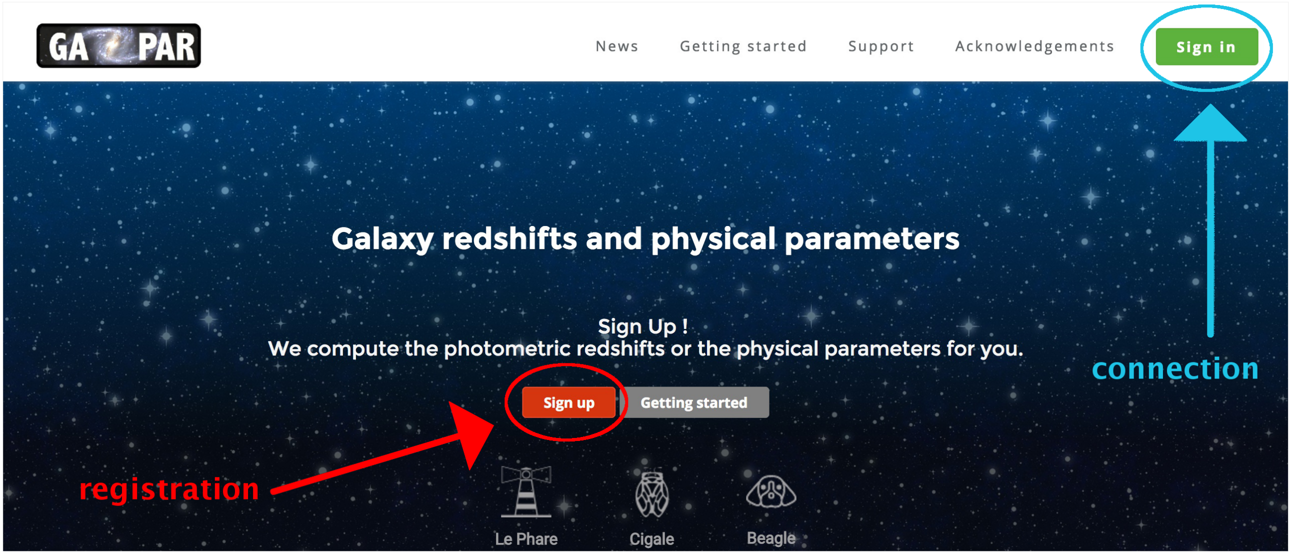
1.5 Timescale

We are several astronomers running the codes for you. Each of us dedicates around 1/2 day per week to run the codes. Therefore, an approximate timescale will be given to you depending on the number of catalogues in the queue.

2 . Authentication and user parameters

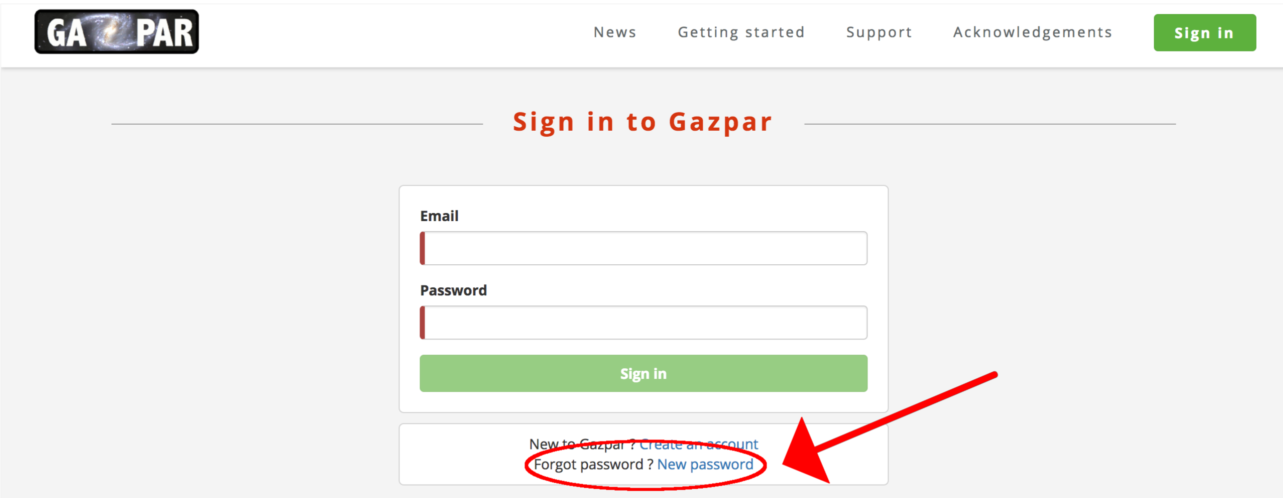
2.1 Authentication

To use the application, you need to be registered to have your personal space for storing catalogues, filters and requests. Then just sign in to find all of your catalogs, filters and requests.

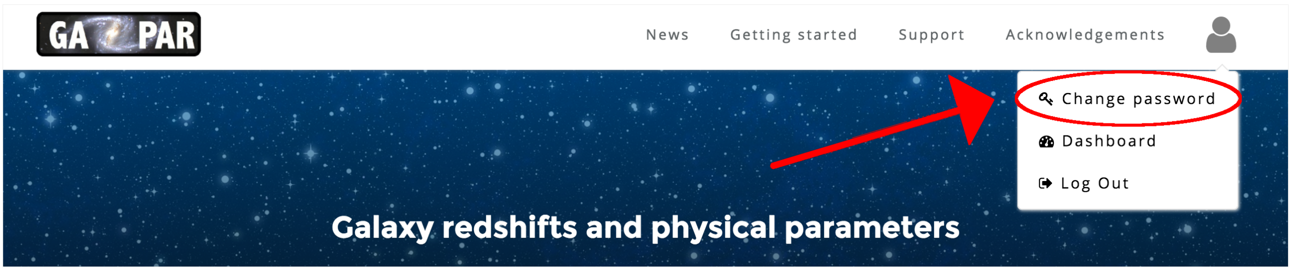


2.2 Forgot password and change password

If you forgot your password, you can have another one by email. For this, use "Forgot password" procedure.



You can change your password at anytime if you are logged.



3. Catalogues

3.1 Format of the input file

We want a file with this format:

[id] | ([Mag] [Err] ...) | [redshift] | [fl] | [alpha] | [delta] | [mask]

or

[id] | ([Flux] [Err] ...) | [redshift] | [fl] | [alpha] | [delta] | [mask]

3.1.1 Id column

You can use any ID that you want, without space or tab. We prefer an integer.

3.1.2 Flux / magnitudes columns

Unit

You can use any unit among this list:

- mag AB
- flux milliJy
- flux microJy
- flux erg/s/cm2/Hz

but the same unit is considered for the full catalogue.

Undefined

If the magnitude/flux is not defined, the user needs to put the value at -9999 for the flux/mag and for the associated error.

Upper-limits

If the error is negative and the flux/mag positive, the value will be considered as an upper-limit.

