Python na Astronomia

Vitoria Baldan

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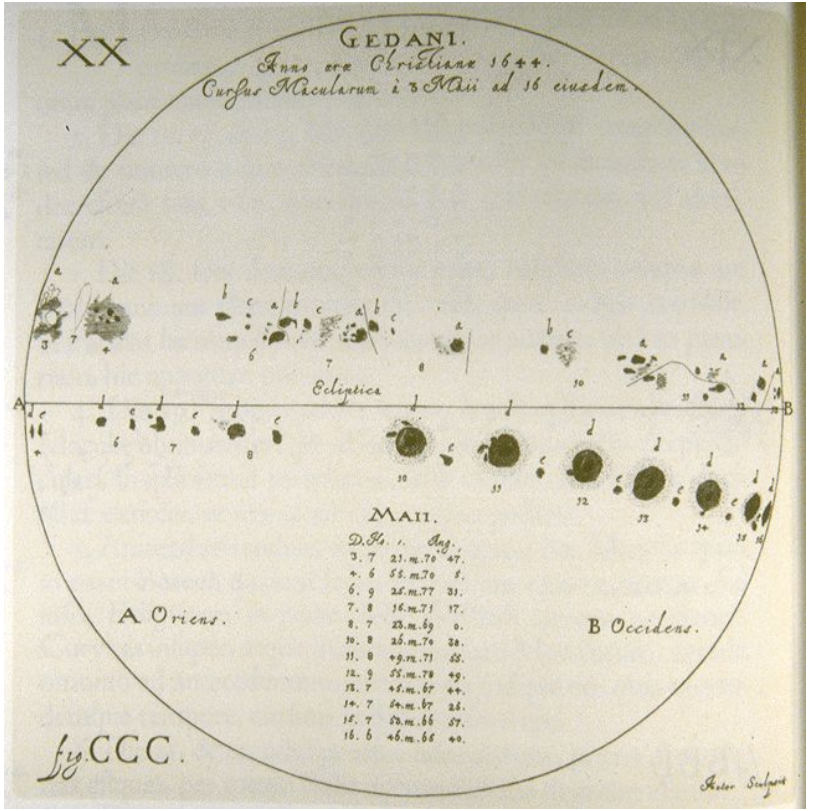
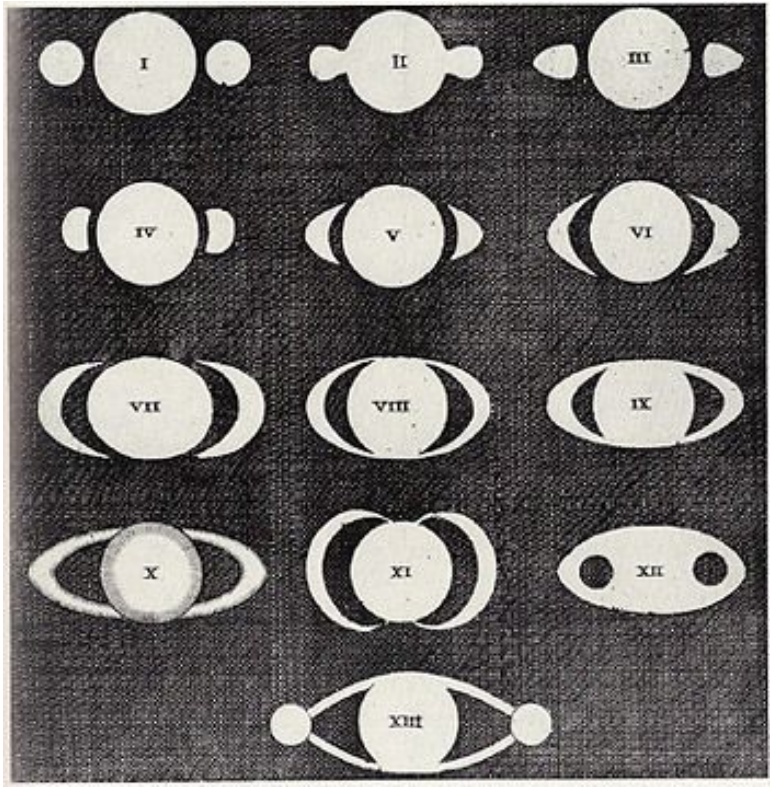
Astronomia antes...

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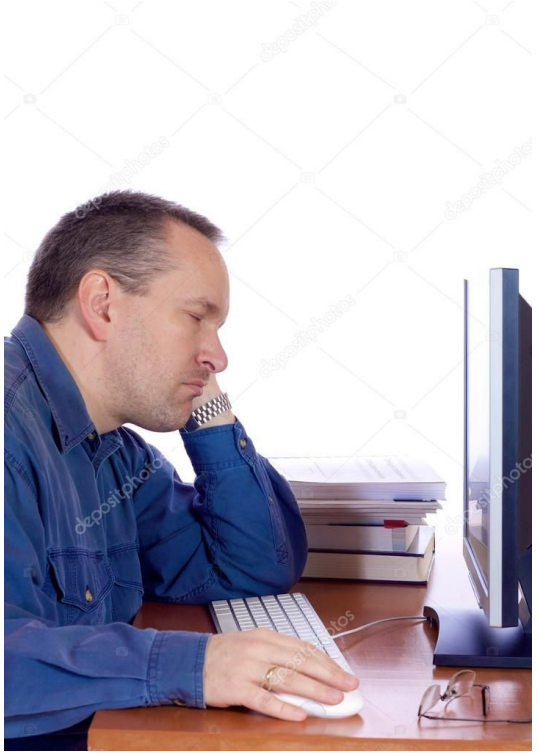
Astronomia agora...



Astronomia agora...

