

The Virtual Observatory

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CENTRO DE ASTROBIOLOGÍA



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Instituto Nacional de
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EXCELENCIA
MARÍA
DE MAEZTU



Data! Data! Data!

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Full length article

Euro-VO—Coordination of virtual observatory activities in Europe



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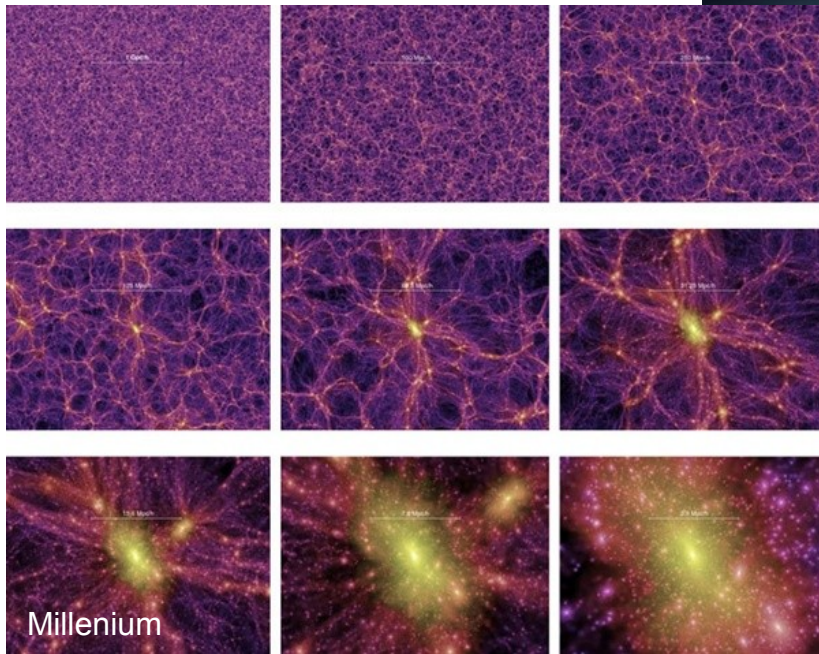
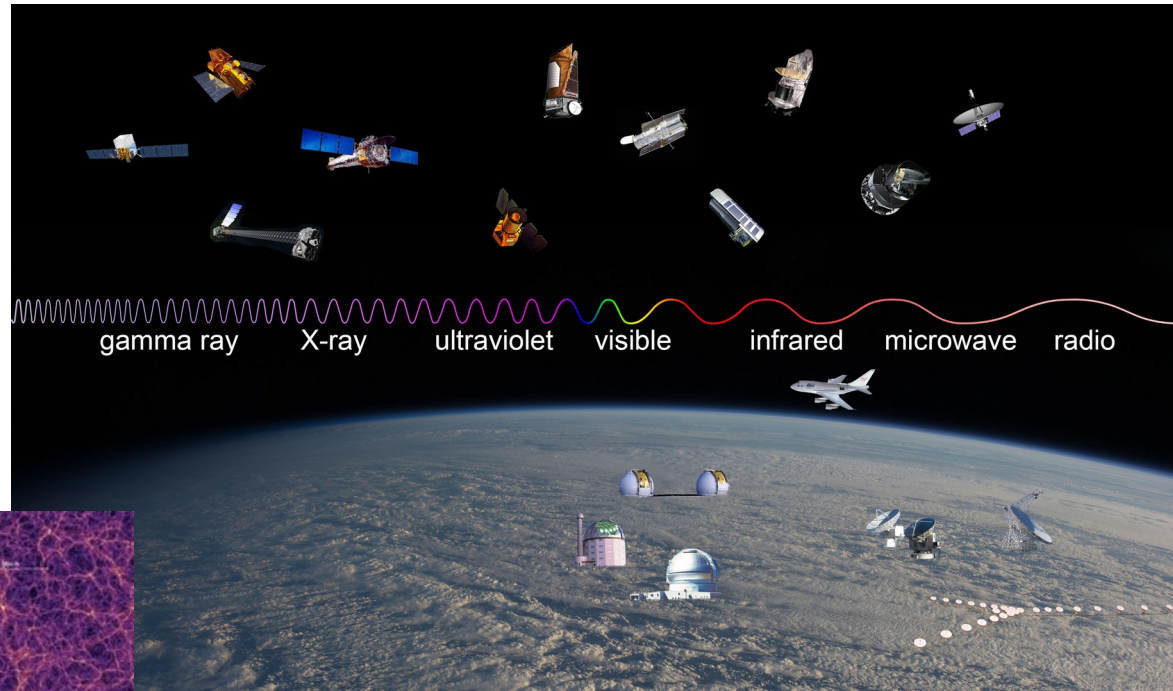
^d INAF - Astronomical Observatory of Trieste, Via G.B. Tiepolo 11, 3114, Trieste, Italy