Photometry

The magnitudes need to be total since we compute the absolute magnitudes, the stellar masses or the physical parameters. If you think that another kind of magnitude is better to get accurate colors (e.g. aperture, iso), you should rescale them with the same factor in all bands for a given object: it preserve the color and allows us to have total quantities (e.g. Moutard et al. 2015).

3.1.3 Redshift column

To measure the photometric redshifts
When you want to compute the photometric redshifts, you do not really need the spectroscopic redshifts. We use them to calibrate the zeropoints if you use this option, and to establish the quality checks. For the sources without spectroscopic redshift, put the value at -99.

To measure the physical parameters
When you want to measure the physical parameters, the redshift is necessary. The galaxies without a redshift will be not considered. It could be either a spectroscopic redshift or a photometric redshift.

3.1.4 Additional columns (but mandatory)

We ask several additional information to the user. These columns are not useful for the computation but are important to establish the quality checks.

Since the information contained in these columns is sensitive, you can replace the columns by fake values. But we will not be able to perform all the tests we want on your catalogue.

Here are the columns that we need:

- a quality flag for the spec-z: 0 robust (>95%); 1 uncertain
- alpha in degree
- delta in degree
- a quality flag to indicate if the object falls in a clean region in photomometry (flag 0) or a bad one (flag 1)

If the user do not have these data or does not want to provide them, s/he could use the following default values:

- fl = 0
- alpha = -999

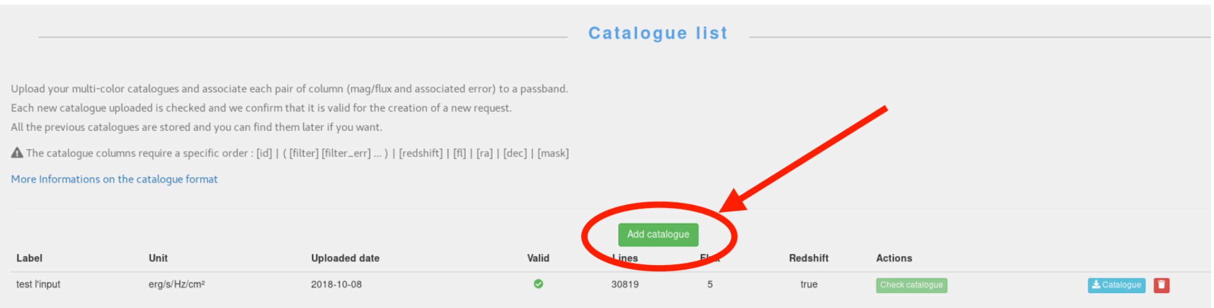
- delta = -999
- mask = 0

3.1.5 Short summary of the format

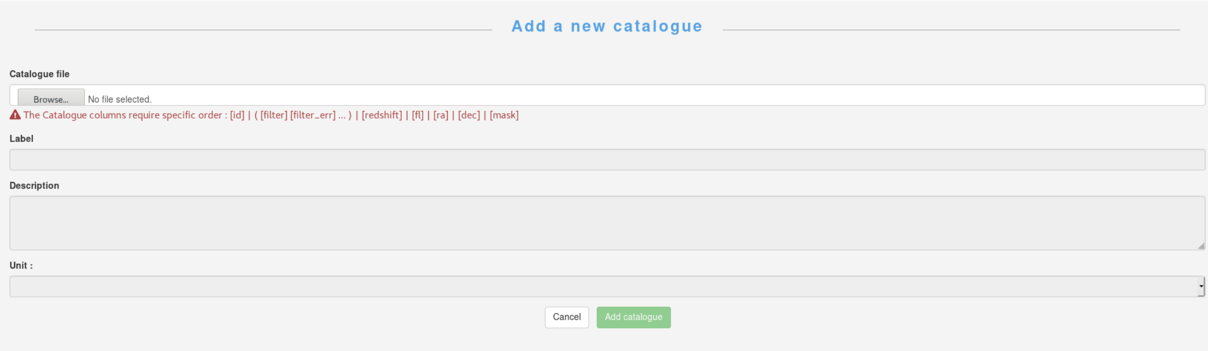
Id
mag/flux (band 1)
associated error
mag/flux (band 2)
associated error
…
...
redshift
fl
alpha
delta
mask

3.2 Upload your catalogue

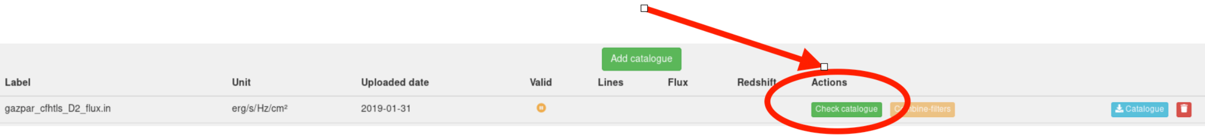
You upload your catalogue in the interface at https://gazpar.lam.fr/dashboard-catalogue



Browse your computer and upload your file. Fill the required information. Indicate in which unit is your catalogue. All the previous catalogues are stored and you can find them later if you want.

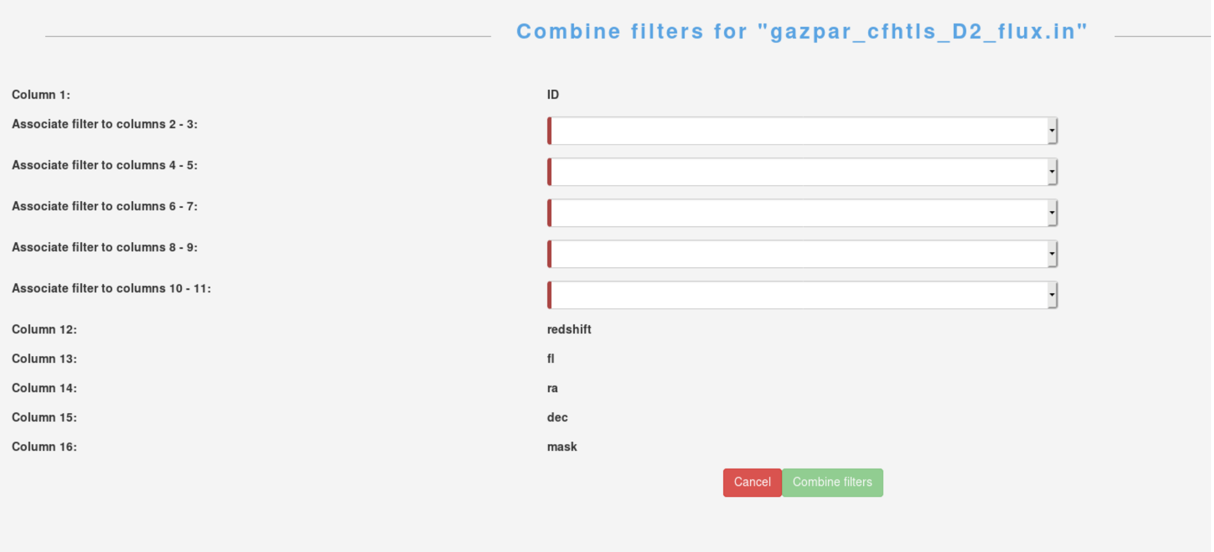


Your catalogue should appear in the list. You need to check that the format is correct.

