SOFIA@AAS 2019
FORCAST Grism and HAWC+ Workshop Setup
January 6, 2019

During the workshop, we will be demonstrating analysis techniques on example data sets from both FORCAST and HAWC+. Both the morning (FORCAST) and afternoon (HAWC+) sessions of the workshop are designed to be interactive. While participants are welcome to follow along with the material presented, the workshop will be more rewarding for attendees who are analyzing SOFIA data in real time with the SOFIA scientists.

We will be working with three example data sets. For the morning session, we will be analyzing grism spectra of AB Aurigae and NGC 7009 from FORCAST. The example data for the afternoon session will be imaging polarimetry of 30 Doradus with HAWC+.

These data can be downloaded directly from the SOFIA Data Cycle System (DCS); alternatively, both data sets have been staged at the SOFIA Observatory Github page. Instructions for downloading the data can be found below.

The workshop is designed to be interactive with the use of python and jupyter notebooks. The notebooks and reduction techniques (data cookbook "recipes") are already available at the SOFIA Observatory Github page, and workshop participants are welcome to attend without having knowledge of python. However, to follow along in a "live" python session, follow the instructions below to create the prerequisite environment.

Downloading AB Aur FORCAST Data

From DCS:

- If you do not yet have a DCS account, register for one at https://dcs.arc.nasa.gov/userSupport/registration.jsp
- Log into DCS: https://dcs.arc.nasa.gov
- Go to Search Science Archive
- Click the arrow next to Advanced Search
- Fill in:
    - Year: 2017 from drop-down menu
    - MissionID: 2017-09-27_FO_F434 from drop-down menu
    - Instrument: FORCAST from drop-down menu
    - Config: GRISM from drop-down menu
    - Processing State: LEVEL_3 from drop-down menu
    - Product Type: combspec
    - Target: AB Aur
    - Click the SIMBAD Position button
    - Change Spatial Search Radius to 60 arcsec
    - Click the Submit button
- After the results load, select the checkboxes next to each of the four rows of the table. Each row represents a single observation in this data set.
- Click Get Selected Data in Current Page
- Click Request Data Bundle
- After a few minutes, an email with a download link will be sent to the email address associated with your DCS account.
- For more information, consult the FORCAST Data Handbook accessible at https://www.sofia.usra.edu/science/proposing-and-observing/data-products/data-resources

Downloading NGC 7009 FORCAST Data

From DCS:

- If you do not yet have a DCS account, register for one at https://dcs.arc.nasa.gov/userSupport/registration.jsp
- Log into DCS: https://dcs.arc.nasa.gov
- Go to Search Science Archive
- Click the arrow next to Advanced Search
- Fill in:
    - Year: 2017 from drop-down menu
    - MissionID: 2017-09-27_FO_F428 from drop-down menu
    - Instrument: FORCAST from drop-down menu
    - Config: GRISM from drop-down menu
    - Processing State: LEVEL_3 from drop-down menu
    - Target: NGC 7009
    - Click the SIMBAD Position button
    - Change Spatial Search Radius to 60 arcsec
    - Click the Submit button
- After the results load, select the checkboxes next to each of the four rows of the table. Each row represents a single observation in this data set.
- Click Get Selected Data in Current Page
- Click Request Data Bundle
- After a few minutes, an email with a download link will be sent to the email address associated with your DCS account.
- For more information, consult the FORCAST Data Handbook accessible at https://www.sofia.usra.edu/science/proposing-and-observing/data-products/data-resources

From Github:

- Sample datasets for both AB Aur and NGC7009 can be obtained from GitHub.
- In your browser, navigate to https://github.com/SOFIAObservatory/Recipes
    - Click on forcast-sample-data
    - Click sofia_data.zip
    - Finally, press the Download button to retrieve the sample data

Downloading 30 Doradus HAWC+ Data

From DCS:

- If you do not yet have a DCS account, register for one at https://dcs.arc.nasa.gov/userSupport/registration.jsp
- Log into DCS: https://dcs.arc.nasa.gov
- Go to Search Science Archive
- Fill in:
    - Instrument: HAWC_PLUS from drop-down menu
    - Processing State: LEVEL_4 from drop-down menu
    - Target: 30Dor
    - Click the SIMBAD Position button
    - Change Spatial Search Radius to 600 arcsec
    - Click the Submit button
- After the results load, select the checkboxes next to each of the six rows of the table. Each row represents a single observation in this data set.
- Click Get Selected Data in Current Page
- Click Request Data Bundle
- After a few minutes, an email with a download link will be sent to the email address associated with your DCS account.
- For more information, consult the HAWC+ Data Handbook accessible at https://www.sofia.usra.edu/science/proposing-and-observing/data-products/data-resources

From Github:

- In your browser, navigate to https://github.com/SOFIAObservatory/Recipes
    - Click on hawc-sample-data
    - Click sofia_data.zip
    - Finally, press the Download button to retrieve the sample data

Python/Jupyter Environment

We recommend attending the workshop with a `conda` installation of `python`. Conda is a package manager for (mostly) python packages, and will ease the installation of the required modules for the FORCAST/HAWC+ notebooks. The `conda` program is included in the Anaconda distribution, which includes a large number of python modules. Alternatively, for the more advanced user, the smaller Miniconda distribution can be installed. The latter is geared towards those comfortable working in a terminal environment. We **strongly recommend** installing **python version 3**.

In either case, the required packages for the SOFIA@AAS workshop session are linked below, with recommended installation instructions for Miniconda users shown in brackets.

- numpy/scipy/matplotlib [conda install numpy scipy matplotlib=3.0.2]
- astropy [conda install -c astropy astropy]
- aplpy [conda install -c astropy aplpy]
- specutils [conda install -c astropy specutils]

During the workshop, we will be presenting our analysis code with a jupyter notebook, a python environment that runs in a browser window. The code we will be reviewing can be run in a basic python terminal, but installation of the notebook environment may prove useful for following along with the demo. Instructions for installation can be found here:

- jupyter [conda install jupyter notebook]

If you cannot fully setup your python environment before the workshop, do not fret: you can always follow along with the presenters or flip through the web version of the notebook recipes. The SOFIA science staff may additionally have some time before the workshop begins to aid in installing the required packages.

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