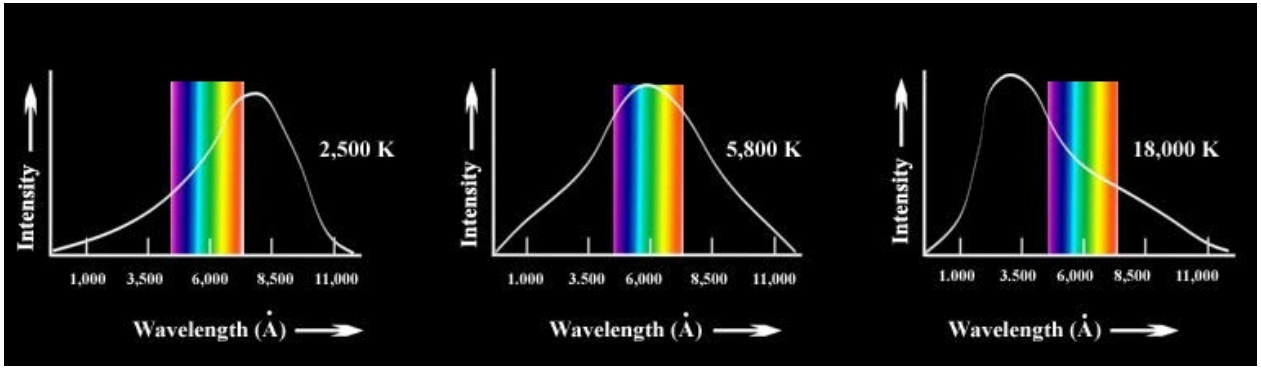
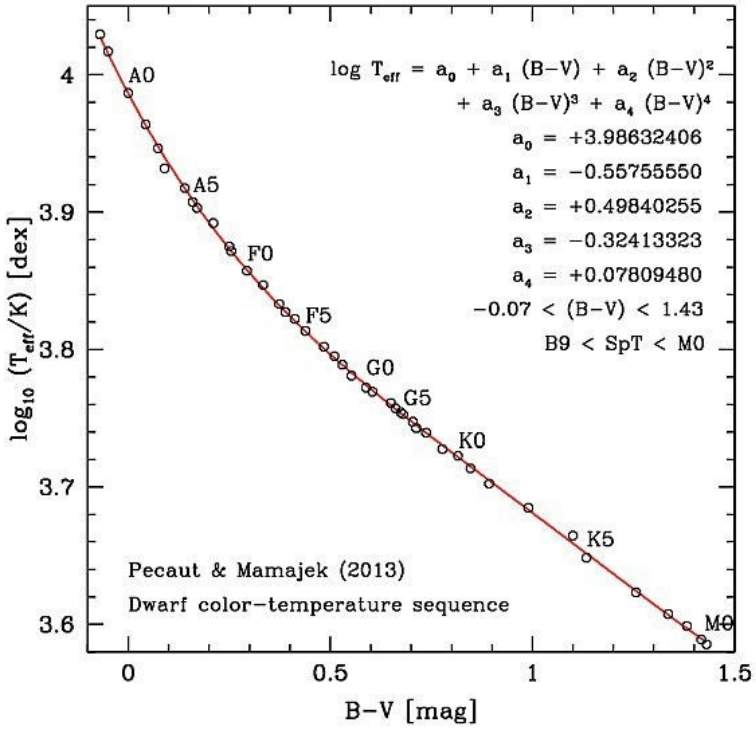
VOSA

Estimating physical parameters in the VO. SED fitting .