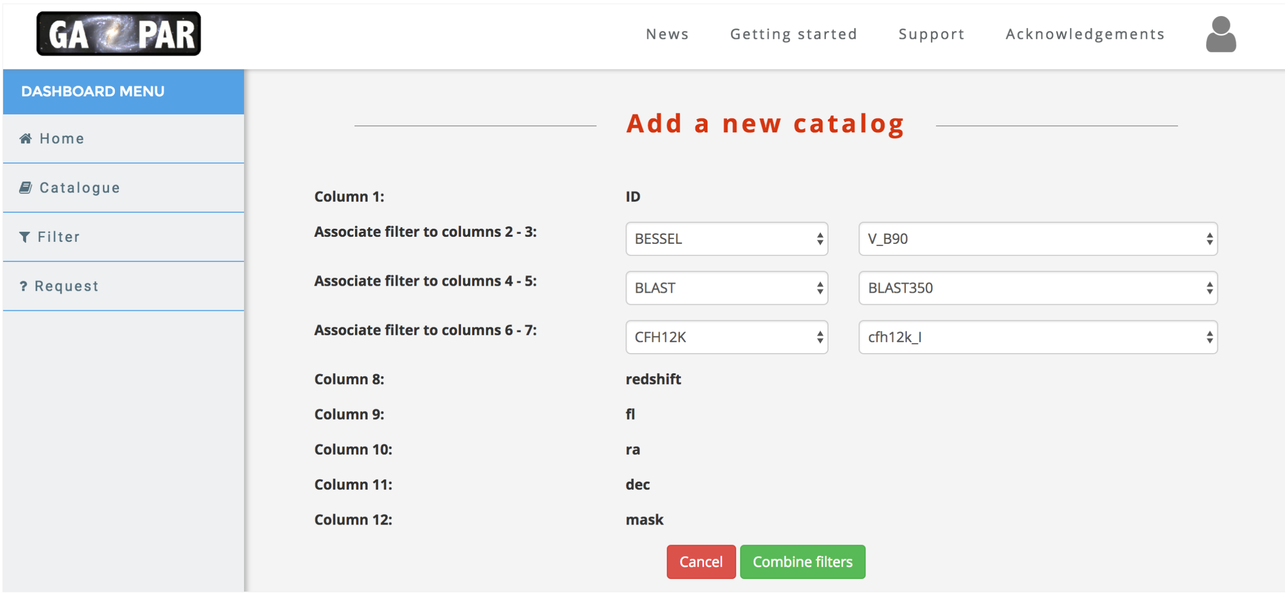


This catalogue is checked and we confirm that it is valid. Warnings could be indicated if we see suspicious columns.

Then, you need to associate each pair of column (mag/flux and associated error) to a passband. We have already a filter database but if the filter that you want to use is missing, you can upload your own (*upload new filter*).



You catalogue should appear in the list.



4 . Filters

4.1 The GAZPAR filter database

We created a database of filters that you can use. The filters are listed in the annex Table1. The filter transmission curves are convolved by the QE of the CCD, the transmission of all the optics and we take into account the atmosphere with an airmass of 1.2.

4.2 Add a new filter

You have the possibility to add a new filter if the one you need is not included in our database. You need to include the transmission of the QE, the reflexibility of the mirror, the atmosphere, etc. The shape of the filter is important (but not its normalization).

We impose several rules for the filter:

- less than 1000 lines (between 100-200 would be perfect);
- the extreme values of the filter should end up with a transmission at 0;
- the wavelength must be in Angstrom and sorted in ascending order;
- no negative transmission.

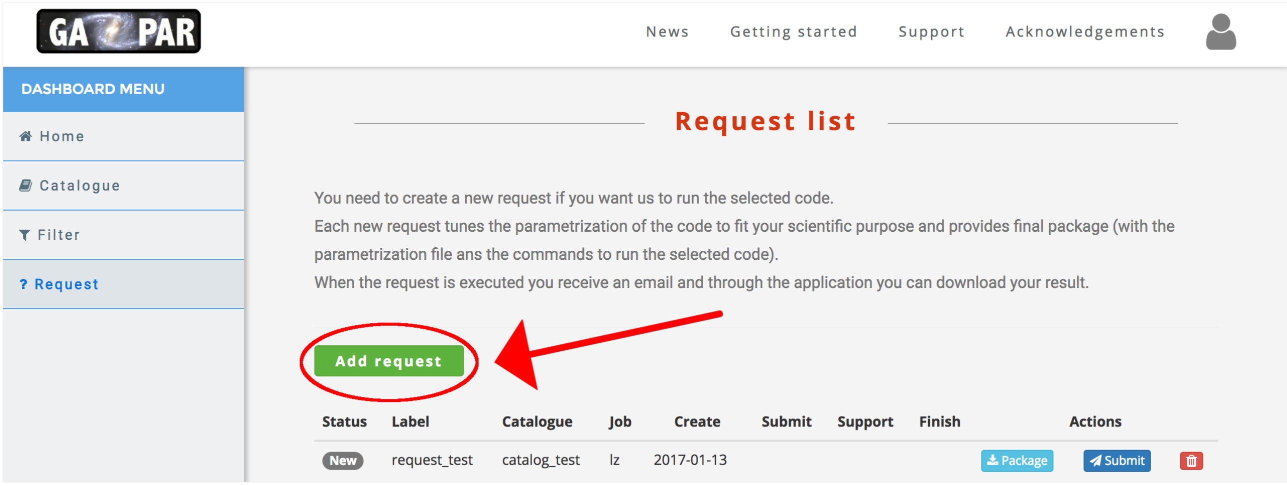
You need to indicate if the transmission in the filter is given in unit of photon or energy.

You also need to indicate the kind of calibration used for your data (see Le Phare documentation, section 5.3). The figure below is extracted from the Le Phare documentation.