Hubble Probes the Early Universe

1990
Ground-based observatories

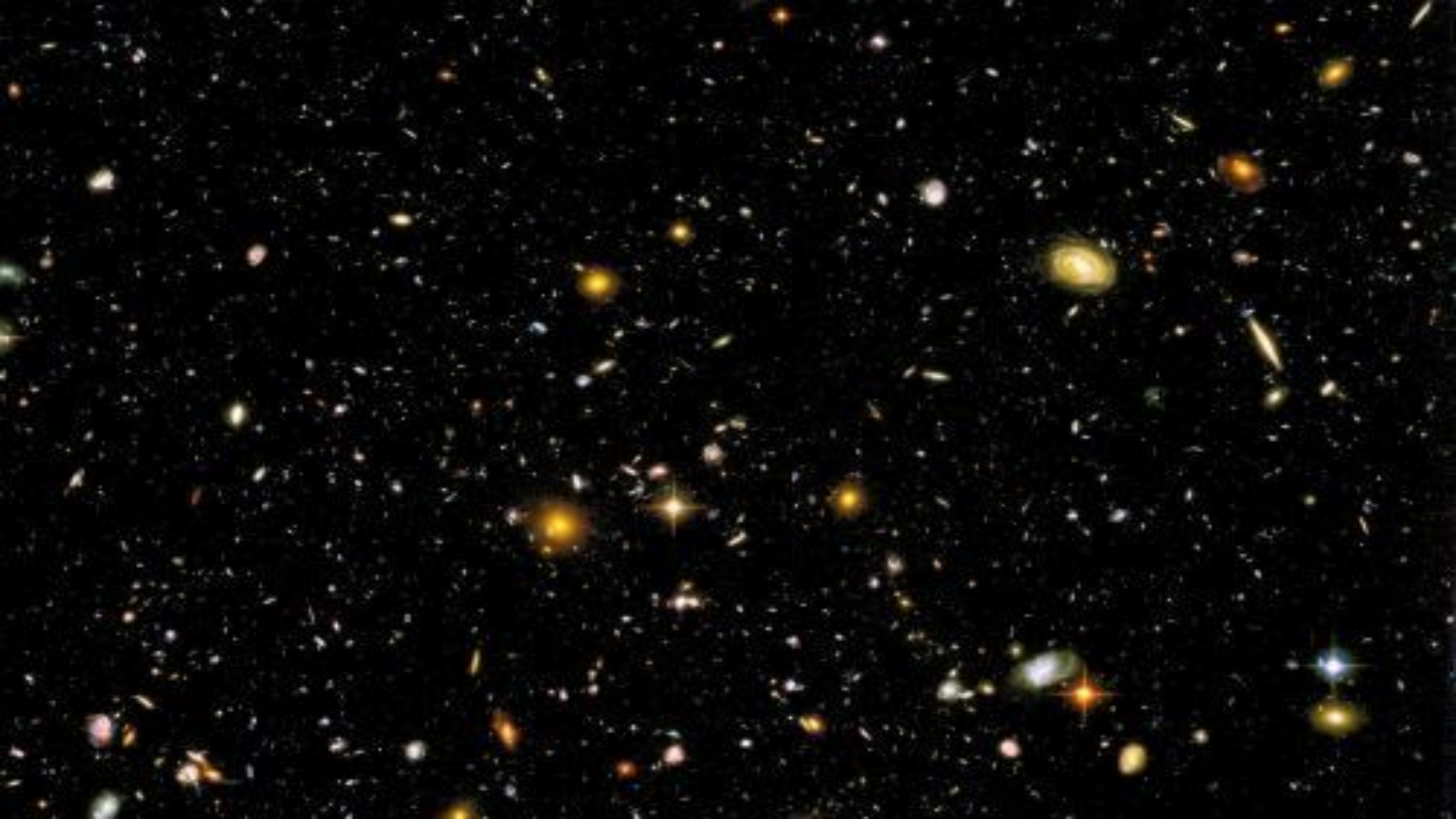
1995
Hubble Deep Field

2004
Hubble Ultra Deep Field

2010
Hubble Ultra Deep Field-IR

FUTURE
James Webb Space Telescope

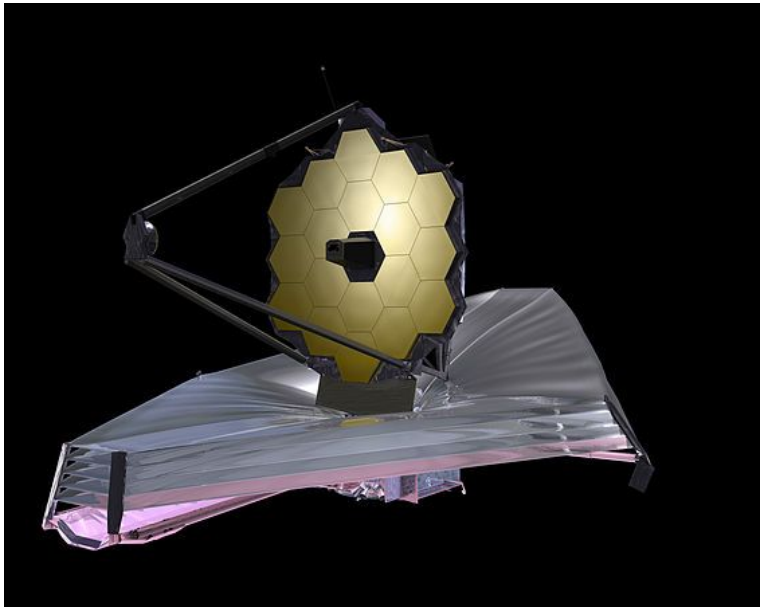
Redshift (*z*):	Present	1	4	5	6	7	8	10	>20
Time after the Big Bang		6 billion years	1.5 billion years			800 million years		480 million years	200 million years



Astronomia no futuro (não tão distante)...

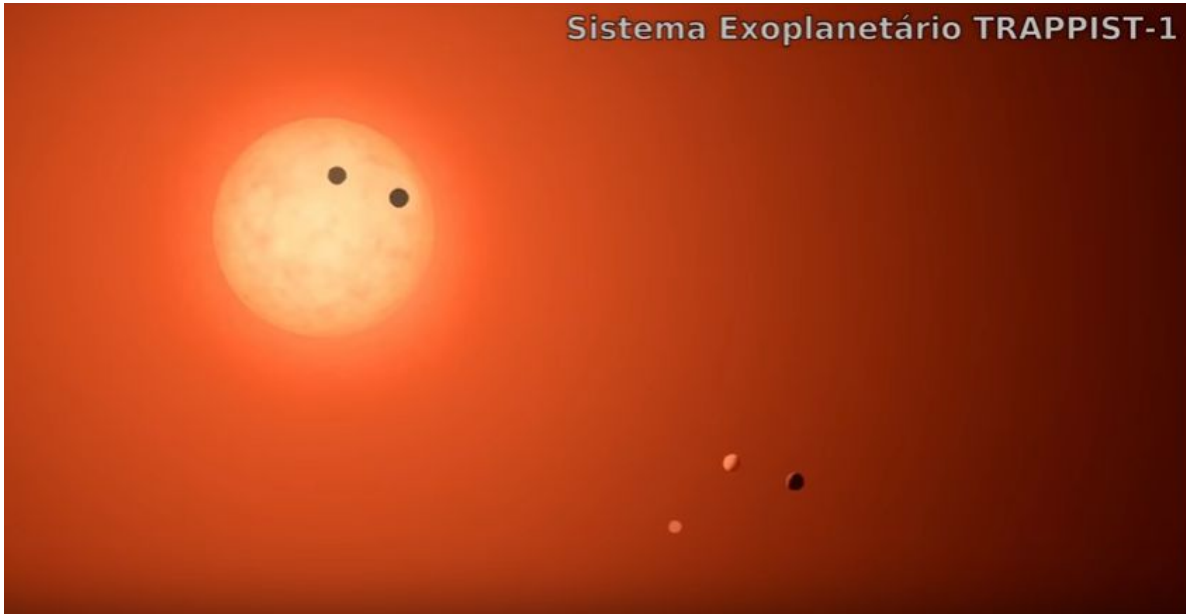
Kepler (2009)

