The Astropy Project

A Community Python Library for Astronomy

Thomas Robitaille

@astrofrog


PyWCS
PyAstro
cosmics.py
PyNOVAS
PyGuide
PyEphem
astropysics
kapteyn
python-montage
pyregion
CosmoPy
astrogui
volib
APLpy
XAssist
NTV
AsPyLib
sunpy
coords
ATpy
pyavm
python-ds9
pySLALIB
RO
EphemPy
pyTPM
pywcsgrid2
asciitable
PyFITS
idlsave
PyRAF
pyastronomy
vo
PyMIDAS
chantipy
astlib
yt
python-sao
SAMPy
python-avm

The Astropy Project is a community effort to develop a single **core package for Astronomy** in Python and **foster interoperability** between Python astronomy packages.

Project Coordinators: Tom Aldcroft, Kelle Cruz, Thomas Robitaille, and Erik Tollerud

Developers/Contributors for core package (as of May 2017):

Ryan Abernathey
Shailesh Ahuja
Tom Aldcroft
Anthony Horton
JC Hsu
Anne Archibald
Cristian Ardelean
Matteo Bachetti
Steven Bamford
Kyle Barbary
Geert Barentsen
Pauline Barmby
Paul Barrett
Andreas Baumbach
Chris Beaumont
Daniel Bell
Elijah Bernstein-Cooper
Kristin Berry
Edward Betts
Mavani Bhautik
Francesco Biscani
Thompson Le Blanc
Christopher Bonnett
Joseph Jon Booker
Médéric Boquien
Azalee Bostroem
Matthew Bourque
Larry Bradley
Gustavo Bragança
Erik M. Bray
Eli Bressert
Hannes Breytenbach
Hugo Buddelmeijer
Doug Burke
Mihai Cara
Patti Carroll
Mabry Cervin
Pritish Chakraborty
Sourabh Cheedella
Alex Conley
Jean Connelly
Simon Conseil
Ryan Cooke
Yannick Copin
Matthew Craig
Steven Crawford
Neil Crighton
Robert Cross
Kelle Cruz
Dan P. Cunningham
Daniel Datsev
Matt Davis
James Dearman
Christoph Deil
Nadia Dencheva
Eric Depagne
Jörg Dietrich
Axel Donath
Bili Dong
Michael Droettboom
Zach Edwards
Jonathan Eisenhamer
Thomas Erben
Henry Ferguson
Leonardo Ferreira
Jonathan Foster
Ryan Fox
Lehman Garrison
Simon Gibbons
Adam Ginsburg
Christoph Gohlke
Danny Goldstein
J. Goutin
Perry Greenfield
Dylan Gregersen
Austen Groener
Frédéric Grollier
Karan Grover
Kevin Gullikson
Hans Moritz Günther
Chris Hanley
Alex Hagen
Christian Hettlage
Paul Hirst
Moataz Hisham
Michael Hoenig
Emma Hogan
Derek Homeier
Anthony Horton
Griffin Hosseinzadeh
Lingyi Hu
Jurien Huisman
Joe Hunkeler
Anchit Jain
Eric Jeschke
Graham Kanarek
Sarah Kendrew
Marten van Kerkwijk
Wolfgang Kerzendorf
Lennard Kiehl
Rashid Khan
Aleh Khvalko
David Kirkby
Dominik Klaes
Kacper Kowalik
Roban Hultman Kramer
Aniket Kulkarni
Amit Kumar
Arie Kurniawan
Arne de Laat
Antony Lee
Daniel Lenz
Kieran Leschinski
Simon Liedtke
Pey Lian Lim
Stuart Littlefair
Joseph Long
Joe Lyman
Jerry Ma
Duncan Macleod
Curtis McCully
Vinayak Mehta
Aaron Meisner
Serge Montagnac
José Sabater Montes
Francesco Montesano
Brett Morris
Michael Mueller
Stuart Mumford
Demitri Muna
Prasanth Nair
Stefan Nelson
Bogdan Nicula
Al Niessner
Joe Philip Ninan
Asra Nizami
Bryce Nordgren
Sigurd Næss
Sara Ogaz
Georgiana Ogrean
Miruna Oprescu
Carl Osterwisch
Luigi Paioro
Asish Panda
John Parejko
Madhura Parikh
Neil Parley
Sergio Pascual
Pratik Patel
Rohit Patil
David Pérez-Suárez
Ray Plante
Adele Plunkett
Orion Poplawski
Adrian Price-Whelan
J. Xavier Prochaska
Tanuj Rastogi
Thomas Robitaille
Juan Luis Cano Rodríguez
Evert Rol
Alex Rudy
Joseph Ryan
Eloy Salinas
Gerrit Schellenberger
Michael Seifert
Srikrishna Sekhar
Mathieu Servillat
David Shiga
Albert Y. Shih
David Shupe
Jonathan Sick
Max Silbiger
Sudheesh Singanamalla
Leo Singer
Brigitta Sipocz
Kevin Sooley
Shivan Sornarajah
Shantanu Srivastava
Ole Streicher
Matej Stuchlik
Bernardo Sulzbach
Vatsala Swaroop
Esteban Pardo Sánchez
James Taylor
Jeff Taylor
Kirill Tchernyshyov
Régis Terrier
Víctor Terrón
Scott Thomas
Erik Tollerud
Matthew Turk
James Turner
Miguel de Val-Borro
Jake VanderPlas
Alex de la Vega
Zé Vinicius
Karl Vyhmeister
Lisa Walter
Laura Watkins
Benjamin Alan Weaver
Jonathan Whitmore
Julien Woillez
Maneesh Yadav
Víctor Zabalza