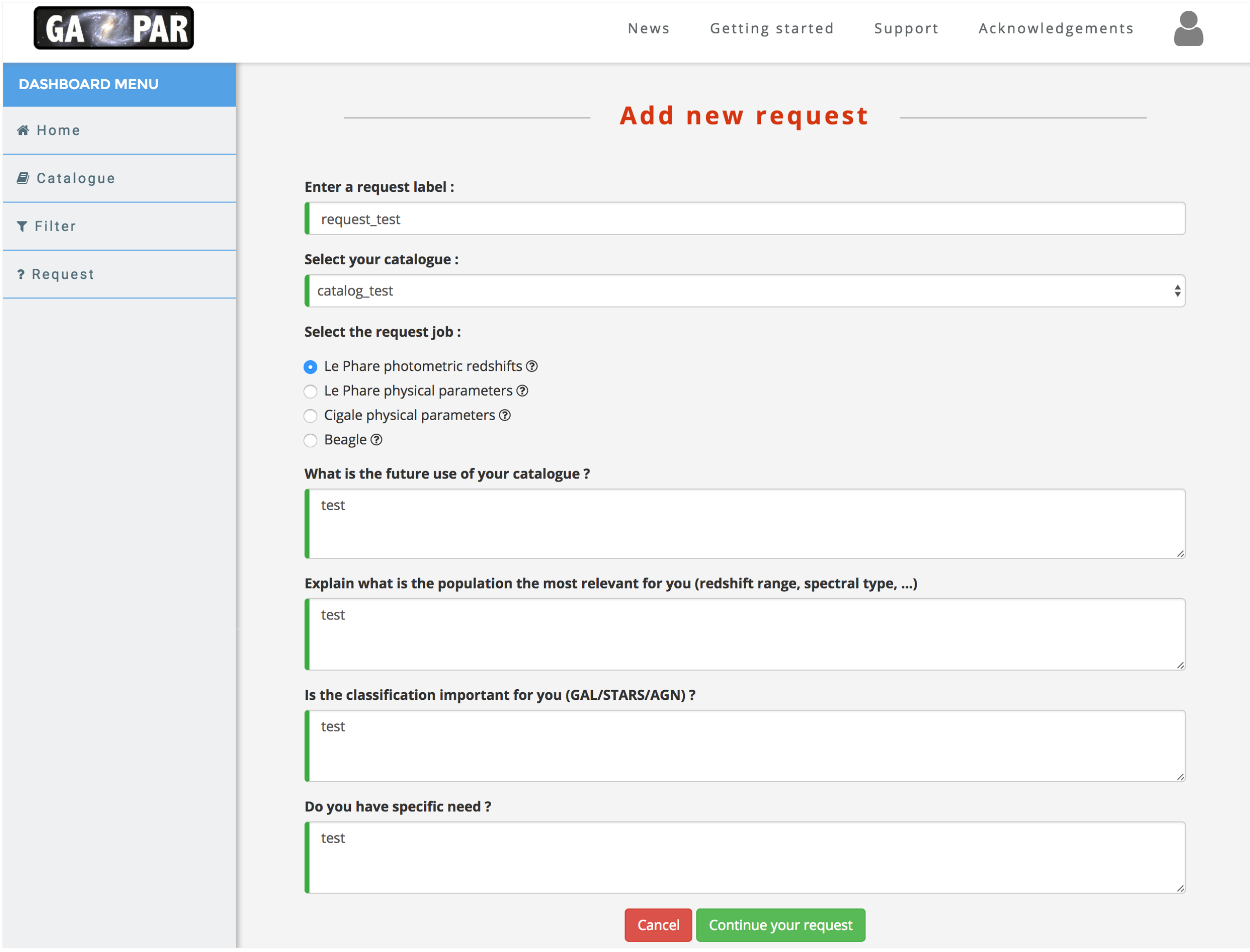
FILTER_CALIB : This keyword allow to consider specific calibrations at long wavelengths in order to apply a correction factor to the original flux estimated by LEPHARE (see section 5.5 for more details).
We define the correction factor as fac_corr= $\frac{\int R_\nu d\nu}{\int \frac{B_\nu}{B_{\nu_0}} R_\nu d\nu} = \frac{\int R_\lambda d\lambda/\lambda^2}{1/\lambda_0^2 \int \frac{B_\lambda}{B_{\lambda_0}} R_\lambda d\lambda}$, where B_ν is the reference spectrum used to calibrate the filters and λ_0 is the effective wavelength defined as $\lambda_0 = \frac{\int R_\lambda B_\lambda \lambda d\lambda}{\int R_\lambda B_\lambda d\lambda}$.
The value of **FILTER_CALIB** allows to describe different combinations of ν_0 and B_ν:
FILTER_CALIB= 0 : $\frac{B_\nu}{B_{\nu_0}} = 1$ or $B_\nu = ctt$. This is the default value used in LEPHARE.
FILTER_CALIB= 1 : $\nu B_\nu = ctt$. This describes the SPITZER/IRAC, ISO calibrations.
FILTER_CALIB= 2 : $B_\nu = \nu$. This describes the sub-mm calibrations.
FILTER_CALIB= 3 : B_ν =black body at T=10,000K.
FILTER_CALIB= 4 : A mix calibration with ν_0 defined from $\nu B_\nu = ctt$ and the flux estimated as B_ν =black body at T=10,000K. This appears to be the adopted scheme for the SPITZER/MIPS calibration.
FILTER_CALIB= 5 : Similar mix calibration with ν_0 defined from $\nu B_\nu = ctt$ and the flux estimated as $B_\nu = \nu$. This may reflect the SCUBA calibration.

5. Requests

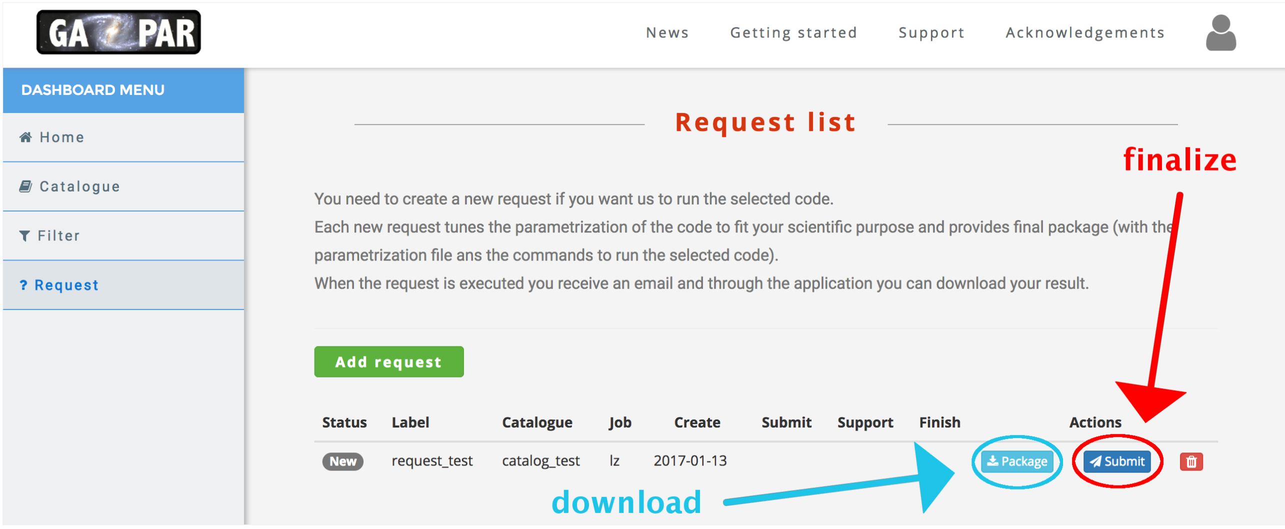
You need to create a new request https://gazpar.lam.fr/dashboard-request if you want us to run the code.