Enrique Solano

Estimating stellar parameters from colours

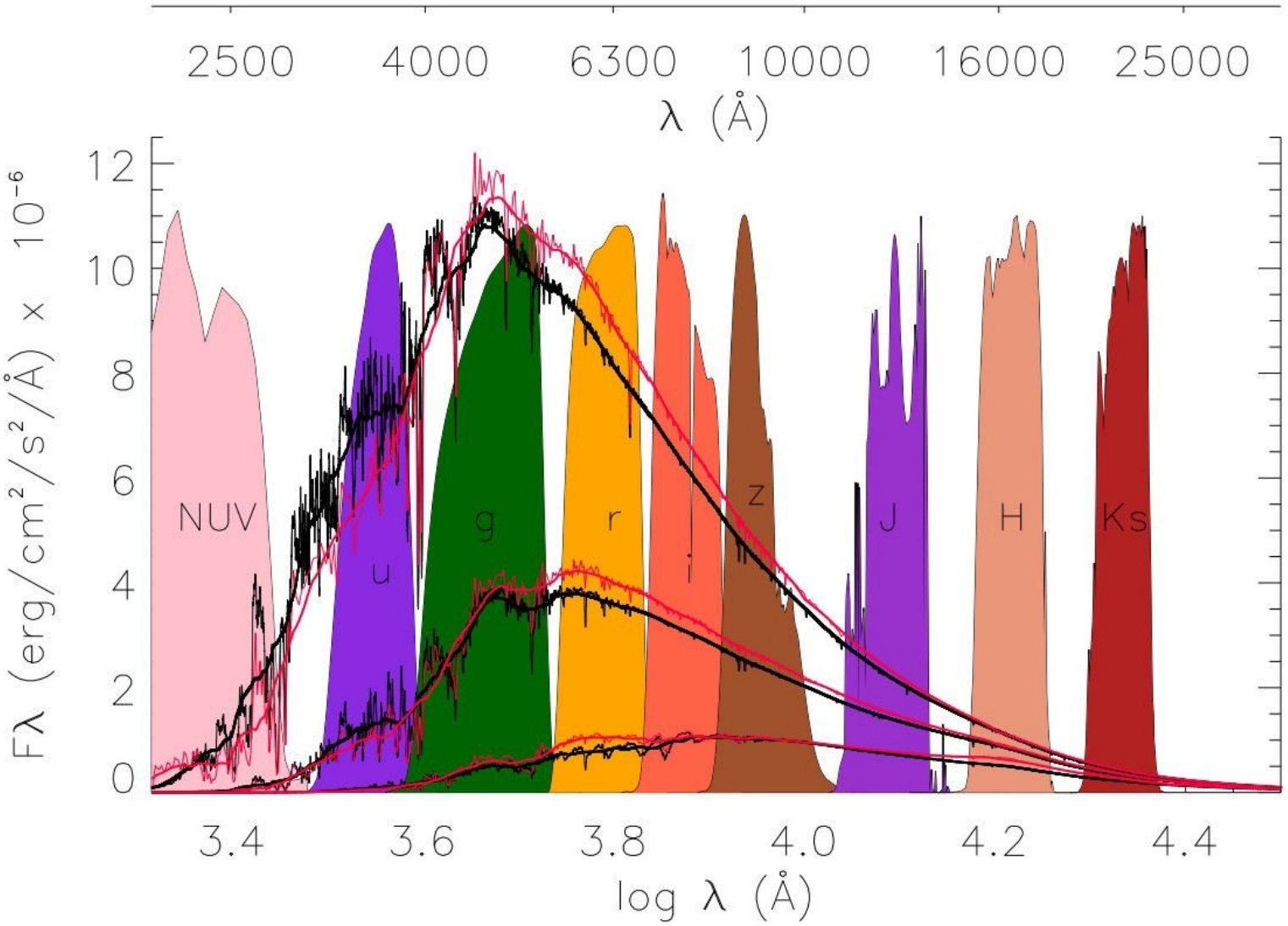




Why SEDs?