^e Centro de Astrobiología (INTA-CSIC), Departamento de Astrofísica, Campus Villafranca, P.O. Box 78, E-28691 Villanueva de la Cañada, Madrid, Spain

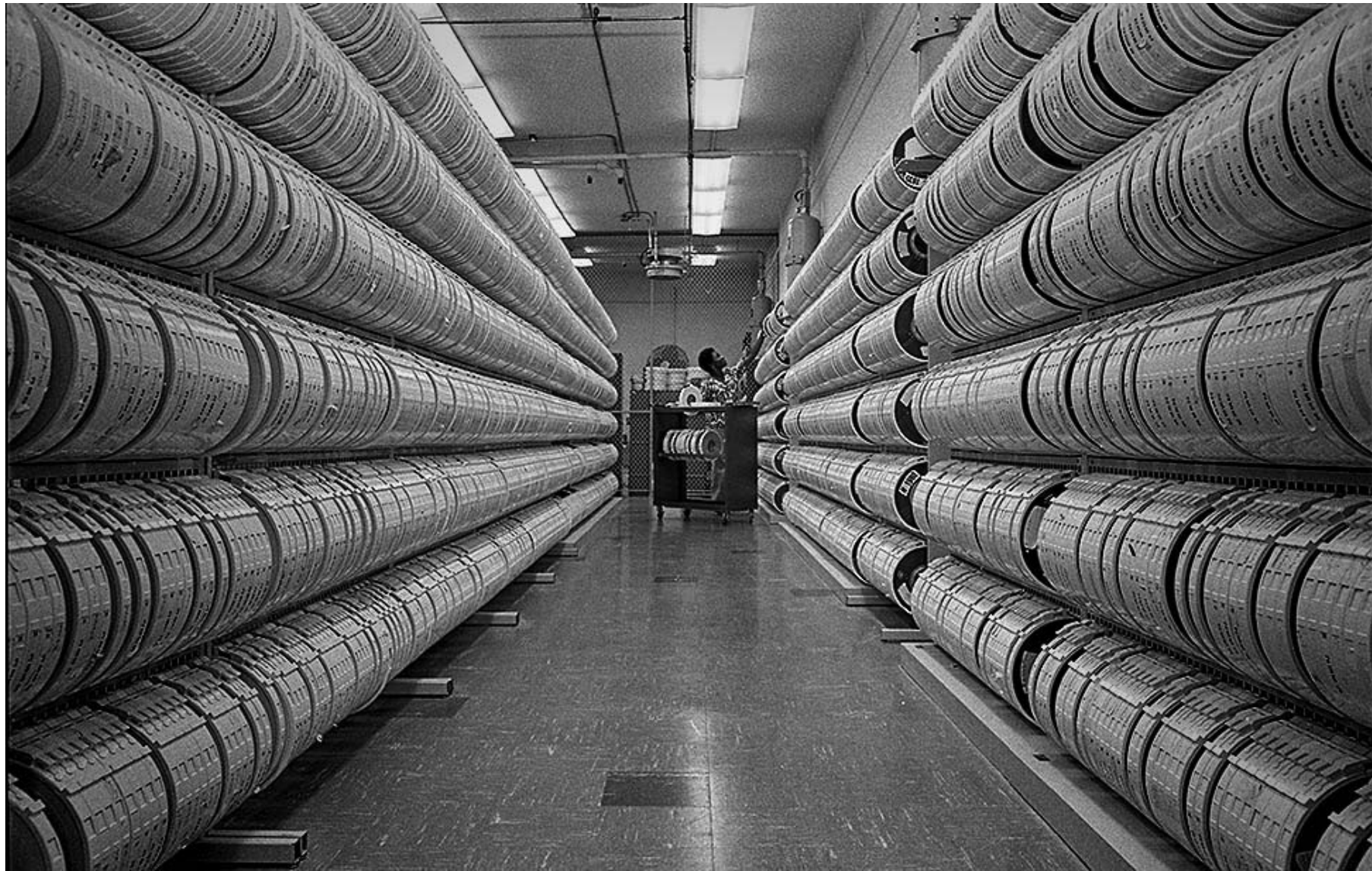
^f Spanish Virtual Observatory, Spain