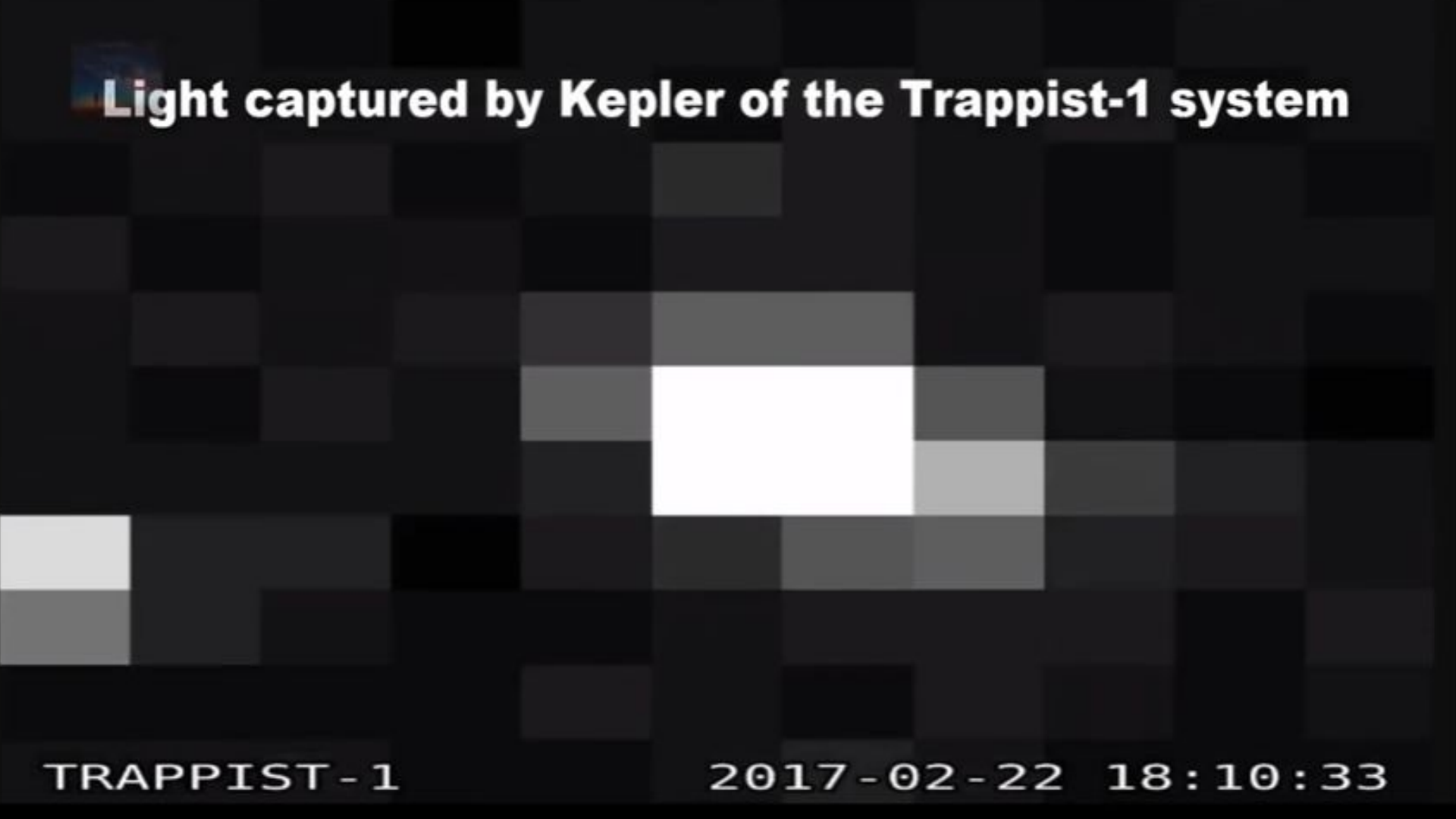
JWST(2018)



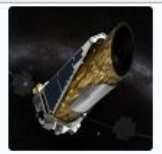
Kepler

- Trappist-1




Light captured by Kepler of the Trappist-1 system
TRAPPIST-1
2017-02-22 18:10:33

GitHub, Inc. [US] | https://github.com/KeplerGO



Kepler/K2 Guest Observer Office

http://keplerscience.arc.nasa.gov KeplerGO@mail.arc.nasa.gov

Repositories 30 People 1 Projects 0

Search repositories... Type: All Language: All

lightkurve

A beautiful package for Kepler, K2, and TESS flux time series analysis in Python.

astrophysics kepler k2 tess

Python ★ 23 15 MIT 1 issue needs help Updated 13 hours ago

oktopus

: A soft-bodied, eight-armed package for beautiful parameter estimation using scipy.optimize