Astropy Core Package

Community consensus for adding features

Well **tested**, **documented**, and **stable** code

Easy to **install**

Works on Linux, MacOS X, and Windows

Python 2 and 3 compatible

Core data structures and transformations

- Constants (**`astropy.constants`**)
- Units and Quantities (**`astropy.units`**)
- N-dimensional datasets (**`astropy.nddata`**)
- Data Tables (**`astropy.table`**)
- Time and Dates (**`astropy.time`**)
- Astronomical Coordinate Systems (**`astropy.coordinates`**)
- World Coordinate System (**`astropy.wcs`**)
- Models and Fitting (**`astropy.modeling`**)
- Analytic Functions (**`astropy.analytic_functions`**)

Latest: **v1.3.3**
(29th May 2017)

```
In [1]: from astropy import units as u

In [2]: (3 * u.Jy).to(u.erg / u.cm**2 / u.s / u.Hz)
Out[2]: <Quantity 3e-23 erg / (cm2 Hz s)>

In [3]: (4 * u.km / u.s).to(u.AA,
                            u.doppler_optical(5654 * u.AA))
Out[3]: <Quantity 5654.075438855771 Angstrom>
```

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```
In [1]: from astropy.table import Table

In [2]: t = Table.read('w5_psc.vot')

In [3]: t.sort('Jmag')

In [4]: t.write('w5_psc.tex')
```

Latest: **v1.3.3**
(29th May 2017)

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Connecting up: Files and I/O

- Unified file read/write interface
- FITS File handling (**`astropy.io.fits`**)
- ASCII Tables (**`astropy.io.ascii`**)
- VOTable XML handling (**`astropy.io.votable`**)
- Miscellaneous Input/Output (**`astropy.io.misc`**)
- Virtual Observatory Access (**`astropy.vo`**)

Astronomy computations and utilities

- Convolution and filtering (**`astropy.convolution`**)
- Data Visualization (**`astropy.visualization`**)
- Cosmological Calculations (**`astropy.cosmology`**)
- Astrostatistics Tools (**`astropy.stats`**)

Latest: **v1.3.3**
(29th May 2017)

```
In [1]: from astropy.cosmology import Planck15

In [2]: Planck15.lookback_time(3)
Out[2]: <Quantity 11.649047657532195 Gyr>

In [3]: Planck15.kpc_proper_per_arcmin(2.2)
Out[3]: <Quantity 508.41661819801976 kpc / arcmin>