^g Zentrum für Astronomie der Universität Heidelberg (ZAH), Astronomisches Rechen-Institut (ARI), Mönchhofstr. 12-14, 69120 Heidelberg, Germany

Data! Data! Data!



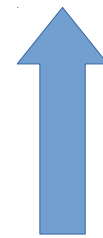
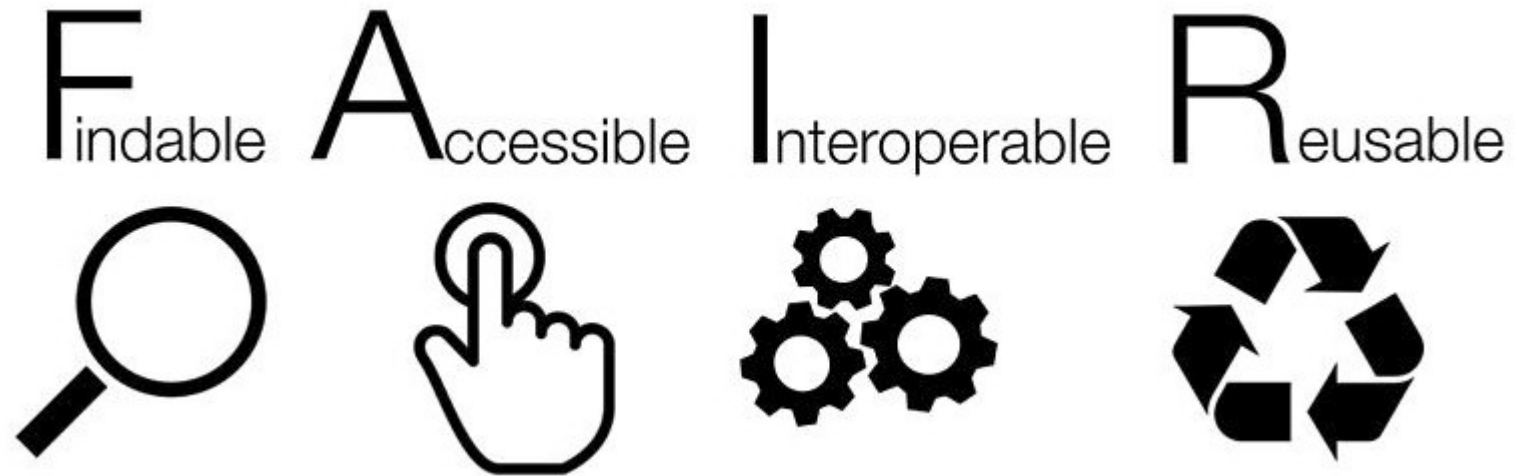
Archives: Not just repositories...