fisher-matrix maximum-likelihood-estimation

Python ★ 5 3 MIT Updated 4 days ago

Top languages

Python CSS Jupyter Notebook C Makefile

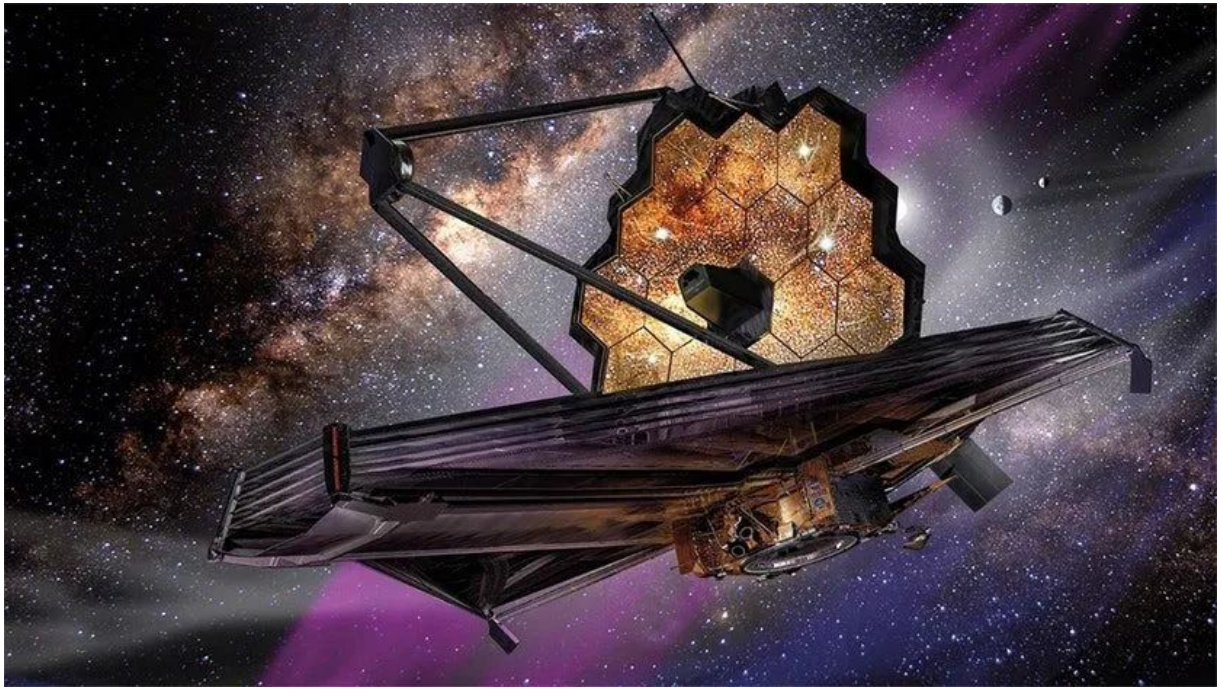
Most used topics

k2 kepler astrophysics tess

People 1 >

mirca

James web Space Telescope (JWST)



- Substituto do Hubble
- Melhor observação do infravermelho
- Espelho primário com diâmetro 2.5 vezes maior que o do hubble.
- Lançamento em maio de 2020

STScI-JWST

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Search repositories... | Type: All | Language: All