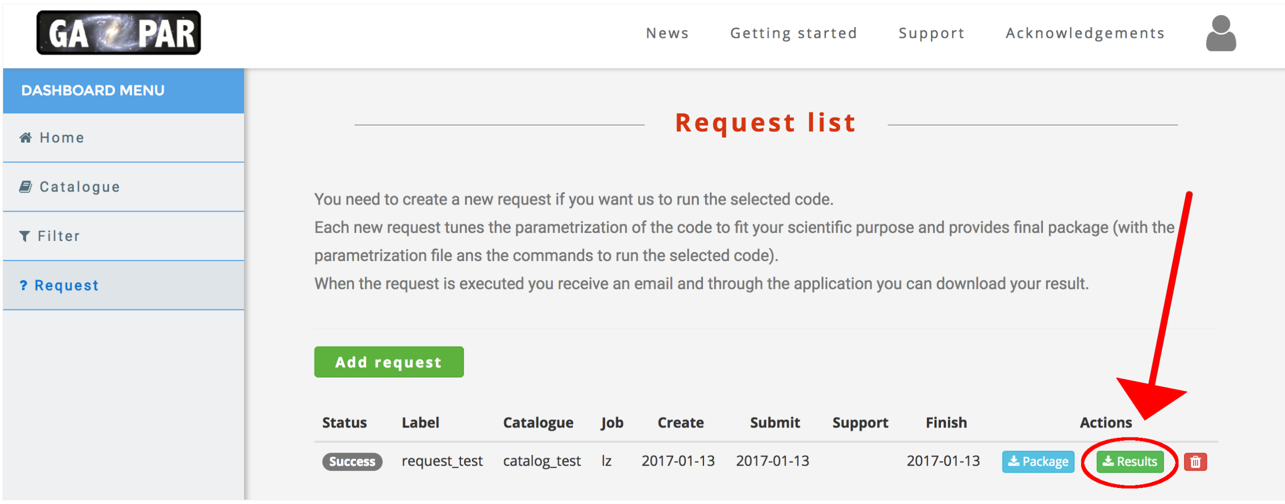
You need to indicate which type of code we should run (LPP, LPZ, CIG, BEA, see section 1.3).
Then, you will have to configure the code. First, you need to fill indications about the scientific goal of your request. This step is necessary for us in order to tuned the code as best as possible for your need. Then, you will have the choice between several options as explained in the next sections. Be aware that we could change these options if we think that they are unappropriated given your dataset.



When the basic configuration of the code is done, you can save and submit directly your request or you can just save it and submit later. On the request page, it's possible to download the final package (catalogue, parameters files...) and submit your request if it was not.



We send you an email as soon as execution of your request is finished. You could download your result through the application.



6 . Configuration of LZ (Le Phare photo-Z)

6.1 Short description of the method

Link to the code: http://cesam.lam.fr/lephare/lephare.html

Documentation of the code:
http://cesam.lam.fr/lephare/download/lephare_doc.pdf

Papers describing the photometric redshifts in Le Phare:
Arnouts et al. (1999) http://adsabs.harvard.edu/abs/1999MNRAS.310..540A
Ilbert et al. (2006) http://adsabs.harvard.edu/abs/2006A%26A...457..841I
Ilbert et al. (2009) http://adsabs.harvard.edu/abs/2009ApJ...690.1236I

6.2 List of the possible options

SED

Only two possible configurations for now:

1. COSMOS_MOD.list // templates used in Ilbert et al. 2009
2. CFHTLS_MOD.list // templates used in Ilbert et al. 2006

REDSHIFT GRID

Step in redshift	0.01 – 0.1
Maximum redshift	0.1 – 15

COSMOLOGY

H0	50 – 100
Omatter	0.1 – 1
O lambda	0 – 0.9

SCALING THE ERRORS

For each filter, the user can add an error in quadrature 0 – 0.5
All the error in flux can also be multiplied by a given factor 1 – 5

ABSOLUTE MAGNITUDE PRIOR

You can impose a prior in absolute magnitude. Galaxies should have $-24<M_B<-5$. If the user wants to use this option, he needs to have a filter close to the B band in rest-frame within its library (G is fine). The user needs to indicate what is this filter to the interface. If not defined, no prior is used. For normal galaxies, we advice to use this option.

TUNING OF THE ZERO-POINTS

Use the spectroscopic sample to tune the zero-points. The method is described in Ilbert et al. (2006). The code compares the predicted and the observed magnitudes. Any systematic offset is corrected band per band.
A minimum of >100 spectroscopic redshifts over a significant range of redshift is necessary to use this option with confidence.

N(z) PRIOR
We can use the N(z) prior defined as a function of the I-band magnitude to remove the risk of catastrophic failures between the Balmer and Lyman breaks. Such option is necessary if you don't have any NIR data. If the user wants to use this option, he needs to have a filter close to the I band within its library. The user needs to indicate what is this filter to the interface. If not defined, no prior is used.

Options for each filters
You can decide to use only a subset of filter from your input catalogue. It allows to perform some tests without changing the input format.
You can also add some error in quadrature to the error. The values are in magnitude (even if your input catalogue is in flux). It allows to decrease the importance of a filter within the fitting procedure.

6.3 Description of the outputs

1. LZ.in // Input file used by GAZPAR
2. LZ.out // photo-z
3. LZ.pdz // Probability Distribution Function
4. LZ.para // Parameter file
5. LZ.pdf // document with the diagnostics
6. fil.tar // tar file with the filters
7. figures.pdf // all the figures that we use for the diagnostics
8. feedback.pdf // The description of the figure and our feedback

7 . Configuration of LP (Le Phare Physical parameters)

7.1 Short description of the method

Link to the code: http://cesam.lam.fr/lephare/lephare.html

Documentation of the code:
http://cesam.lam.fr/lephare/download/lephare_doc.pdf

Papers describing the physical parameters in Le Phare:
Arnouts et al. (2013) http://adsabs.harvard.edu/abs/2013A%26A...558A..67A
Ilbert et al. (2015) http://adsabs.harvard.edu/abs/2014arXiv1410.4875I

7.2 List of the possible options

SED
We allow only the BC03 templates.

bc2003_lr_m62_chab_tau01_dust00.ised	expo	0.1	solar
bc2003_lr_m62_chab_tau03_dust00.ised	expo	0.3	solar
bc2003_lr_m62_chab_tau1_dust00.ised	expo	1	solar
bc2003_lr_m62_chab_tau3_dust00.ised	expo	3	solar
bc2003_lr_m52_chab_tau5_dust00.ised	expo	5	1/2 solar
bc2003_lr_m62_chab_tau5_dust00.ised	expo	5	solar
bc2003_lr_m52_chab_tau30_dust00.ised	expo	30	1/2 solar
bc2003_lr_m62_chab_tau30_dust00.ised	expo	30	solar
bc2003_lr_m52_chab_delayed1_dust00.ised	delayed	1	1/2 solar
bc2003_lr_m52_chab_delayed3_dust00.ised	delayed	3	1/2 solar
bc2003_lr_m62_chab_delayed1_dust00.ised	delayed	1	solar
bc2003_lr_m62_chab_delayed3_dust00.ised	delayed	3	Solar

