Abstract
We present CIGALE (Burgarella et al., 2005; Noll et al., 2009), a SED fitting code developed especially to take into account both the dust UV-optical attenuation and the corresponding infra-red re-emission. From multi-wavelength observations of galaxies, CIGALE can derive some of their physical parameters. We also give some examples of scientific results obtained with CIGALE.

Aim of the software
The multi-wavelength observation of galaxies allows astrophysicists to derive some of their physical parameters from the comparison of their spectral energy distributions (SEDs) to computed SEDs based on models and templates (SED fitting). Scientists from the Laboratoire d’Astrophysique de Marseille developed CIGALE (CIGALE), a Code Investigating Galaxy Emission that takes into account both the dust ultraviolet-optical attenuation and its corresponding infra-red re-emission. CIGALE is able to statistically derive reliable physical parameters from UV to IR observations.

How CIGALE works
As presented in figure 1, the user provides CIGALE with multi-fluxes and redshift for studied galaxies, as well as a list possible values for physical parameters. Those parameters are related to star formation history (τ and ages for young and old Stellar Populations (SP), dust attenuation (V-band attenuation, reduction factor of $A_v$ for old SP) and dust emission (IR power law slope, AGN related fraction of $l_{EUV}$). Using various models, libraries and templates (in blue in figure 2) CIGALE computes all the possible spectra and derives mean fluxes for the observed filter bands. Then a Bayesian-like statistical analysis permits to determine the best value for each parameter as well as the best computed model (see figures 3 and 4) for each galaxy.

Examples of scientific applications

![Graph showing dust-related depression at 217.9nm](image)

Buat et al. (2011) used CIGALE to show a dust-related depression in flux density at 217.9nm (rest-frame) in high redshift sources (figure 3).

![Graph showing CIGALE fitting results](image)

Conley et al. (2011) used CIGALE to study the multiply-lensed galaxy HLSW-01 and compute some of its physical properties.

![Diagram of CIGALE operation workflow](image)

From the CIGALE code base, Serra et al. (2011) developed CIGALEMC that uses a Monte Carlo Markov Chain method to find the best fit parameters. CIGALEMC was developed to be:
- efficient: needed CPU time grows linearly (not exponentially as with CIGALE) with the number of fitted parameters
- accurate: statistical quantities are robustly determined using Gelman & Rubin diagnostic as convergence criteria
- user friendly: a priori deciding the parameter density, to find a compromise between accuracy and speed, is not necessary

Future evolutions of CIGALE
- We are studying the port of CIGALE to Python for more modularity, more readability of the code and more evolution opportunities.

Contact and download
CIGALE is available for download on its web site (see footer), where you will also find an on-line, java applet based, version. For more information on CIGALE software, you can contact Denis Burgarella (denis.burgarella@oamp.fr).
You can also talk to Yannick during ADASS conference.

http://cigale.oamp.fr/misc/adass2010poster

View this poster ↑ on the web.

References