jwst

JWST Calibration Pipeline

python | astronomy | jwst

Jupyter Notebook ★ 44 40 Updated 2 days ago

Top languages

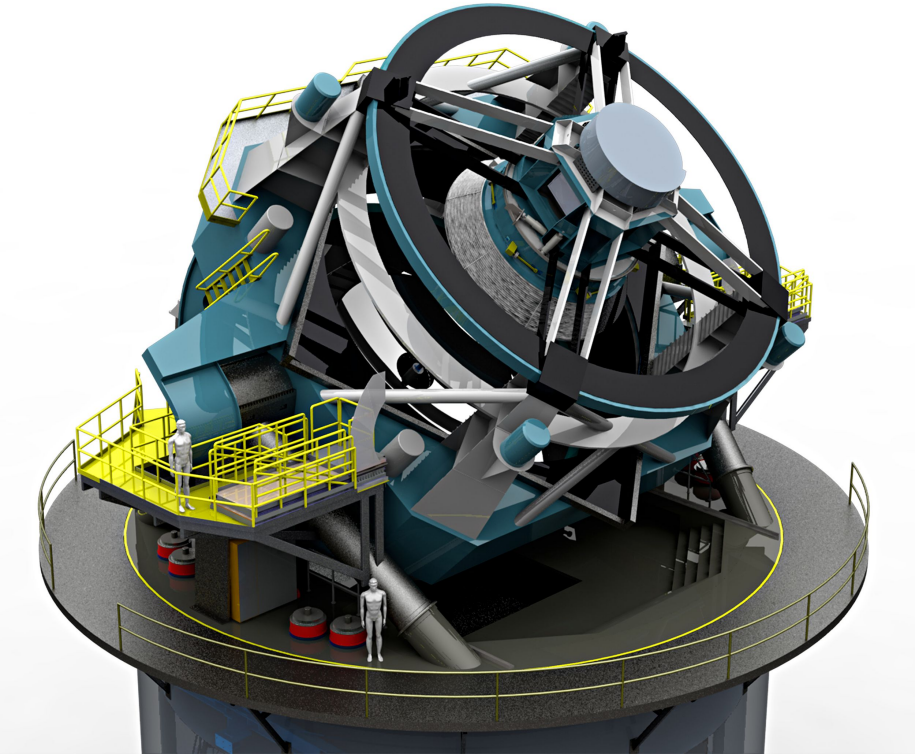
Jupyter Notebook

People 3 >

larrybradley
Larry Bradley

rendinam
Matt Rendina

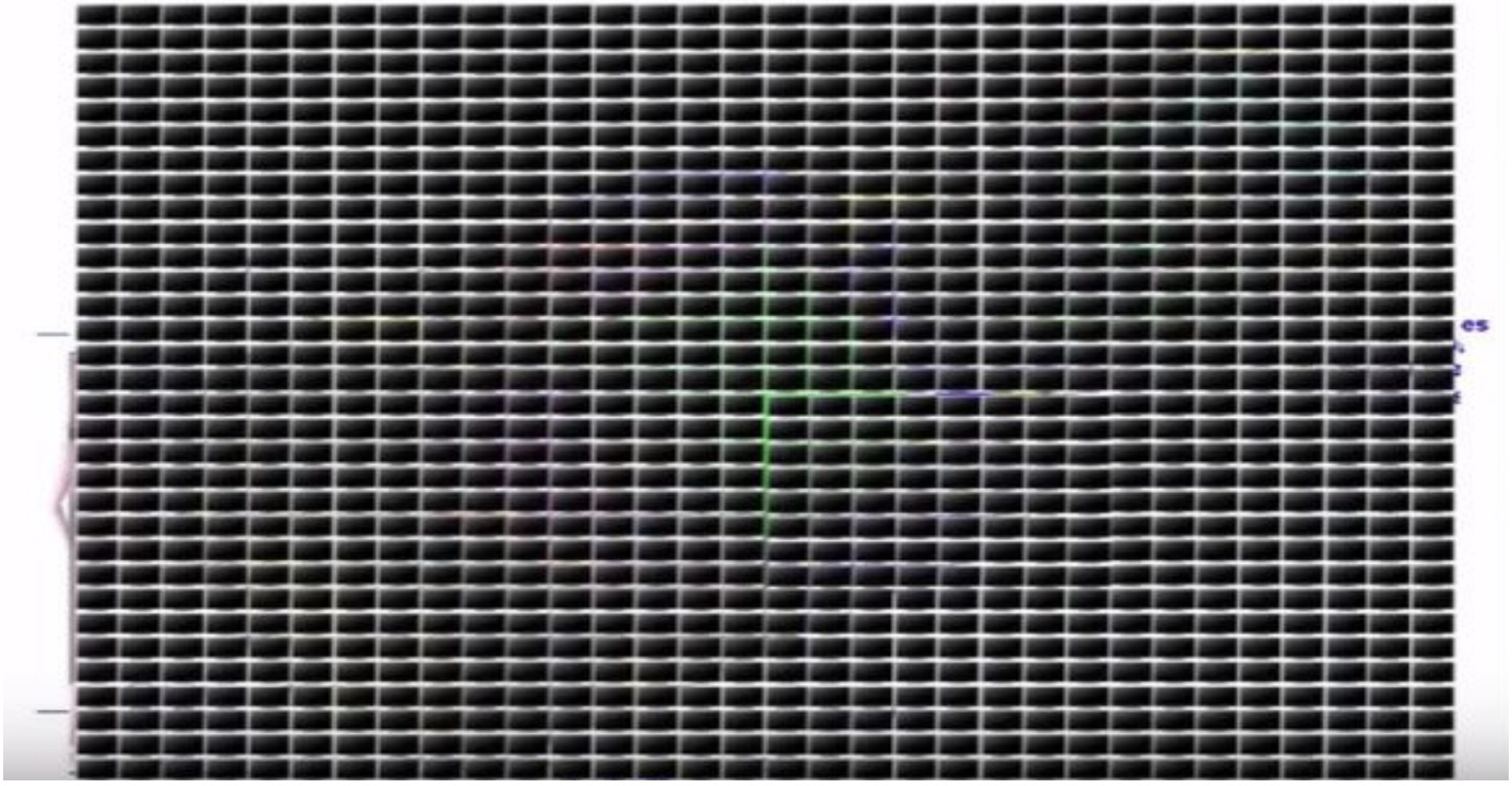
Large synoptic survey telescope (2020)



- Possuirá a maior câmera já conhecida
- 3 Giga pixels
- Duas exposições a cada 30 segundos

- 100s Petabytes de memória (depois de 10 anos)

3 Gigapixel Camera = ~1500 HD TVs



lsst

Large Synoptic Survey Telescope - Astronomy that's Wider, Faster, Deeper

Tucson, AZ http://lsst.org

Repositories 359 People 22 Projects 0

Search repositories... Type: All Language: All

versiondb

★ 1 6 Updated 6 hours ago

sims_featureScheduler

Telescope scheduler that uses basis functions computed from features to optimize observing strategy

Python ★ 5 5 Updated 8 hours ago

display_firefly

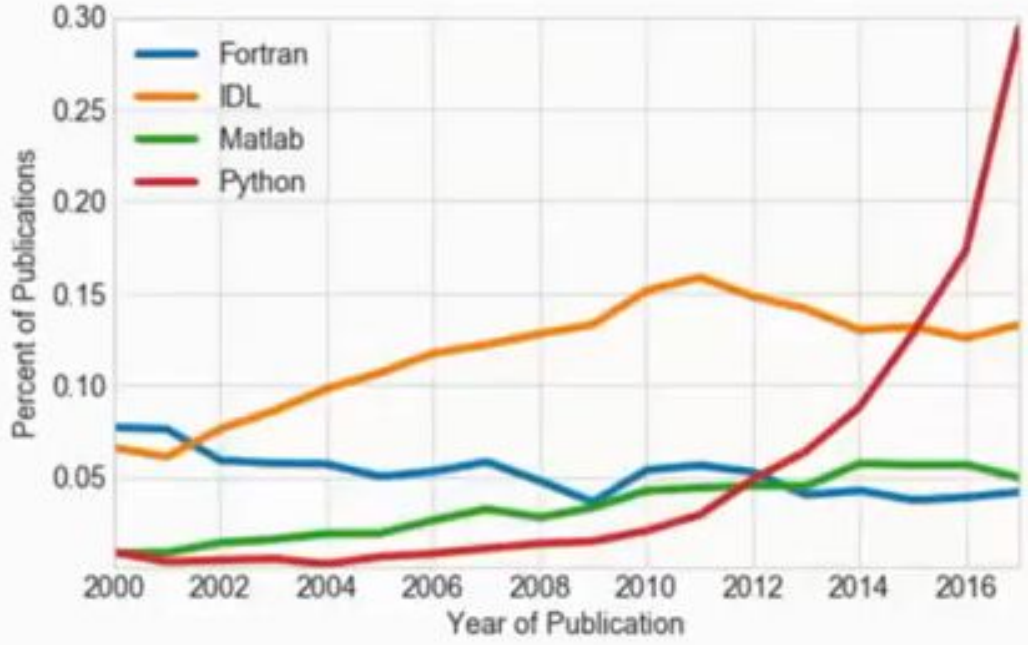
Interface between afw and firefly

Top languages

Python Shell TeX C++ Jupyter Notebook

People 22 >

Mentions of Software in Astronomy Publications:



Compiled from NASA ADS (code)

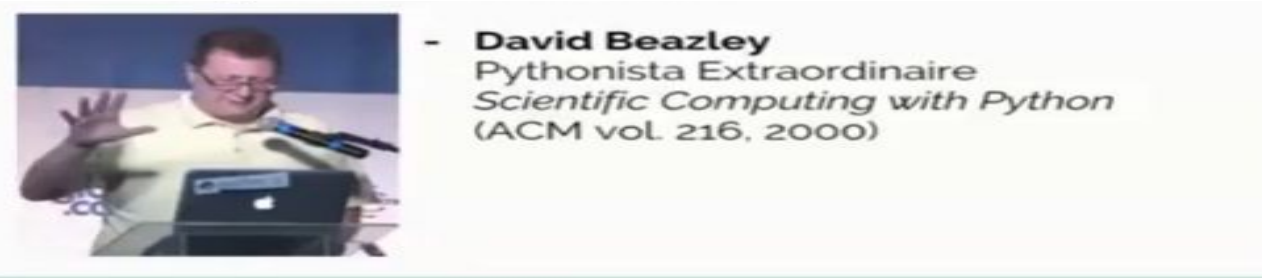
Thanks to Juan Nunez-Iglesias, Thomas P. Robitaille, and Chris Beaumont.

Por que python?

- Interpolação com outras linguagens
- Fácil entendimento
- Fácil acesso
- Packages!


