

# GUAIX Software Development

- Sergio Pascual Ramírez
  - Nicolás Cardiel López
- Cristina Catalán-Torrecilla
  - África Castillo Morales
    - Armando Gil de Paz
- Alejandro Sánchez de Miguel



## Software development

The development of common software in our group is centralized in our GitHub group:

<https://github.com/guaix-ucm>

Most of the code is Python, with relevant parts in C, C++ and Fortran.


Python packages are also released via PyPI and Conda-Forge (also stored in [Zenodo](#))

The screenshot shows a GitHub search results page for the 'guaix-ucm' organization. It displays a list of public repositories:

- megaradrp** (Public): MEGARA (Multi-Espectrógrafo en GTC de Alta Resolución para Astronomía) is a facility instrument designed for the 10.4m GTC telescope in La Palma (Spain). Python, 11 stars, 6 forks.
- pyemir** (Public): EMIR (Espectrógrafo Multi Objeto Infrarrojo) is a facility instrument designed for the 10.4m GTC telescope in La Palma (Spain). This packages provides de Data Reduction Pipeline. Python, 6 stars, 6 forks.
- rgbloom** (Public): RGB synthetic photometry from Gaia DR3 spectrophotometry. Python, 2 forks.
- filabres** (Public): Forked from [nicocardiel/filabres](#). Automatic data reduction of astronomical images. Python.

Below the repository list, there is a search bar and filters for 'Type', 'Language', and 'Sort'. The search results are filtered to show Python packages:

- rawplot** (Public): Collection of plotting commands to analyze DSLR raw images using matplotlib. Python, 0 stars, 0 forks, 0 issues, 0 pull requests. Updated yesterday.
- pyemir-tutorials** (Public): Tutorials for PyEmir, the EMIR pipeline. Python, 0 stars, 1 fork, 0 issues, 0 pull requests. Updated 5 days ago.
- pyemir** (Public): EMIR (Espectrógrafo Multi Objeto Infrarrojo) is a facility instrument designed for the 10.4m GTC telescope in La Palma (Spain). This packages provides de Data Reduction Pipeline. Python, 0 stars, 1 fork, 0 issues, 0 pull requests. Updated 5 days ago.





MEGARA Data Reduction Pipeline

copied from [cf-staging / megaradrp](#)

<b>Conda</b>	Files	Labels	Badges
--------------	-------	--------	--------

- License: GPL-3.0-or-later
- Home: <https://github.com/guaix-ucm/megaradrp>
- Development: <https://github.com/guaix-ucm/megaradrp>
- Documentation: <https://megaradrp.readthedocs.io/>
- 123249 total downloads
- Last upload: 3 months and 21 days ago

## Installers

**Info:** This package contains files in non-standard [labels](#).

- linux-64 v0.14.1
- osx-64 v0.14.1
- win-64 v0.13
- osx-arm64 v0.14.1

conda install



Buscar proyectos



[Ayuda](#)

[Patrocinadores](#)

[Acceder](#)

[Registrarse](#)

# rgbloom 1.7



[Versión más reciente](#)

```
pip install rgbloom
```



Publicación: 27 sept 2023

RGB from Gaia EDR3

## Navegación

[Descripción de proyecto](#)

[Histórico de versiones](#)

[Archivos de descarga](#)

## Enlaces del proyecto

[Homepage](#)

## Descripción de proyecto

### rgbloom

This Python code retrieves RGB magnitudes computed from low resolution spectra published in *Gaia* DR3, following the methodology described in [Carrasco et al. \(2023\)](#). These magnitudes are given in the standard system defined by [Cardiel et al. \(2021a\)](#).

The code presented here is an updated version of [rgbloves](#), which originally provided RGB magnitudes from *Gaia* EDR3 photometric data, as explained in [Cardiel et al. \(2021b\)](#).

The RGB magnitudes provided by [Carrasco et al. \(2023\)](#) are considered more reliable as they are directly computed from the source spectrum, without the need for any approximate calibration or constraints on source colour or extinction. Moreover, the number of sources with RGB estimates has significantly increased from approximately 15



IPARCOS



## Software development: Data reduction pipelines

Our group develops Data Reduction Pipelines (DRP) for several instruments.

For GTC:

- [pyemir](#) and [megaradrp](#) are the official pipelines of [EMIR](#) and [MEGARA](#).
- In the case of [FRIDA](#), we are currently developing the official pipeline [fridadrp](#).
- The integration of the DRP with the GTC control system is provided by our package [numina](#)
- Other instruments such as [MIRADAS](#) are using the framework provided by **numina**.

