



The ESO Astroquery module and its Jupyter Notebooks examples

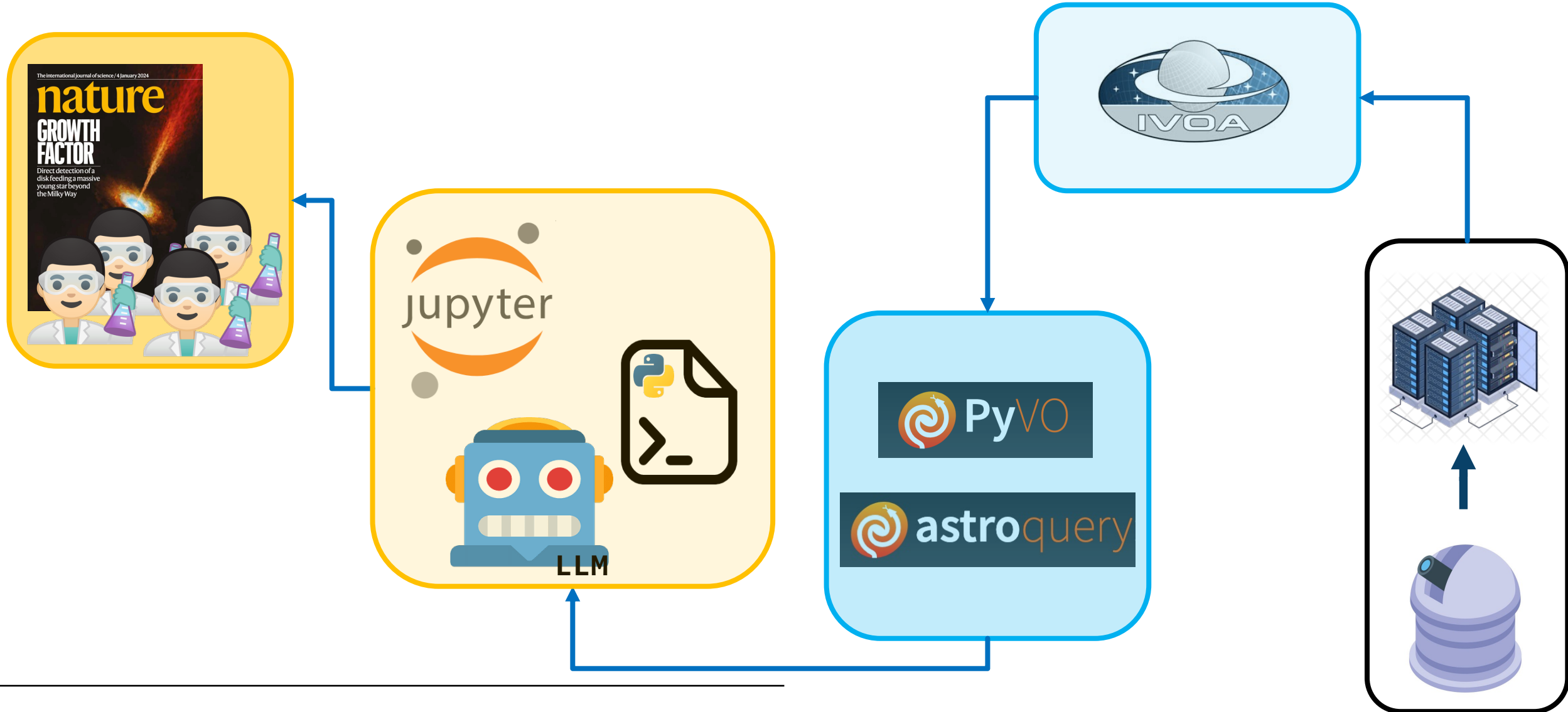
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ESO Science Archive Group



The ESO archive enables smooth data journeys

“By adopting VO standards, reproducible science is possible – Go further together”



Astroquery enables end-to-end analyses

 “Astroquery is a set of tools for querying astronomical web forms and databases.”

 **Documentation:** astroquery.readthedocs.io

 **Code and issue tracker:** <https://github.com/astroquery/astroquery>

 **Paper:** Ginsburg, Sipőcz, Brasseur et al 2019.

Available Services

The following modules have been completed using a common API:

- ALMA Queries ([astroquery.alma](#))
- Atomic Line List ([astroquery.atomic](#))
- Besancon Queries ([astroquery.besancon](#))
- CADC ([astroquery.cadc](#))
- CASDA Queries ([astroquery.casda](#))
- Cologne Database for Molecular Spectroscopy (CDMS) Queries ([astroquery.linelists.cdms](#))
- ESA EUCLID Archive ([astroquery.esa.euclid](#))
- ESA Herschel Science Archive ([astroquery.esa.hsa](#))
- ESA HST Archive ([astroquery.esa.hubble](#))
- ESA Integral Science Legacy Archive (ISLA) ([astroquery.esa.integral](#))
- ESA ISO Archive ([astroquery.esa.iso](#))
- ESA JWST Archive ([astroquery.esa.jwst](#))
- ESA XMM-Newton Archive ([astroquery.esa.xmm_newton](#))
- ESASky Queries ([astroquery.esasky](#))
- ESO Queries ([astroquery.eso](#))
- FIRST Queries ([astroquery.image_cutouts.first](#))
- Gaia TAP+ ([astroquery.gaia](#))
- GAMA Queries ([astroquery.gama](#))
- Gemini Queries ([astroquery.gemini](#))
- HEASARC Queries ([astroquery.heasarc](#))
- HiPS2fits Service ([astroquery.hips2fits](#))
- HITRAN Queries ([astroquery.hitran](#))
- IRSA Moving Object Search Tool ([astroquery.ipac.irsa.most](#))
- IRSA Dust Extinction Service Queries ([astroquery.ipac.irsa.irsa_dust](#))
- IRSA Image Server program interface (IBE) Queries ([astroquery.ipac.irsa.ibe](#))
- IRSA Queries ([astroquery.ipac.irsa](#))
- JPL Spectroscopy Queries ([astroquery.jplspec](#))
- MAGPIS Queries ([astroquery.magpis](#))
- MAST Queries ([astroquery.mast](#))
- CDS MOC Service ([astroquery.mocserver](#))
- Minor Planet Center Queries ([astroquery.mpc/astroquery.solarsystem.MPC](#))
- NASA ADS Queries ([astroquery.nasa_ads](#))
- NED Queries ([astroquery.ipac.ned](#))
- NIST Queries ([astroquery.nist](#))
- NVAS Queries ([astroquery.nvas](#))
- SIMBAD Queries ([astroquery.simbad](#))
- Skyview Queries ([astroquery.skyview](#))
- Splatalogue Queries ([astroquery.splatalogue](#))
- SVO Filter Profile Service Queries ([astroquery.svo_fps](#))
- UKIDSS Queries ([astroquery.ukidss](#))
- Vamdc Queries ([astroquery.vamdc](#))
- VizieR Queries ([astroquery.vizieR](#))
- VO Simple Cone Search ([astroquery.vo_conesearch](#))
- VSA Queries ([astroquery.vsa](#))
- xMatch Queries ([astroquery.xmatch](#))

The ESO module delivers complex datasets quickly

 “Simple python functions to script your access to the ESO archive via TAP.”

 ESO astroquery fork: <https://github.com/eso/astroquery>

 ESO example notebooks: https://github.com/eso/astroquery_examples

- The ESO astroquery module allows users to search for raw and reduced data, retrieve metadata, and download data products. Proprietary access is also supported.
- The **new** ESO module enables faster, larger and more complex dataset analyses by using the the Table Access Protocol (**TAP**), an International Virtual Observatory Alliance (**IVOA**) standard.

WEB scraper (OLD)

- Limited query interfaces with predefined queries
- Users can only enter constraints on predefined queries
- No direct query language
- Users cannot modify underlying queries
- Catalogues not accessible
- Simplified access for specific, common queries

TAP (“New”)

- Full read-only access to ESO databases
- Users can write their own custom queries
- Uses ADQL 2.0 (SQL-based, VO standard)
- Users fully control query structure
- Catalogues accessible via dedicated interface
- Advanced, flexible querying for complex data retrieval

Functionality

- List instruments and data releases.
- Instrument-specific and instrument-independent raw data search.
- Search across / by data releases.
- Automatic calibration selection (raw).
- Get extended FITS header information.
- Download datasets by their identifiers.
- “Auth & Auth” access to your assets.
- Run custom / complex ADQL queries.

→ Find, Access, Interoperate, Reuse ←

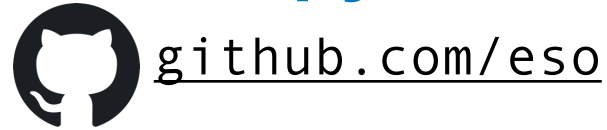




Where to find it?



Get the ESO module and Jupyter notebooks from GitHub



Overview Repositories 3 Projects Packages Teams People 9

ESO 11 followers International <http://www.eso.org> Follow

Popular repositories

- homebrew-pipelines** (Public) - Ruby, 1 star, 1 fork
- astroquery_examples** (Public) - Jupyter Notebook, 1 star
- astroquery** (Public) - Python, Forked from [astropy/astroquery](#). Maintainers: @keflavich and @bsipocz and @ceb8

View as: Public

You are viewing the README and pinned repositories as a public user.

People

Top languages

- Python
- Ruby
- Jupyter Notebook

github.com/eso/astroquery

- Fork of the official astroquery repository
- Latest ESO features not yet part of an official astroquery release

github.com/eso/astroquery_examples

- Jupyter notebooks with tutorials and real application examples
- Submit your own! ;)

- assets
- binder
- figs
- .gitignore
- ESO_Introduction.ipynb
- ESO_Query_APEX.ipynb
- ESO_Query_TAP.ipynb
- ESO_Query_login.ipynb
- ESO_Query_programID.ipynb
- ESO_Query_source.ipynb
- ESO_WorkingExample_ALPA...
- ESO_WorkingExample_Aladin...
- ESO_WorkingExample_Rawfr...
- ESO_WorkingExample_Spect...
- ESO_WorkingExample_Spect...
- LICENSE
- README.md

>github.com/eso/astroquery_examples



Introduction to basic functionality

- Query the archive for raw* and reduced data
 - Perform a simple cone search
 - Obtain extended information on data products
 - Download datasets from the archive
- *Either instrument-specific or generic

Tutorials on basic functionality

- Searching via ADQL (SQL-like syntax)
- Downloading datasets by identifier
- Searching a source by name
- ...

Real life examples and use cases

- Investigate ESO data using Aladin
- Download raw data for a reduced data product
- Examine Spectral Data as function of time
- ESO observatories light contamination trends



What's next?



What's next?

- `astropy` release v0.4.12 (currently in pre-release)
-

- Catalogues
 - Atmospheric data (ASM)
 - Cutouts
-

- Increase number of notebooks and tutorials
 - Turn simple specific use-cases into general science-ready blue-prints
-

→ Submit your notebooks! ←



Recap

- We enable reproducible science by..
 - *Speaking V0* since 2018.
 - Developing astroquery.
 - Fostering adoption via Jupyter notebooks.



Thank you!

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