REDSHIFT GRID
Step in redshift 0.01 – 0.1
Maximum redshift 0.1 – 15

COSMOLOGY
H0 50 – 100
Omatter 0.1 – 1
O lambda 0 – 0.9

EXTINCTION
We allow three different configurations of E(B-V). The maximum value of the extinction depends on the nature of your sample. For instance, you should push it at 0.7 when you study infrared sources or if you want to investigate all possible degeneracies.
EB_V 0.,0.1,0.2,0.3,0.4,0.5,0.6,0.7
EB_V 0.,0.05,0.1,0.15,0.2,0.25,0.3,0.35,0.4,0.45,0.5
EB_V 0.,0.05,0.1,0.15,0.2,0.25,0.3

SCALING THE ERRORS
For each filter, the user can add an error in quadrature 0 – 0.5
All the error in flux can also be multiplied by a given factor 1 – 5

7.3 Description of the outputs

1. LP.in // Input file used by GAZPAR
2. LP.out // physical parameters
3. LP.para // Parameter file
4. LP.pdf // document with the diagnostics
5. fil.tar // tar file with the filters
6. figures.pdf // all the figures that we use for the diagnostics
7. feedback.pdf // The description of the figure and our feedback

8 . Configuration of CI (CIGALE physical parameter)

8.1 Short description of the method

Link to the code: http://cigale.lam.fr

Link to the documentation: http://cigale.lam.fr/pcigale/pcigale_manual.html

Several papers present the concept of CIGALE: Burgarella et al. (2005) and Noll et al. (2009). However, a new version of CIGALE has been released in April 2015 and two papers are in preparation that describe the new CIGALE: Burgarella et al. (2015) and Boquien et al. (2015).

8.2 List of the possible options

The number of options provided by CIGALE is large but is designed in a modular way that allows to select some of them only. Several values can be provided for each parameter. The code will select the best one(s) in from a PDF analysis and plot the best one.

8.2.1 Star formation history

- **sfh2exp**: 2 exponentials (declining or rising), i.e. $e^{-T1/t} + e^{-T2/t}$ for which you need to provide:
  - the value(s) of $T1$, e-folding time of the main stellar population model in Myr
  - the value(s) of $T2$, e-folding time of the young stellar population model in Myr
  - the age(s) of the first stellar population in Myr
  - the age(s) of the second stellar population in Myr
  - the percentage(s) of mass formed in the second one (assumed to be the youngest) [0,1]

- **sfhdelayed**: $T\, e^{-T/t}$ for which you need to provide T and the age of the stellar populations
  - the value(s) of T, e-folding time of the stellar population model in Myr
  - the age(s) of the oldest stellar population in Myr

8.2.2 Simple stellar populations models

- **Bruzual & Charlot (2003)**
- **Maraston (2005)**
- The **Initial Mass Function**, 0 (Salpeter) or 1 (Chabrier)
- The **metallicity**, discrete values depending on the selected SSP

8.2.3 Nebular emission

- **logU**: the ionization parameter

- **f_esc**: the fraction of Lyman continuum photons escaping the galaxy [0,1]
- **f_dust**: the fraction of Lyman continuum photons absorbed by dust [0,1]
- **lines_width**: the line width in km/s

8.2.4 The attenuation law

- **E_BVs_young**: the color excess(es) $E(B-V)_{star}$ of the stellar light for the young population

- **E_BVs_old_factor**: the reduction factor for the $E(B-V)_{star}$ of the old population compared to the young one [0,1]

- **uv_bump_amplitude**: the amplitude of the UV bump at 217.5nm (for Calzetti: 0, for the Milky Way: 3)

- **power_slope**: the slope delta of the power law modifying the attenuation curve. (for Calzetti: 0)

8.2.5 Dust emission models and templates

- **mbb**: single modified black body (with or without energy balance but, on this component only)
    - epsilon_mbb: fraction of the L_dust in the MBB. Possible values between 0 and 1
    - t_mbb: temperature of the dust in K
    - beta_mbb: emissivity index of the dust emission
    - energy_balance: energy balance checked? If false, Lum[MBB] no taken into account in energy balance

- **casey2012**: power-law in the mid-IR and modified black body in the far-IR from Casey et Al. (2012)
    - Temperature of the dust in K
    - Emissivity index of the dust emission
    - Mid-infrared power-law slope
- **dale2014**: Dale et al. (2014) templates
    - fracAGN: AGN fraction. It is not recommended to combine this AGN emission with the of Fritz et al. (2006) models
    - alpha slope in the far-infrared. Possible values are: 0.0625, 0.1250, 0.1875, 0.2500, 0.3125, 0.3750, 0.4375, 0.5000, 0.5625, 0.6250,

0.6875, 0.7500, 0.8125, 0.8750, 0.9375, 1.0000, 1.0625, 1.1250, 1.1875, 1.2500, 1.3125, 1.3750, 1.4375, 1.5000, 1.5625, 1.6250, 1.6875, 1.7500, 1.8125, 1.8750, 1.9375, 2.0000, 2.0625, 2.1250, 2.1875, 2.2500, 2.3125, 2.3750, 2.4375, 2.5000, 2.5625, 2.6250, 2.6875, 2.7500, 2.8125, 2.8750, 2.9375, 3.0000, 3.0625, 3.1250, 3.1875, 3.2500, 3.3125, 3.3750, 3.4375, 3.5000, 3.5625, 3.6250, 3.6875, 3.7500, 3.8125, 3.8750, 3.9375, 4.0000

- **dl2014**: Draine & Li (2014) models: update of Draine & Li (2007)
  - qpah: mass fraction of PAH. Possible value are: 0.47, 1.12, 1.77, 2.50, 3.19, 3.90, 4.58, 5.26, 5.95, 6.63, 7.32
  - umin: minimum radiation field. Possible values are: 0.100, 0.120, 0.150, 0.170, 0.200, 0.250, 0.300, 0.350, 0.400, 0.500, 0.600, 0.700, 0.800, 1.000, 1.200, 1.500, 1.700, 2.000, 2.500, 3.000, 3.500, 4.000, 5.000, 6.000, 7.000, 8.000, 10.00, 12.00, 15.00, 17.00, 20.00, 25.00, 30.00, 35.00, 40.00, 50.00
  - alpha: power-law slope dU/dM propto U^alpha. Possible values are: 0.100, 0.120, 0.150, 0.170, 0.200, 0.250, 0.300, 0.350, 0.400, 0.500, 0.600, 0.700, 0.800, 1.000, 1.200, 1.500, 1.700, 2.000, 2.500, 3.000, 3.500, 4.000, 5.000, 6.000, 7.000, 8.000, 10.00, 12.00, 15.00, 17.00, 20.00, 25.00, 30.00, 35.00, 40.00, 50.00
  - **gamma**: fraction illuminated from Umin to Umax. Possible values between 0 and 1