VISTA
2MASS
IRAS
Gaia
DES
EUCLID
Tycho
WISE
UKIDSS
SDSS
GALEX
IPHAS

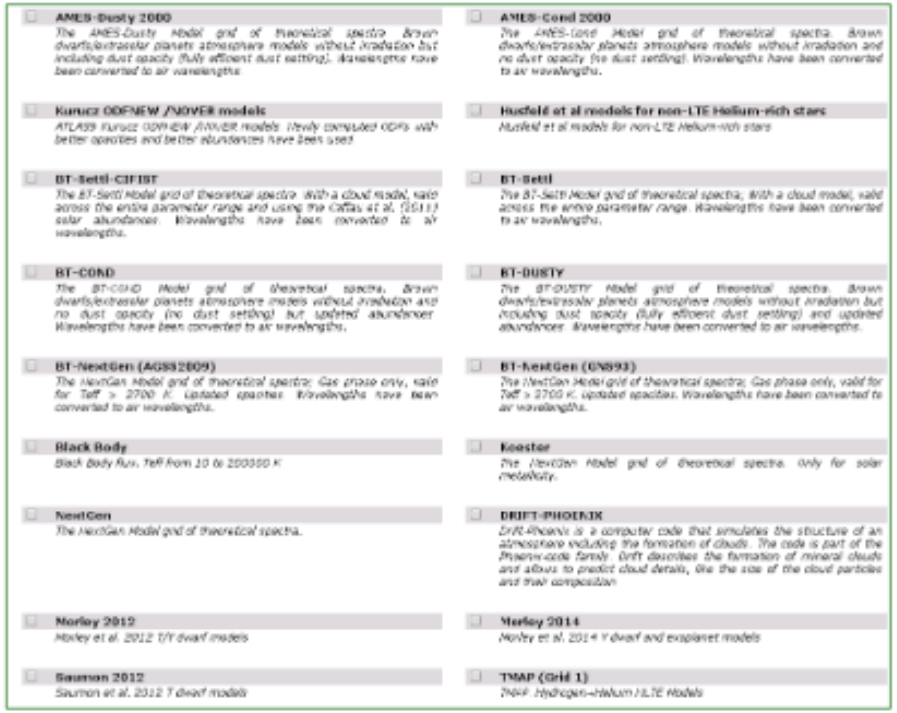
Why SEDs?


2500
4000
6300
10000
16000
25000
λ (Å)
12
10
8
6
4
2
0
Fλ (erg/cm²/s²/Å) x 10⁻⁶
NUV
u
g
r
i
z
J
H
Ks
3.4
3.6
3.8
4.0
4.2
4.4
log λ (Å)

Building SEDs: Difficulties

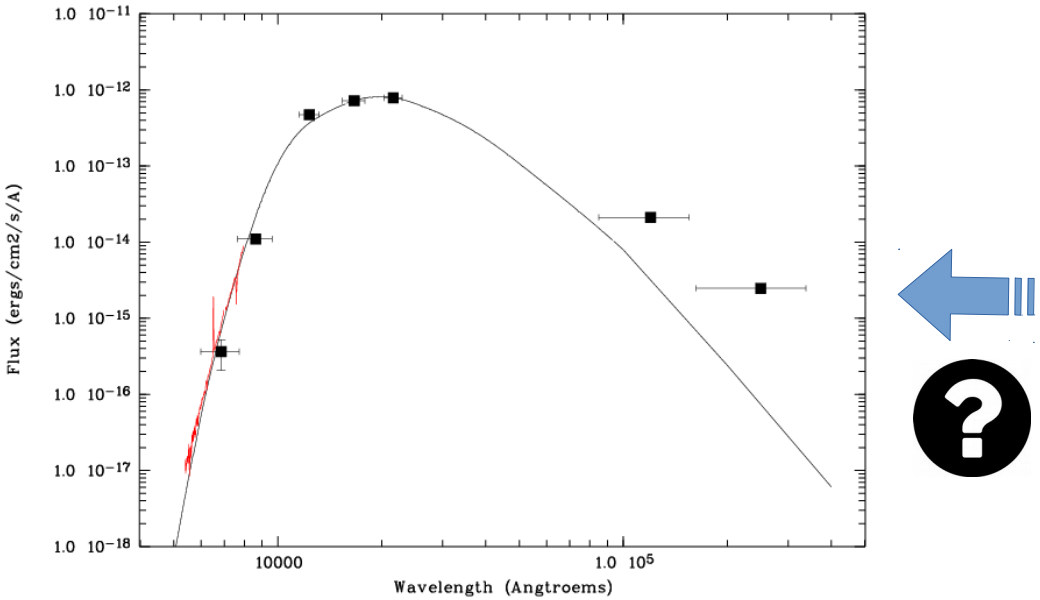
Searching for information:

Observational photometry and Theoretical models.



Building SEDs: Difficulties

- **Data Manipulation: From magnitudes to fluxes**



I/337/gaia Gaia DR1 (Gaia Collaboration, 2016
Post annotation GaiaSource data (**Download** Gaia Sc

start AladinLite

Full	RA_ICRS deg	DE_ICRS deg	<Gmag> mag
1	063.4107528711	-89.9888879972	17.965
2	037.5117084305	-89.9858176527	16.664
3	084.7593492719	-89.9781776713	18.553
4	081.5942616579	-89.9832765720	20.472
5	070.9024070024	-89.9715663343	19.829
6	060.8702751299	-89.9781334323	19.492
7	073.1733654732	-89.9817426647	20.019
8	027.3236159503	-89.9767950251	17.006
9	029.9573489468	-89.9759664621	18.649
10	020.0044580076	-89.9836077196	19.202

