

## Eighth ctools coding sprint

The Eighth ctools coding sprint will take place at IRAP, Toulouse in the week 9-13 October 2017. A detailed schedule will be uploaded in the near future.

Follow us on twitter (hash tag #ctools8).

### Audience and Participants

Everyone is welcome; if you have used ctools for CTA science simulations or IACT data analysis, if you are interested in contributing to the ctools and GammaLib software code development, or if you are already an experienced developer, you can contribute. You will need programming skills in Python or C++, best is of course if you are experienced in both. We will split into groups and work onto a number of issues. Bring your laptop. If possible, install git before coming and git clone ctools and GammaLib. For new folks: you can get a head start also by making an account on Redmine and taking a look at the code documentation ( <http://cta.irap.omp.eu/ctools/> and <http://cta.irap.omp.eu/gammalib/>).

If you plan to attend, simply add your name to the list below:

- Jürgen Knödlseder (IRAP)
- Josh Cardenzana (IRAP)
- Pierrick Martin (IRAP)
- Luigi Tibaldo (IRAP)

### Practical information

The meeting will take place at IRAP-Roche, information of how to reach the location can be found at <http://cta.irap.omp.eu/toulouse2011/practical.html> (the bus schedule may be a bit outdated! Take the bus 78 from Faculté de Pharmacie and exit at stop LAAS, then it's less then 5 min walk to IRAP).

A suggestion of possible hotels is on <http://cta.irap.omp.eu/toulouse2011/accomodation.html> (also this information dates back to 2011, but I guess most hotels are still there). Note that since recently we have a tramway connection to the airport. You may take the tram to go to the terminus (Palais de Justice) and from there take the metro to Faculté de Pharmacie (direction Ramonville) to go to the lab.

Another link with information about IRAP is here: <http://www.irap.omp.eu/en/presentation/infos-pratiques>

### Prerequisites for the sprint

- Have Git installed on your laptop and familiarize with it's use (see <https://git-scm.com>). You may use a GUI front end for Git. Personally I use SmartGit which I find extremely convenient to forget about the detailed syntax of Git commands (see <http://www.syntevo.com/smartgit/>)
- Learn about the ctools & GammaLib Git workflow and learn how to use GitLab (see <http://cta.irap.omp.eu/ctools/develop/git/index.html>)
- If you never have done a commit, try to create a fake commit in your GitLab user space as follows
  - create forks of the ctools and GammaLib projects in your GitLab user space
  - create a feature branch in the fork (either in ctools or GammaLib)
  - clone the fork to your machine
  - edit the code
  - compile the code
  - commit the code
- Read our GammaLib & ctools reference paper (<http://www.aanda.org/articles/aa/abs/2016/09/aa28822-16/aa28822-16.html>)

### Tentative agenda

This will be updated later

### Next sprint

Contact Jürgen if you would like to host a future coding sprint!

# Collection of issues to be addressed during the sprint

Post your ideas for possible projects to work on during the coding sprint here:

- Improve tools based on Data Challenge User feedback
  - #2194
- Give classical analysis a push
  - #2207: Add ring background method to ctscopymap for background subtraction
    - Add RING option, loop over all sky regions ("pixels") and determine background in a ring, scale by background rate, and subtract
    - Inputs:
      - Source integration radius
      - Ring radii (inner & outer), ON region solidangle is 1/7 of OFF region solidangle in H.E.S.S
      - Optional exclusion regions
  - Add sky map smoothing capabilities to ctscopymap
  - Work out and implement a classical analysis use case
  - Reflected region background for spectra
    - #2208: Add csphagen script to produce XML/PHA/ARF/RMF data to be fed into ctlike, csspec
      - Inputs:
        - Event list or XML file
        - On region
        - Exclusion region (optional)
        - Minimum number of reflected regions (use all reflected regions that you can)
        - Flag to toggle between stacking and joint analysis
      - Outputs:
        - PHA file(s), ARF file(s), RMF file(s), XML file
        - DS9 file of ON and OFF regions
    - #1121: Add GSKyRegionMap to handle exclusion regions
    - #2209: Add WSTAT as option to GCTAOnOffObservation
    - #2210: Check current assumptions in GCTAOnOffObservation
    - Check that all of the following tools work with On/Off data: ctlike, csspec, ctlimit, ctbutterfly
  - #2130: cssens improvements
    - Add background systematics and  $N > 10$  limit to cssens
    - Add Li & Ma sensitivity computation to cssens
- Give non-CTA analysis a push (specifically thinking about Fermi-LAT; there were requests of tutorials on how to analyse Fermi-LAT data, and simply working on such tutorials and adding new stuff to the code as needed would be a nice project)
- Adding Global or Shared Model Parameters (similar to setting a single DM limit with stacked dwarf galaxy observations - NKH)