8.2.6 AGN models

Fritz et al. (2006) models. The relative normalization of these components is handled through a parameter which is the fraction of the total IR luminosity due to the AGN so that: L_AGN = fracAGN * L_IRTOT, where L_AGN is the ANG luminosity, fracAGN is the contribution of the AGN to the total IR luminosity L_IRTOT), i.e. L_Starburst + L_AGN

  - **r_ration**: ratio of the maximum to minimum radio of the dust torus. Possible values are: 10, 30, 60, 100, 150

- **tau**: optical depth at 9.7 microns. Possible values are: 0.1, 0.3, 0.6, 1.0, 2.0, 3.0, 6.0, 10.0
- **beta**: possible values are: -1.00, -0.75, -0.50, -0.25, 0.00
- **gamma**: possible values are: 0.0, 2.0, 4.0, 6.0
- **opening_angle**: full opening angle of the dust torus (Fig 1 of Fritz. 2006). Possible values are: 60, 100, 140
- **fracAGN**: AGN fraction. Possible values between 0 and 1
- **psy**: angle between equatorial axis and line of sight. Psy = 90° for type 1 and Psy = 0° for type 2. Possible values are: 0.001, 10.100, 20.100, 30.100, 40.100, 50.100, 60.100, 70.100, 80.100, 89.990

8.2.7 Radio emission

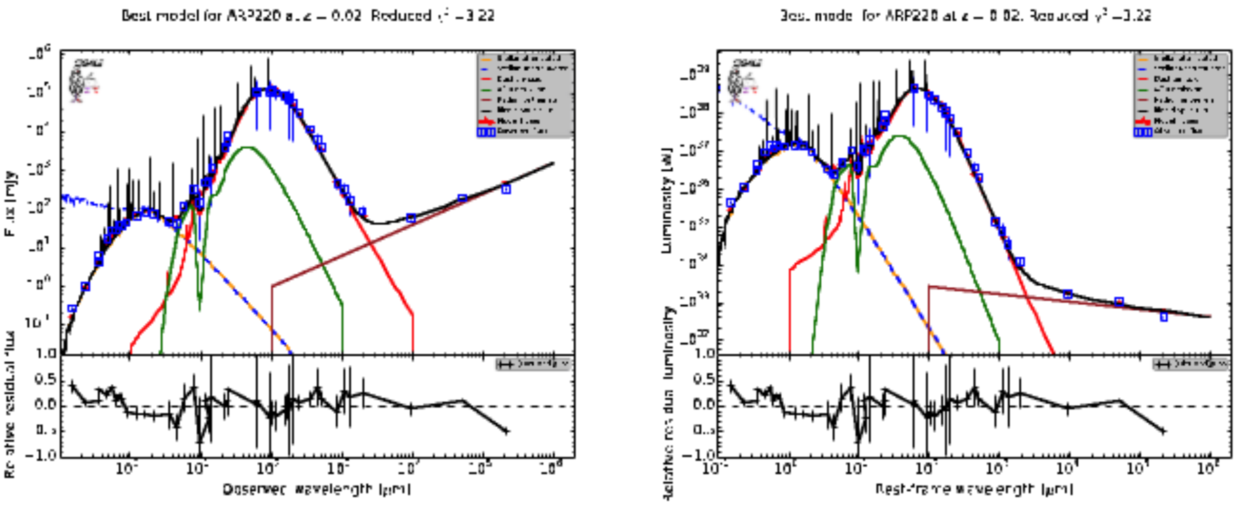
Given the number of Lyman photons, the module computes the free-free (thermal) emission of galaxies. Based on the SN collapse rate, the module computes the synchrotron (non-thermal) emission of galaxies.

- **qir**: the value of the FIR/radio correlation coefficient
- **alpha**: the slope of the power-law synchrotron emission

8.3 Description of the outputs

- **best_models**: ASCII file containing the description of the best model (parameters and modeled flux densities)

- **analysis_results.txt**: ASCII file containing the statistical analysis (from probability distribution function) of the list of parameters specified among the following ones:
- for each object fitted, **plots** (see below) containing the best model (mJy in observed frame or Watt in rest-frame superimposed to the observed data and the different components used in the fit (stellar, nebular, AGN, dust, radio emission)



- **Plots** containing the probability distribution functions for each of the analyzed parameters

- for each object, an **XML file** containing the star formation history, the total flux density F$_{lambda}$, the total flux density F$_{nu}$ and the various (all of them) components used to the best fit (see below).

	Visible	Name	$ID	Class	Units	Description	UCD	Datatype	VOTable ID
0	☐	Index	$0	Long		Table row index			
1	☑	wavelength	$1	Double	nm		em.wl	double	wavelength
2	☑	F_nu	$2	Double	mJy		phot.flux	double	F_nu

	Visible	Name	$ID	Class	Units	Description	UCD	Datatype	VOTable ID
0	☐	Index	$0	Long		Table row index			
1	☑	wavelength	$1	Double	nm		em.wl	double	wavelength
2	☑	F_lambda_total	$2	Double	W.nm-1		phot.flux	double	F_lambda_total
3	☑	stellar.old	$3	Double	W.nm-1		phot.flux	double	stellar.old
4	☑	stellar.young	$4	Double	W.nm-1		phot.flux	double	stellar.young
5	☑	attenuation.stellar.old	$5	Double	W.nm-1		phot.flux	double	attenuation.stellar.old
6	☑	attenuation.stellar.young	$6	Double	W.nm-1		phot.flux	double	attenuation.stellar.young
7	☑	dust	$7	Double	W.nm-1		phot.flux	double	dust
8	☑	igm	$8	Double	W.nm-1		phot.flux	double	igm

	Visible	Name	$ID	Class	Units	Description	UCD	Datatype	VOTable ID
0	☐	Index	$0	Long		Table row index			
1	☑	time	$1	Double	Myr		time.age	double	time
2	☑	SFR	$2	Double	Msun.yr-1		phys.SFR	double	SFR

9 . Configuration of BEA (BEAGLE physical parameters)