EUROPEAN SPACE AGENCY SCIENCE & TECHNOLOGY Search

GAIA DATA RELEASE DOCUMENTATION esa

Gaia Data Release 1 Documentation release D.0

[-] Gaia Data Release 1 Documentation release D.0
I Introduction to Gaia DR1

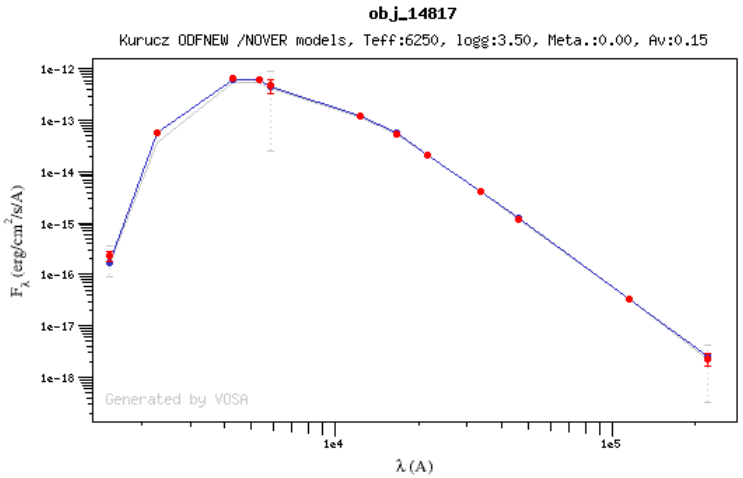
5 Photometry
5.2 Properties of the input data 5.4 Processing steps

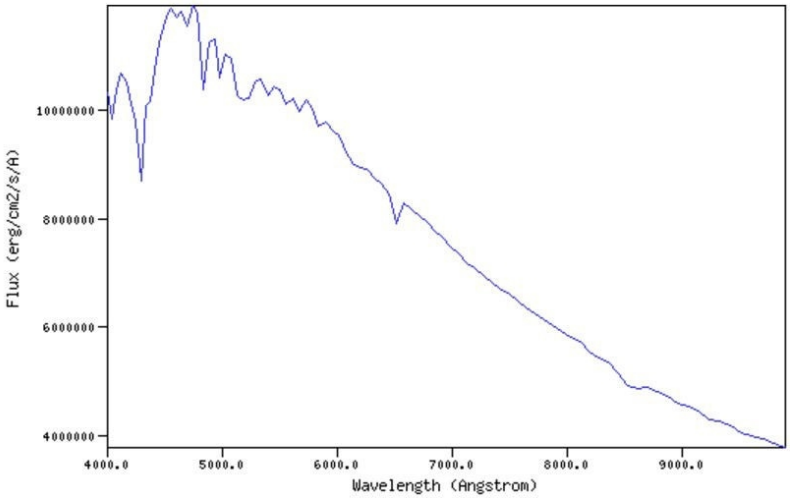
5.3 Calibration models

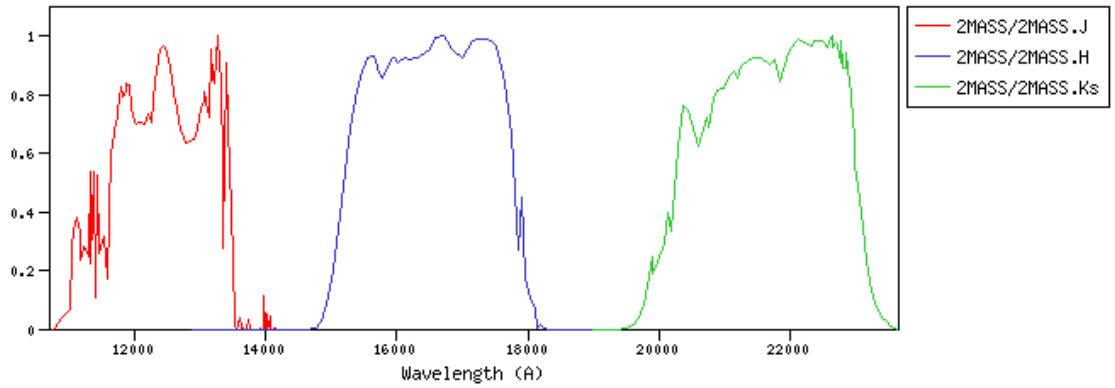
$$m_x = -2.5 \log_{10}\left(\frac{F_x}{F_{x,0}}\right)$$

