

ADASS 2021: Instructions for the Participants

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Title for the tutorial

Gnuastro hands-on tutorial for astronomical data analysis

Links to download the data needed for the exercises

The datasets consist in 3 images (different photometric filters) and 1 catalog that can be downloaded from the following links:

- F105W image: http://cdsarc.u-strasbg.fr/ftp/J/A+A/621/A133/fits/ah_f105w.fits
- F125W image: http://cdsarc.u-strasbg.fr/ftp/J/A+A/621/A133/fits/ah_f125w.fits
- F160W image: http://cdsarc.u-strasbg.fr/ftp/J/A+A/621/A133/fits/ah_f160w.fits
- UVUDF catalog: https://archive.stsci.edu/missions/hlsp/uvudf/v2.0/hlsp_uvudf_hst_wfc3-uviz_udf-epoch3_multi_v2.0_cat.fits

Software to install

- **(Mandatory)** Laptop or machine, with GNU/Linux or macOS.
- **(Mandatory)** Gnuastro installed and ready to be used. At least Gnuastro 0.15: <https://www.gnu.org/software/gnuastro/#download>. More information about how to install it: https://www.gnu.org/software/gnuastro/manual/html_node/Installation.html
- **(Mandatory)** SAO DS9 installed and ready to be used. This is necessary for visualizing astronomical images. More information: <https://sites.google.com/cfa.harvard.edu/saoimageds9>
- **(Recommended)** TOPCAT. Necessary for plotting some kind of data. More information: <http://www.star.bris.ac.uk/~mbt/topcat/>

Installing Gnuastro via Conda

Execute the following lines to install Gnuastro using Conda.

```
# Download (add also the link for macOS)
wget https://repo.anaconda.com/miniconda/Miniconda3-latest-Linux-x86_64.sh

# Installing (in a directory named conda-install)
bash Miniconda3-latest-Linux-x86_64.sh -b -p conda-install

# Activating the environment
source conda-install/etc/profile.d/conda.sh

# Creating the Gnuastro's conda environment
conda create -n gnuastro -c conda-forge gnuastro

# Activating the Gnuastro environment
conda activate gnuastro
```

How to test that everything works and is ready for the exercise(s)

In order to check that Gnuastro and SAO DS9 have been properly installed, and the datasets downloaded, here are some very basic checks:

- **Checking Gnuastro.** Open a terminal and go to the directory in which you have downloaded the image “ah_f125w.fits”. Then, run this line: `$ astfits ah_f125w.fits`. You should obtain something like:

```
Fits (GNU Astronomy Utilities) 0.15
Run on Thu Sep 30 04:42:07 2021
-----
HDU (extension) information: 'ah_f125w.fits'.
Column 1: Index (counting from 0, usable with '--hdu').
Column 2: Name ('EXTNAME' in FITS standard, usable with '--hdu').
Column 3: Image data type or 'table' format (ASCII or binary).
Column 4: Size of data in HDU.
-----
 0      INFO          no-data          0
 1      SCI           float32         2809x2856
 2      +1s          float64         2809x2856
 3      -1s          float64         2809x2856
```

- **Checking SAO DS9.** Open a terminal and go to the directory in which you have downloaded the image “ah_f125w.fits”. Then, run this line: `$ ds9 ah_f125w.fits`. A DS9 windows should pop out. If not, check that DS9 is properly installed. You may have to configure it to be able to invoke DS9 from the command line: https://www.gnu.org/software/gnuastro/manual/html_node/SAO-DS9.html#SAO-DS9
- **Where to find any support material.** The tutorial is already available at: <https://gitlab.com/makhlaghi/smack-talks-iac/-/blob/master/smack-3-gnuastro.md>. Similar tutorial is also available in YouTube: <https://www.youtube.com/watch?v=6mp5-y5XYS0>. Much more extended tutorials and examples can be found at the Section 2 of the Gnuastro documentation Book: https://www.gnu.org/software/gnuastro/manual/html_node/Tutorials.html#Tutorials.
- **Contact information for pre-tutorial support.** Do not hesitate to contact by email: `infante-sainz::at::gmail.com`