Archives:... but research infrastructures



FAIR: The magic word



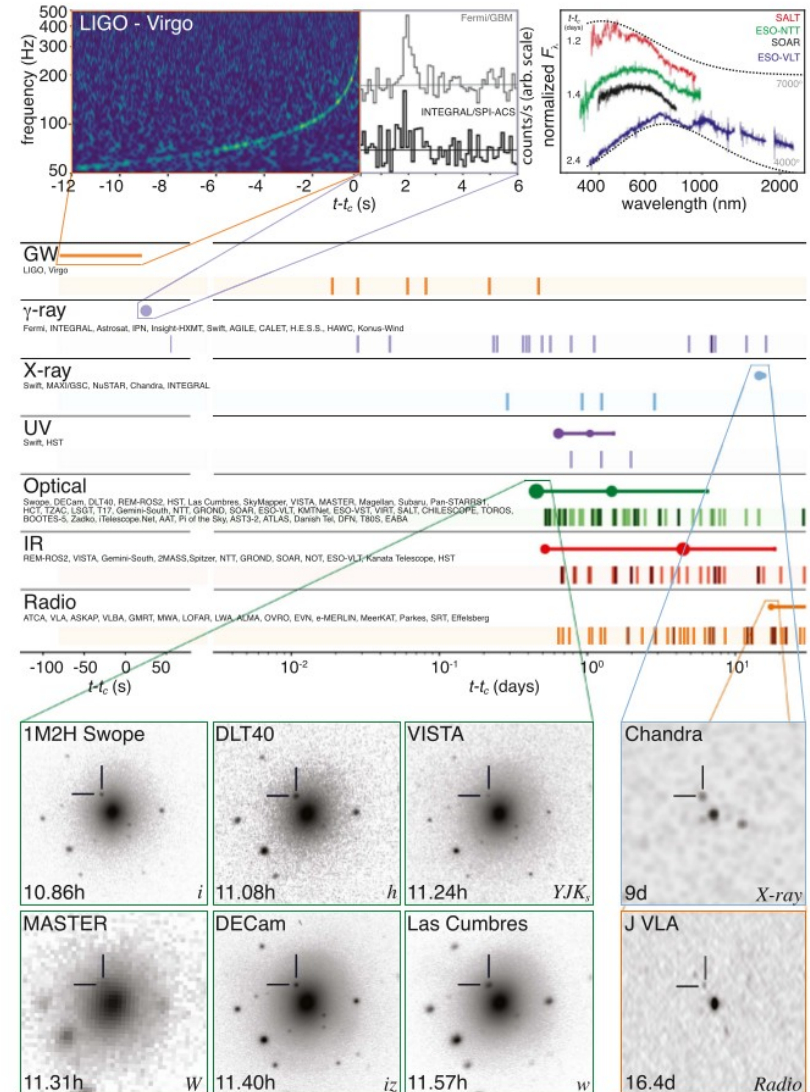
FAIR: Interoperable



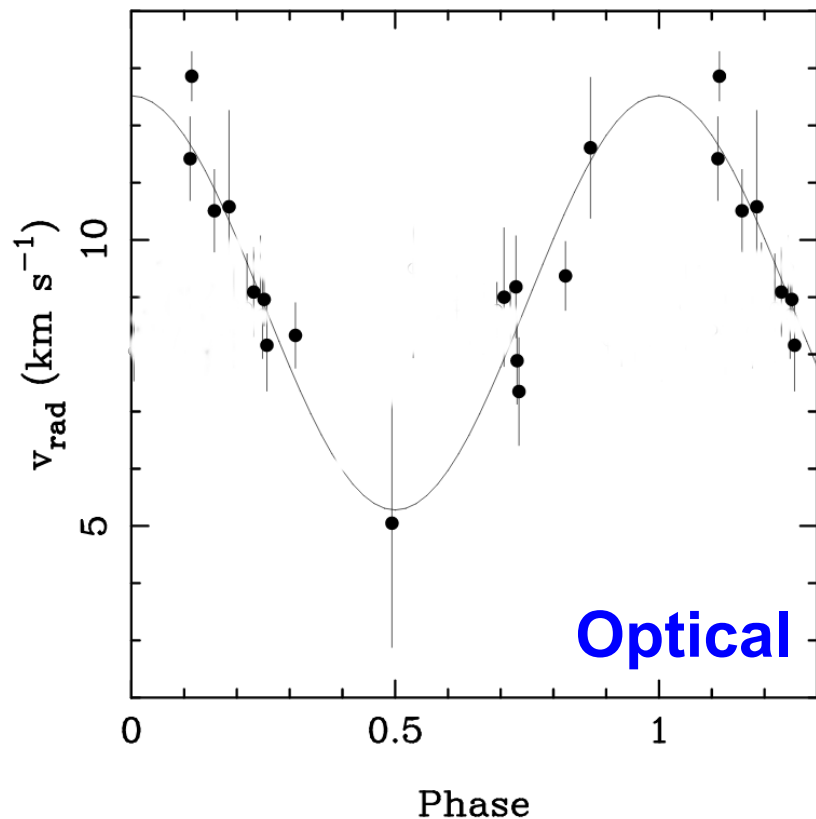