Building SEDs: Difficulties

- **Data Manipulation: From theoretical spectra to synthetic photometry**

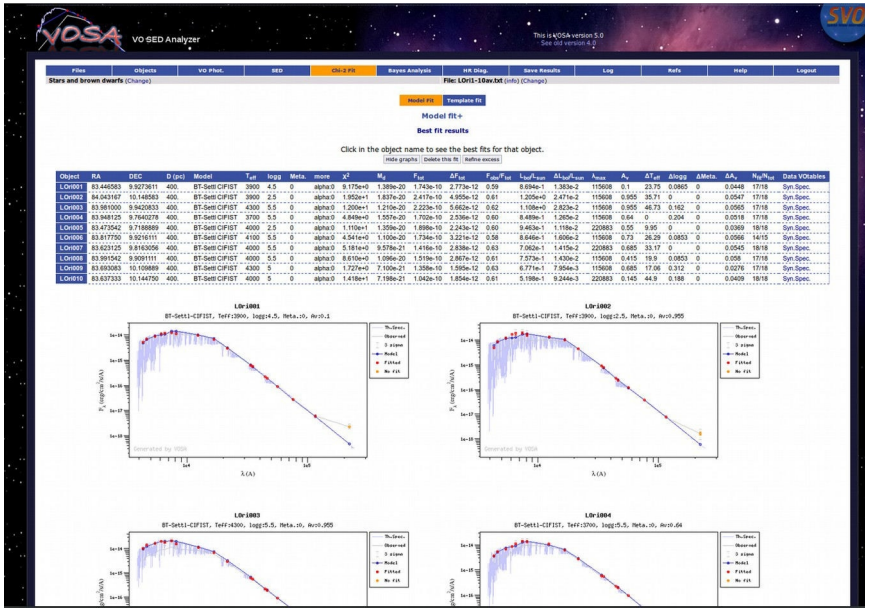






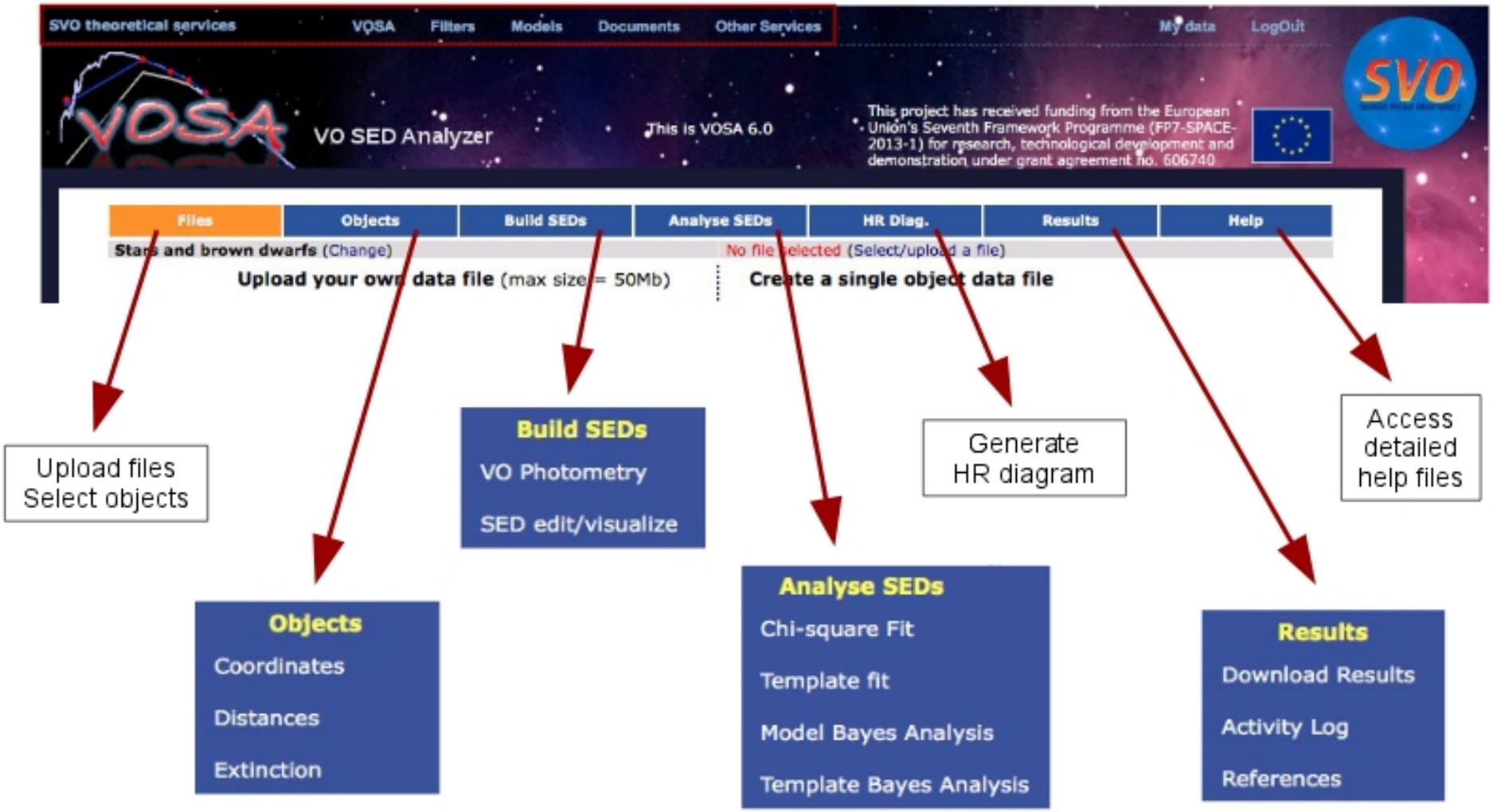
VOSA: the **VO** **S**ED **A**nalyzer

http://svo2.cab.inta-csic.es/theory/vosa/



- Available since 2008.
- > 2 600 users.
- 10. 000.000 objects.
- > 200 refereed papers.

VOSA: the **VO** **S**ED **A**nalyzer



The science case

THE ASTRONOMICAL JOURNAL

Accurate Empirical Radii and Masses of Planets and Their Host Stars with *Gaia* Parallaxes

Keivan G. Stassun[1,2], Karen A. Collins[1,2], and B. Scott Gaudi[3,4]

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The Astronomical Journal, Volume 153, Number 3