Why don't you use C instead of Python? It's so much faster!
Why don't you commute by airplane instead of by car? It's so much faster!

“Os cientistas trabalham com uma ampla variedade de sistemas, desde códigos de simulações, pacotes de análise de dados, bancos de dados, ferramentas de visualização e softwares desenvolvidos localmente - cada um deles apresenta ao usuário um conjunto diferente de interfaces e um conjunto de interfaces e formatos de arquivos. Como resultado, um cientista deve passar um bom tempo tentando fazer esses componentes trabalharem juntos de alguma maneira”



Packages (incrivelmente úteis) para a ciência

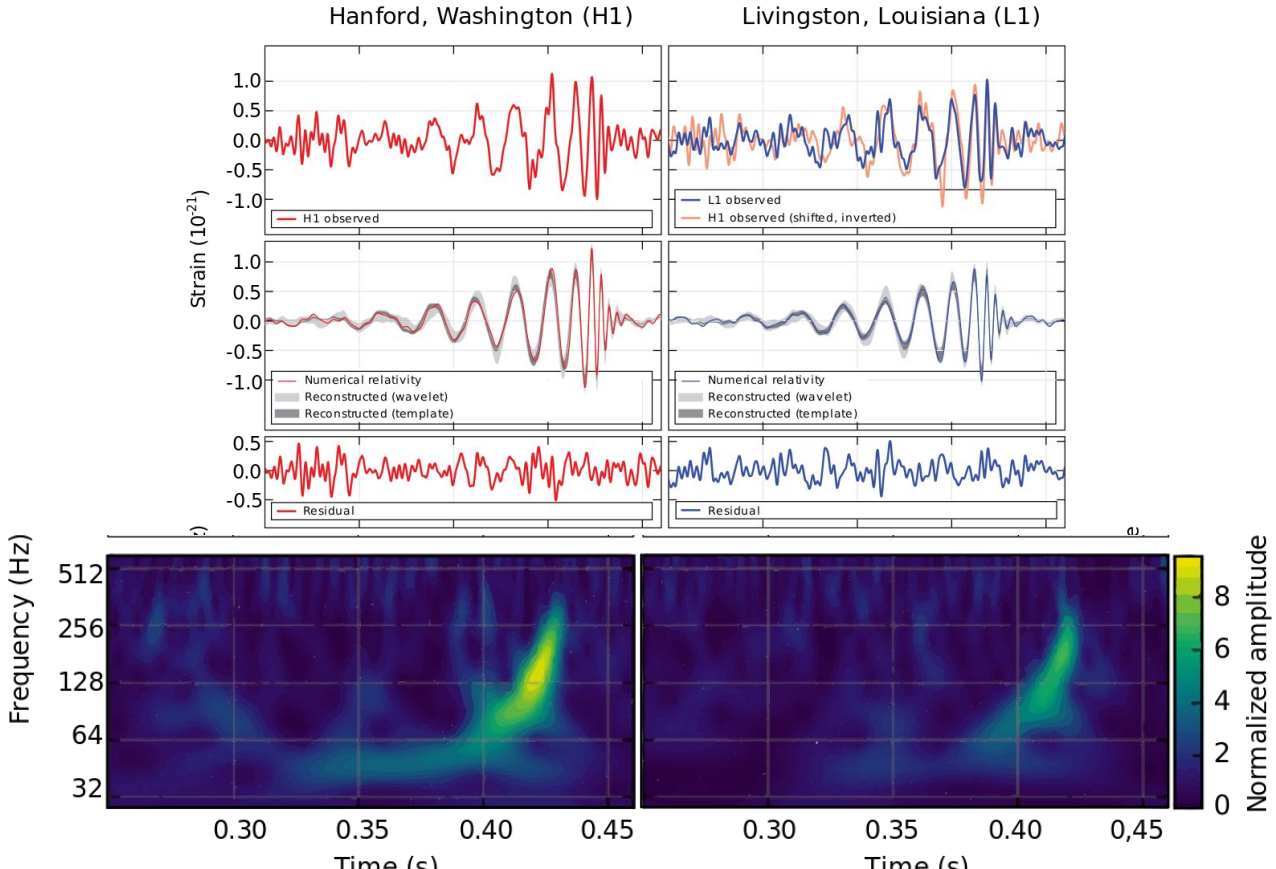
- Numpy
- SciPy
- PyLab
- Matplotlib

Astropacks

- astropy
- sunpy
- E mais dezenas de outras


astropy
IPY
NIPY
SunPy
(and many, many more)
SymPy
NetworkX
SM StatsModels Statistics in Python
scikit-image
learn
matplotlib
PyMC
Bokeh
pandas
xarray
SciPy
NumPy
jupyter
IP[y]: IPython
ython
DASK
python
Numba

LIGO, Ondas gravitacionais e... Jupyter!!



LIGO Open Science Center

LIGO is operated by California Institute of Technology and Massachusetts Institute of Technology and supported by the U.S. National Science Foundation.

Tutorials

Each tutorial will lead you step-by-step through some common data analysis tasks. While LIGO data can be analyzed using libraries in many software languages (C, C++, Matlab, etc.), most of these tutorials use Python. See also the software page for more examples.

See the tutorial setup page for help installing software to run these tutorials.

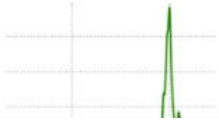
Tutorials shown here are not used to produce published results. For gravitational-wave software analysis packages that are used to produce LSC and Virgo Collaboration publications, see https://losc.ligo.org/software/.

Open Data Workshop Web Course (2018)