For Calar Alto observatory:

- [filabres](#) is an automated pipeline for CAFOS, the camera at 2.2m telescope
- **tarsisdrp** is currently in design stage, will be the DRP of the future Tarsis instrument at 3.5m telescope

Usually not considered an astronomical instrument are **DSLR cameras**.

As an ongoing effort, we are creating **tools to process images** obtained with such cameras in the **context of light pollution**:

- [rgbloom](#) computes magnitudes of Gaia DR3 stars in filters tailored for DSLR cameras.





## Light pollution

The measurement of the **sky brightness as a proxy of light pollution** has been the task of the astronomers to monitor the light pollution.

Increasing light pollution is a threaten to astronomical observatories

**The night sky brightness is one of the key parameters of the sky astronomical quality.**



IPARCOS

**Light pollution** can be measured in two complementary ways. From the surface using **photometers and DSLR cameras**.

From low orbit using **satellite images**.



# TESS night sky brightness photometry

- **TESS** is a photometer designed by our group in the context of the Stars4all project.
- It monitors zenith sky brightness every night
- It is mounted inside a weatherproof enclosure
- Only electricity and WIFI is needed.
- Extra features: Open data, hardware and software. MQTT protocol.

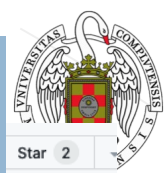
32 mm

83 mm

60 mm







**Tesstractor** is a SW to read data from TESS and SQM photometers via serial connection. Useful when no Wi-Fi is available

## Home

Sergio Pascual edited this page on Nov 16, 2023 · 8 revisions

# Tesstractor

Tesstractor is a software designed to read data from TESS photometers (<http://tess.stars4all.eu>). It also reads data also from Unihedron SQM-LU photometers.

The data from the TESS photometers can be:

- Written to a file using the IDA format
- Sent via MQTT to the STARS4ALL server

In the case of SQM-LU, only the file output is supported. The STARS4ALL server doesn't handle the SQM data at the moment, but we are testing the procedure.

## Installation

TESStractor works with Python 3.6 and 3.7. It could work with previous versions of Python 3 (we haven't tested).

You can install directly from [PyPI](#). We recomend installing in a virtual environment or with the `--user` option. Please do not [sudo pip](#)

```
$ pip install tesstractor
```

Pages 1

Find a page...

Home

- Tesstractor
- Installation
- Using TESStractor
  - Configuration file
  - Running tesstractor
  - Running tesstractor with systemd
- License

Clone this wiki locally

<https://github.com/guaix-ucm/te>



## AC<sup>3</sup> project

AC<sup>3</sup>

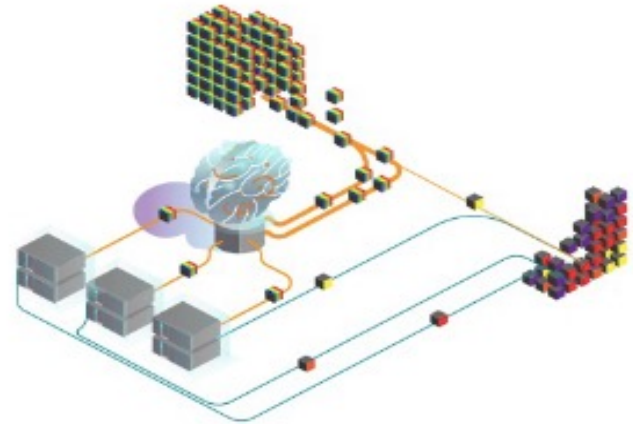
AGILE AND COGNITIVE CLOUD EDGE CONTINUUM MANAGEMENT



**Agile and Cognitive Cloud edge Continuum management** (<https://ac3-project.eu/>) is a project under the European Union's Horizon Europe Research and Innovation programme.

The AC<sup>3</sup> project will employ an AI/ML algorithm to predict the use of resources (computing power, networking and Data, CECC) and microservices.

Our group oversees UseCase3: **Deciphering the universe: processing hundreds of TBs of astronomy data**, one of the proofs of concept of the project.



We plan to containerize specific analysis tools (**Steckmap**, **pPXF**, **Starlight**) and run them inside a K8s cluster.

- The purpose is:
- To demonstrate the CECCM's capabilities to deploy and run astronomical software
  - To integrate scientific applications that will take advantage of cloud infrastructures