The science case

KNOW THE STAR, KNOW THE PLANET

$$\Delta F = \left(\frac{R_{planet}}{R_{star}}\right)^2$$

$$M_p = \frac{K_{RV}\sqrt{1-e^2}}{\sin i}\left(\frac{P}{2\pi G}\right)^{1/3} M_\star^{2/3}$$

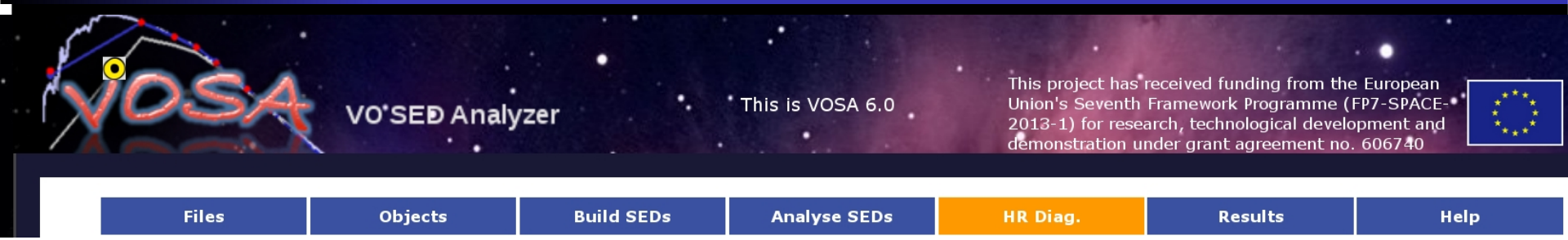
SED fitting → F_{bol} and T_{eff}

$L = 4\pi D^2 F_{bol}$

$R = \mathrm{sqrt}(L/(4\pi\sigma T_{eff}^4))$

$g = G M / R^2$

The tutorial



Don't forget:

Turn off your microphone and video

Question can be addressed any time during the execution of the tutorial via chat.

Questions must be addressed to “Everyone”.

Raise your hand via chat when you've finished Step #9 and when you've finished Case #1