Self-paced web course on LIGO data analysis

Course Material

Binary Black Hole Events



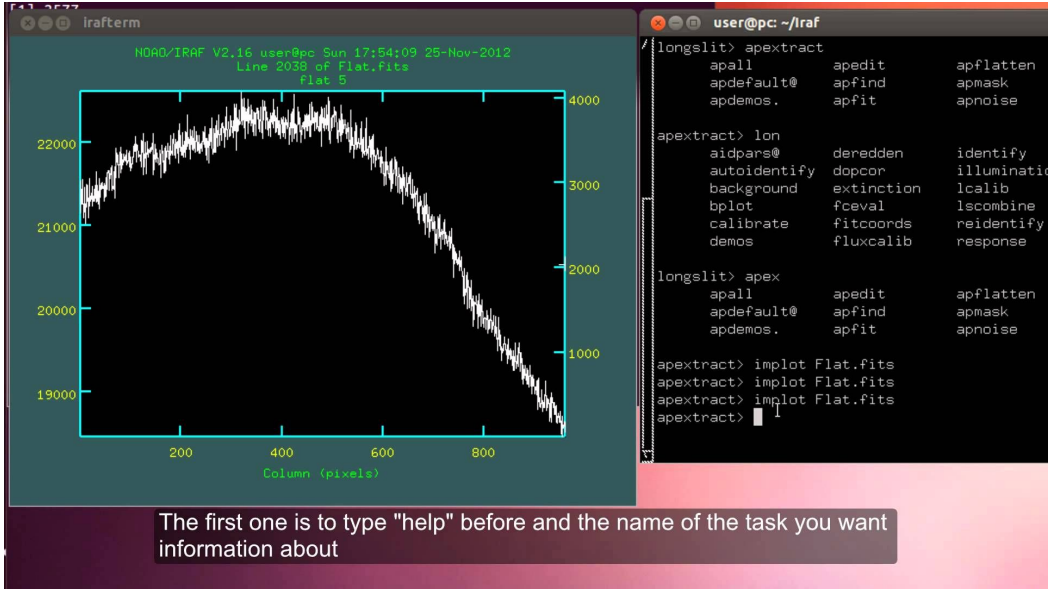
Use matched filtering to find signals hidden in noise.

Run: Azure | mybinder (Beta)

View: GW150914 | LVT151012 | GW151226 | GW170104

Experiências pessoais com python x astronomia

- Espectroscopia estelar



Search projects

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moog 2013.02

```
pip install moog
```

Latest version

Last released: Apr 20, 2013

Spectrum synthesis and LTE line analysis.

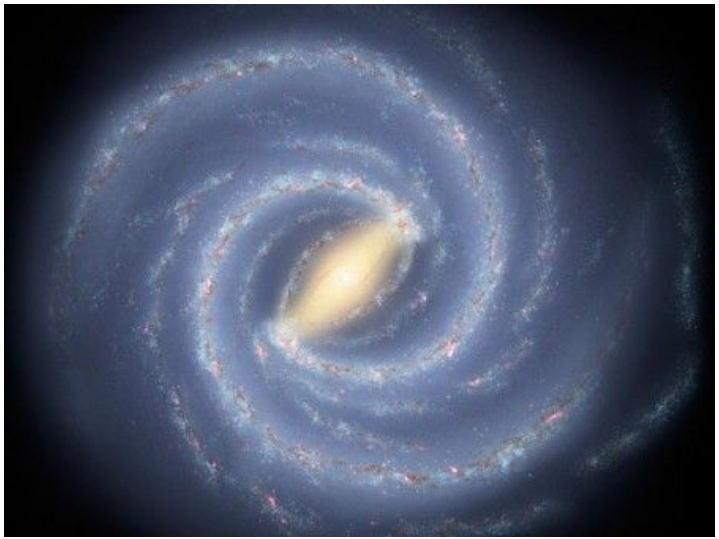
Navigation

- Project description
- Release history
- Download files

Project description

MOOG is a code that performs a variety of LTE line analysis and spectrum synthesis tasks. The typical use of MOOG is to assist in the determination of the chemical composition of a star.