In [4]: Planck15.luminosity_distance(1.1)
Out[4]: <Quantity 7638.990927720774 Mpc>
```

Major releases every ~6 months

7 major public releases (first release February 2013)

Latest stable version: **v1.3.3** (released 29th May 2017)

Over **210** individual contributors so far

Almost **20,000** commits (as of June 2017)

Long Term Support (LTS) releases

Supported with bug fixes for **2 years**

(exception: 2.0.x will be supported for 3 years)

Guarantee **no changes apart from bug fixes**

Ideal for pipelines and other applications where **stability** is essential

We continue to release **new major releases** (1.1, 1.2, etc.) in the mean time.

Release Plan

2.0 (June 2017)

LTS release, last to support Python 2.7

3.0 (December 2017)

Will support only Python 3.5+

3.1 (June 2018)

…

End of 2019: end of support for 2.0

Coming soon in 2.0!

Support for velocities in astropy.coordinates
(e.g. proper motions and radial velocities)

Support for units in astropy.modeling

Improved astropy.convolution package

New infrastructure to version constants

New CCDData class

New statistical functions

Astropy affiliated packages

These can be:

- Functionality under development
- More specialized functionality
- Packages with incompatible licenses

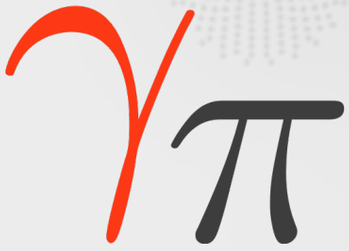
Adhere to Astropy **coding, testing, and docs guidelines**

Use Astropy wherever possible (avoid duplication)

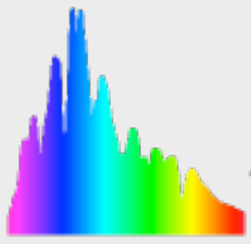