9.1 Short description of the method

Link to the code : http://www.jacopochevallard.org/beagle/

9.2 List of the possible options

TO BE DONE

10 . Annex

# NAME	Lbda_mean	Lbeff(Vega)	FWHM	AB-cor
2mass/J.pb	1.2445	1.2322	0.1830	0.9009
2mass/H.pb	1.6551	1.6428	0.2580	1.3790
2mass/Ks.pb	2.1690	2.1558	0.2771	1.8450
cfht/atm_uMegacam.fil	0.3854	0.3914	0.0526	0.3198
cfht/atm_gMegacam.fil	0.4915	0.4821	0.1433	-0.0800
cfht/atm_rMegacam.fil	0.6283	0.6218	0.1202	0.1636
cfht/atm_iMegacamOld.fil	0.7719	0.7639	0.1452	0.3955
cfht/atm_iMegacamNew.fil	0.7585	0.7497	0.1587	0.3714
cfht/atm_zMegacam.fil	0.8872	0.8827	0.0947	0.5267
cfht/Y_wircam.final	1.0263	1.0234	0.1001	0.6096
cfht/J_wircam.final	1.2558	1.2501	0.1510	0.9281
cfht/H_wircam.final	1.6348	1.6212	0.2817	1.3579
cfht/Ks_wircam.final	2.1587	2.1447	0.3176	1.8350
galex/FUV.pb	0.1546	0.1550	0.0234	2.3403
galex/NUV.pb	0.2343	0.2307	0.0789	1.7501
herschel/PACS_70.pb	72.7502	70.2997	21.7095	9.0667
herschel/PACS_100.pb	103.8662	98.8571	36.6686	9.8421
herschel/PACS_160.pb	170.4786	-99.9999	77.8152	-99.0000

herschel/SPIRE_PSW.pb	253.6124	-99.9999	75.0991	-99.0000
herschel/SPIRE_PMW.pb	355.6330	-99.9999	103.9586	-99.0000
herschel/SPIRE_PLW.pb	518.1159	-99.9999	197.2566	-99.0000
hst/wfc_F435W.lowres	0.4357	0.4339	0.0898	-0.0956
hst/wfc_F475W.lowres	0.4800	0.4709	0.1402	-0.0891
hst/wfc_F555W.lowres	0.5396	0.5332	0.1238	0.0016
hst/wfc_F606W.lowres	0.6033	0.5810	0.2257	0.0940
hst/wfc_F625W.lowres	0.6351	0.6266	0.1390	0.1705
hst/wfc_F755W.lowres	0.7731	0.7652	0.1518	0.3979
hst/wfc_F814W.lowres	0.8143	0.7989	0.2112	0.4324
hst/wfc3-F125W.lowres	1.2561	1.2349	0.2998	0.9059
hst/wfc3-F140W.lowres	1.4064	1.3731	0.3936	1.0859
hst/wfc3-F160W.lowres	1.5464	1.5305	0.2880	1.2648
hst/NICMOS_F160W.lowres	1.6016	1.5718	0.4029	1.3048
noao/J1.lowres	1.0486	1.0422	0.1490	0.6440
noao/J2.lowres	1.1970	1.1914	0.1487	0.8394
noao/J3.lowres	1.2798	1.2749	0.1406	0.9598
noao/H1.lowres	1.5623	1.5568	0.1662	1.2998
noao/H2.lowres	1.7088	1.7037	0.1746	1.4266
noao/Ks.lowres	2.1762	2.1612	0.3121	1.8493
scuba/SCUBA450.dat	45.0802	59.0023	3.1640	19.0610
scuba/SCUBA850.dat	865.4975	-99.9999	86.1953	-99.0000
sdss/up.pb	0.3572	0.3609	0.0566	0.9260
sdss/gp.pb	0.4751	0.4674	0.1176	-0.0921
sdss/rp.pb	0.6204	0.6141	0.1131	0.1496
sdss/ip.pb	0.7520	0.7459	0.1253	0.3636
sdss/zp.pb	0.8993	0.8928	0.0998	0.5273
spitzer/irac_ch1.pb	3.5762	3.5260	0.7411	2.7959
spitzer/irac_ch2.pb	4.5288	4.4608	1.0105	3.2635
spitzer/irac_ch3.pb	5.7869	5.6751	1.3509	3.7556
spitzer/irac_ch4.pb	8.0440	7.7034	2.8394	4.3961
spitzer/mips_24.pb	23.8463	19.9829	5.3245	16.0620
spitzer/mips_70.pb	72.5645	70.0044	18.9835	9.1164
spitzer/mips_160.pb	156.9651	-99.9999	34.5472	-99.0000
subaru/B_suprime.pb	0.4478	0.4439	0.0807	-0.1015
subaru/V_suprime.pb	0.5492	0.5448	0.0935	0.0102
subaru/r_suprime.pb	0.6314	0.6232	0.1349	0.1649
subaru/i_suprime.pb	0.7707	0.7628	0.1488	0.3927
subaru/z_suprime.pb	0.9054	0.9021	0.0956	0.5220
subaru/zpp_suprime.pb	0.9124	0.9088	0.1351	0.5219
subaru/IB427_suprime.pb	0.4264	0.4256	0.0207	-0.1445
subaru/IB464_suprime.pb	0.4636	0.4633	0.0218	-0.1511
subaru/IB484_suprime.pb	0.4851	0.4847	0.0228	-0.0240
subaru/IB505_suprime.pb	0.5064	0.5061	0.0231	-0.0649
subaru/IB527_suprime.pb	0.5262	0.5259	0.0242	-0.0251
subaru/IB574_suprime.pb	0.5766	0.5762	0.0272	0.0671
subaru/IB624_suprime.pb	0.6234	0.6230	0.0301	0.1540
subaru/IB679_suprime.pb	0.6783	0.6779	0.0336	0.2543
subaru/IB709_suprime.pb	0.7075	0.7070	0.0316	0.2985
subaru/IB738_suprime.pb	0.7363	0.7358	0.0323	0.3471
subaru/IB767_suprime.pb	0.7687	0.7681	0.0364	0.3992
subaru/IB827_suprime.pb	0.8246	0.8241	0.0344	0.4896
subaru/NB711_suprime.pb	0.7120	0.7120	0.0073	0.3078
subaru/NB816_suprime.pb	0.8150	0.8149	0.0120	0.4731
subaru/g_HSC.pb	0.4851	0.4761	0.1194	-0.0858
subaru/i_HSC.pb	0.7716	0.7636	0.1476	0.3945
subaru/r_HSC.pb	0.6242	0.6142	0.1539	0.1468
subaru/y_HSC.pb	0.9801	0.9770	0.0797	0.5536
subaru/z_HSC.pb	0.8915	0.8907	0.0768	0.5181
ukirt/Y.pb	1.0377	1.0347	0.1022	0.6292
ukirt/J.pb	1.2511	1.2449	0.1501	0.9202

ukirt/H.pb	1.6399	1.6248	0.2874	1.3605
ukirt/Ks.pb	2.1628	2.1480	0.3267	1.8385
vista/Y_vircam.pb	1.0222	1.0196	0.0919	0.6047
vista/J_vircam.pb	1.2556	1.2482	0.1712	0.9232
vista/H_vircam.pb	1.6497	1.6352	0.2893	1.3703
vista/Ks_vircam.pb	2.1576	2.1435	0.2926	1.8341
vlt/wfi_U38.pb	0.3681	0.3715	0.0326	0.7824
vlt/wfi_U50.pb	0.3530	0.3550	0.0536	1.0233
vlt/wfi_B.pb	0.4619	0.4574	0.0847	-0.1093
vlt/wfi_V.pb	0.5391	0.5355	0.0915	-0.0066
vlt/wfi_R.pb	0.6540	0.6436	0.1597	0.1996
vlt/wfi_I.pb	0.8691	0.8578	0.1459	0.4999
vlt/wfi_Z.pb	0.9605	0.9595	0.0543	0.5303

Table1. Generic filter list included in GAZPAR