Análise e reconhecimento de padrões de shapes de Galáxias



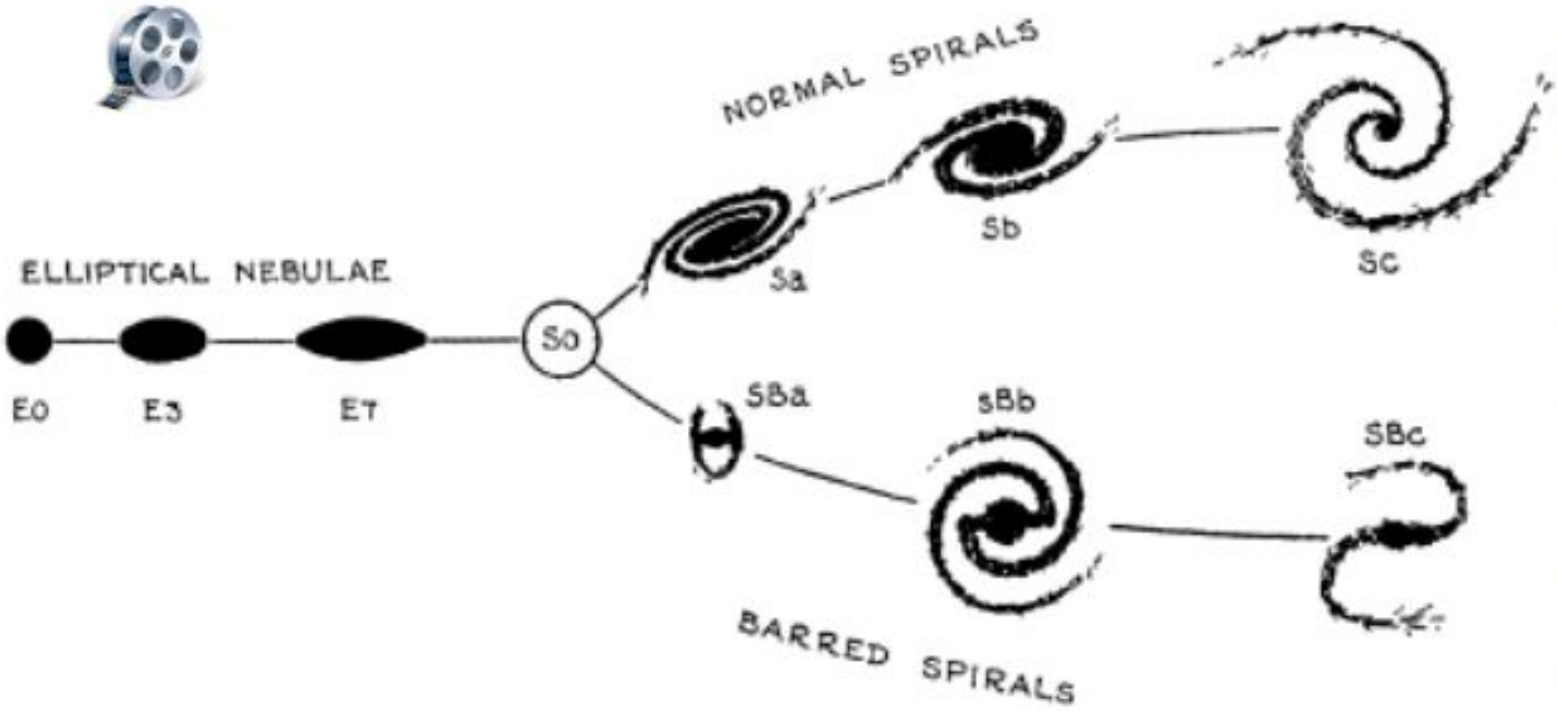
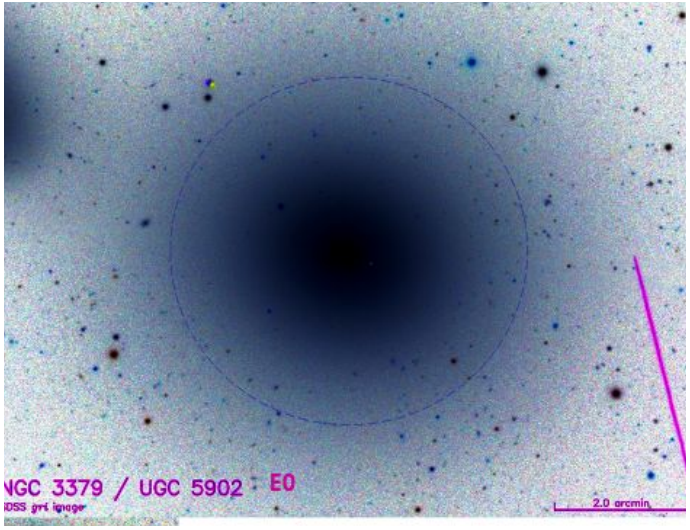
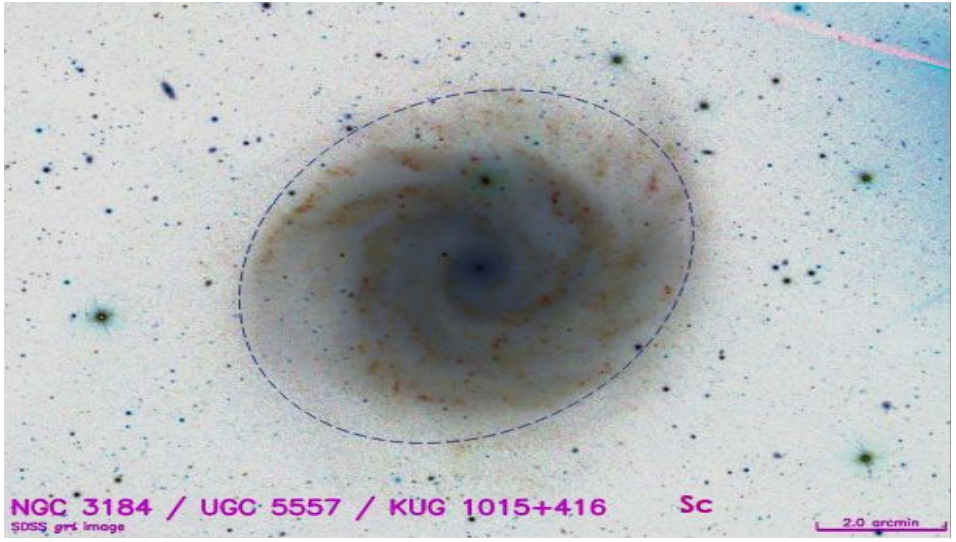
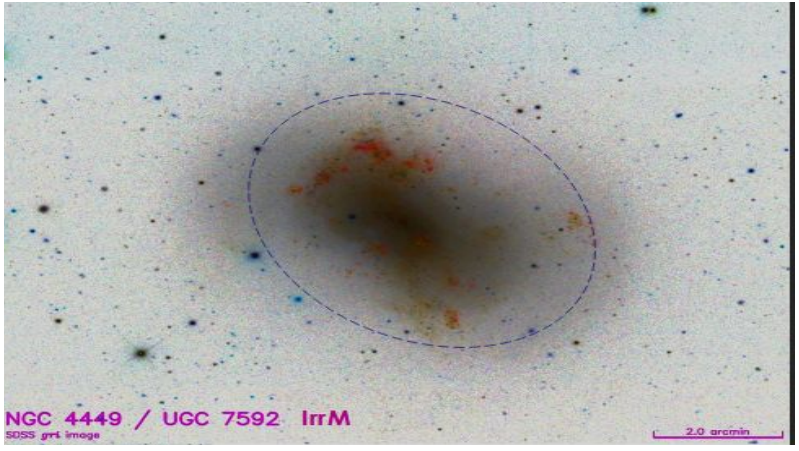
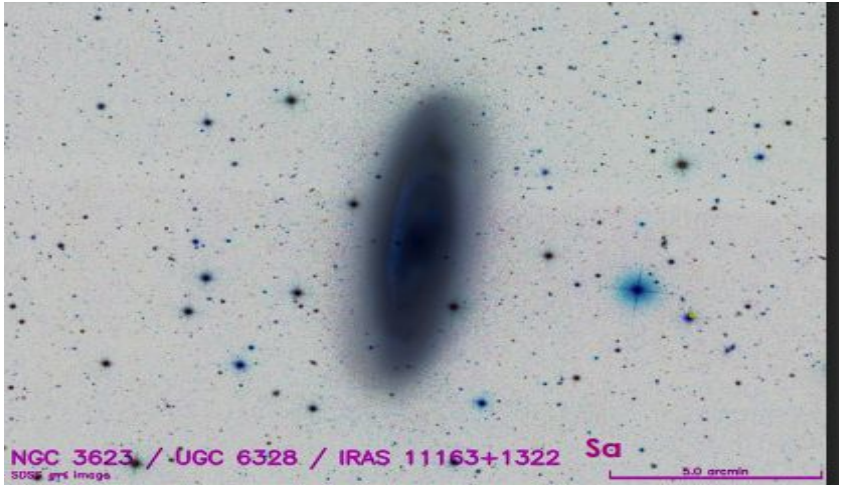


FIG. 1. *The Sequence of Nebular Types.*


NGC 3379 / UGC 5902 E0
SDSS grɛ image
2.0 arcmin


NGC 3184 / UGC 5557 / KUG 1015+416 Sc
SDSS grɛ image
2.0 arcmin


NGC 4449 / UGC 7592 IrrM
SDSS grɛ image
2.0 arcmin


NGC 3623 / UGC 6328 / IRAS 11163+1322 Sa
SDSS grɛ image
5.0 arcmin

FONTES

- Why astronomers love Python - Jake Vanderplast, Pycon 2017
- The Unexpected Effectiveness of Python in Science - Jake Vanderplast, Pycon 2017
- LIGO tutorial

Links Git

- Kepler
- JWST
- LSST

OBRIGADA!

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