We provide a **package template**

photutils

An Astropy Package for Photometry



A **Python** package for **gamma-ray** astronomy



sncosmo

A Python Library for Supernova Cosmology

Image reprojection

Observation planning

Publication-quality image plotting

Machine learning

Photometry

Interface to many web services/archives

Gamma-ray data analysis

CCD image reduction

Interfaces to ds9

Spectroscopic analysis

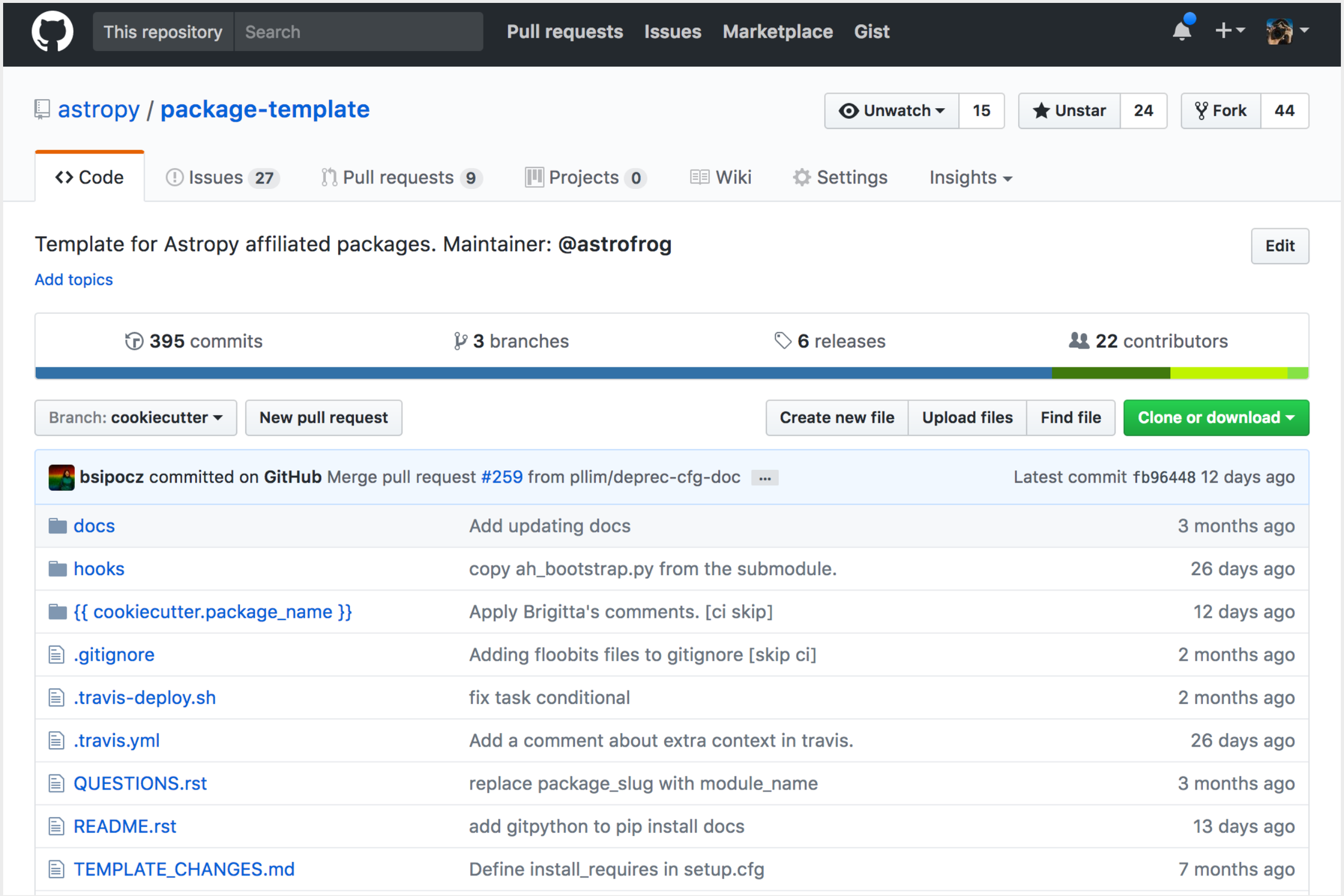
‘Big’ spectral cube analysis (e.g. ALMA, etc.)

Spectral cube slicing

<your package here!>

etc.

https://github.com/astropy/package-template

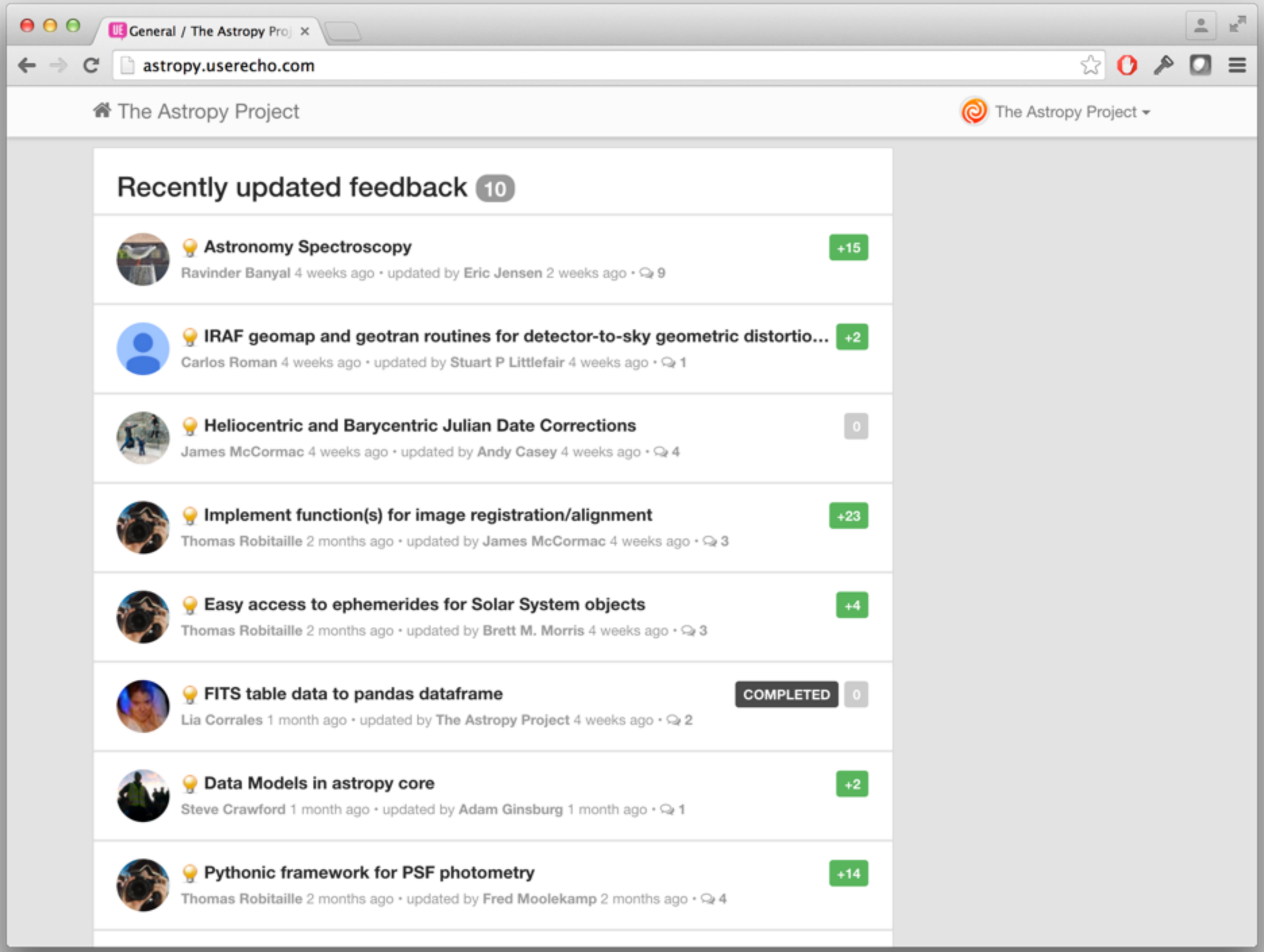


Getting help

There are several popular venues for getting help:

- **astropy mailing list** (note: may be migrating to Google Groups) https://mail.scipy.org/mailman/listinfo/astropy
- **Python Users in Astronomy** Facebook group
- **StackOverflow** - http://stackoverflow.com (use ‘astropy’ tag)
- **Gitter** - https://gitter.im/astropy/astropy

http://astropy.userecho.com



Getting involved in Astropy

Report any issues

Contribute **bug fixes** or **features**

Improve **documentation**

Write a **tutorial**

Join or start an **affiliated package**

http://www.astropy.org/contribute.html

This research made use of Astropy, a community-developed core Python package for Astronomy (Astropy Collaboration, 2013)

Web: http://www.astropy.org

Docs: http://docs.astropy.org

Code: http://github.com/astropy/astropy

Twitter: @astropy