GW170817

THE ASTROPHYSICAL JOURNAL LETTERS, 848:L12 (59pp), 2017 October 20

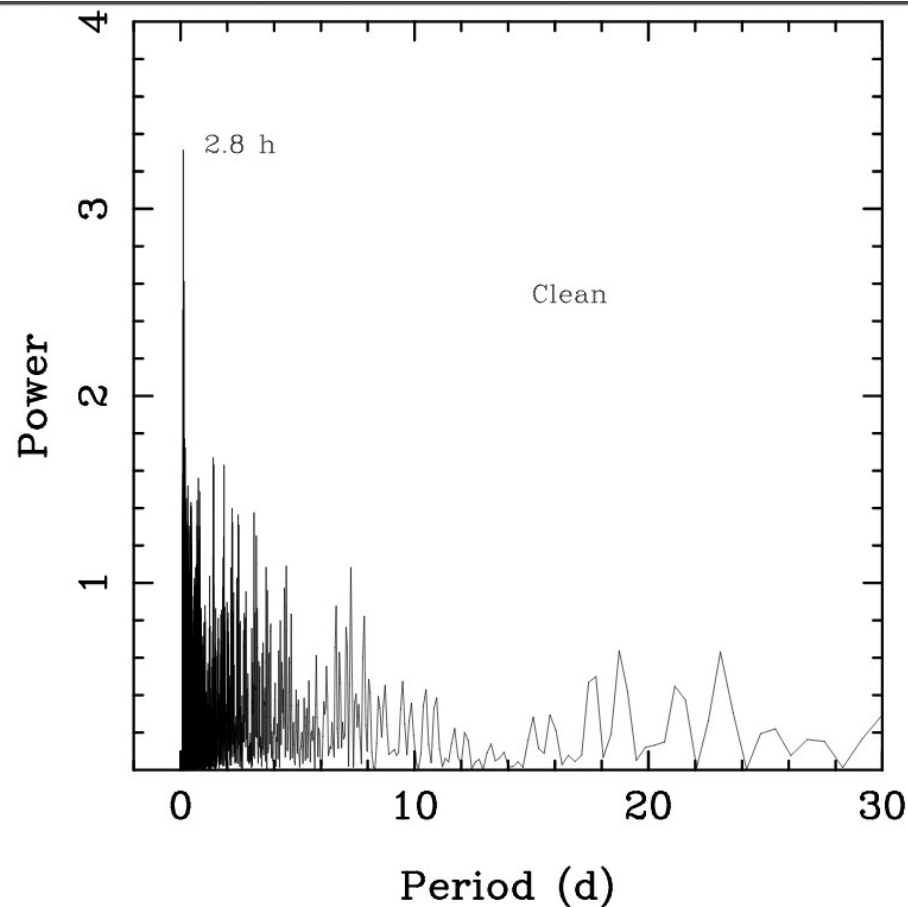
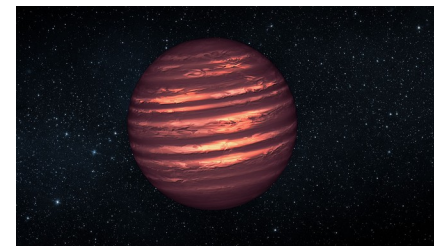
Abbott et al.



Multi- λ Astronomy

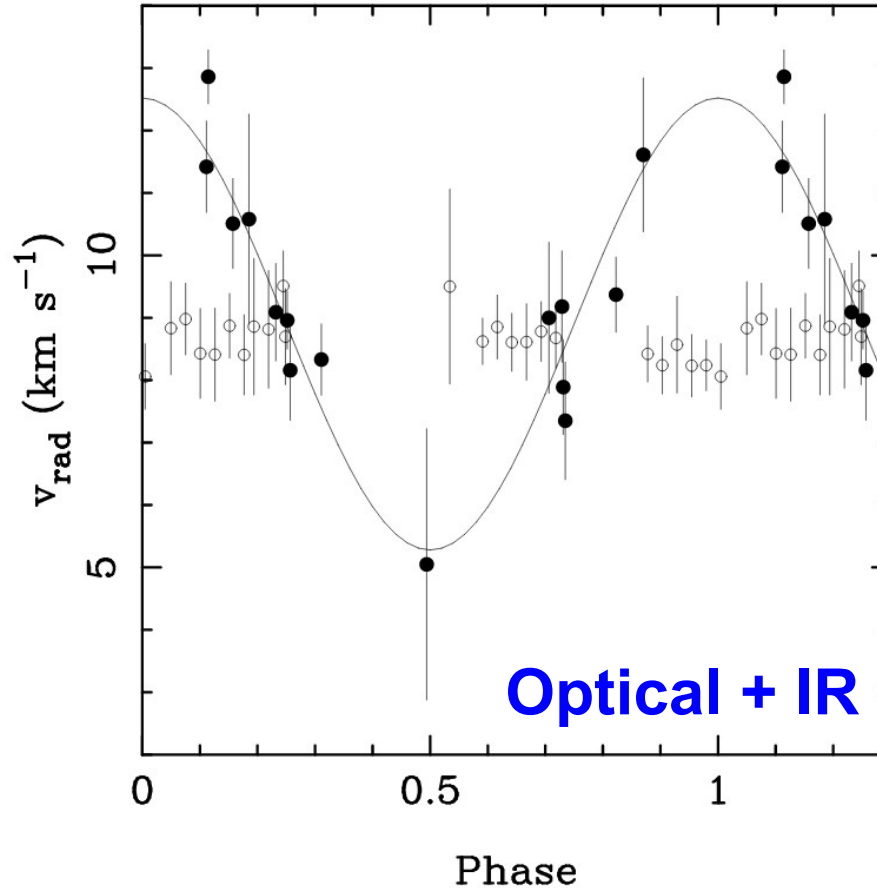


LP 944-20



- 14 nights covering 841 days
- Period: 2.5 – 3.7 hours
- VLT/UVES

Multi- λ Astronomy



NIRSPEC / IR data rules out the planetary hypothesis

The multi- λ nightmare

- **Data discovery**
 - How can I find archives that contain the data I am looking for?
 - Once identified, how to select only those fulfilling certain conditions (spectral resolution, wavelength range, spatial resolution,...).
- **Data access:** Access protocols of very diverse nature.
- **Data analysis:** How to put all the pieces of the puzzle together?
 - **For images:**
 - Different pixel scales, orientations,...
 - **For spectra:**
 - Different unit both in flux and wavelength.
 - **For photometry:**
 - Where to find the filter / filter + detector / filter+detector+telescope / filter+detector+telescope+atmosphere curves?
 - And the zero-points?
 - **For catalogues:**
 - Different labels for the same magnitude (V, Vmag, Johnson V,...)



The International Virtual Observatory Alliance

Virtual Observatories of the Future

Caltech campus, Pasadena, Calif., USA
June 13 - 16, 2000
<http://astro.caltech.edu/nvoconf>
Email inquiries: nvoconf@astro.caltech.edu

MPA/ ESO/ MPE Joint Astronomy Conference

MINING THE SKY

July 31 - August 4, 2000
Garching, Germany



The International Virtual Observatory Alliance



Spanish Virtual Observatory



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Enrique Solano



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El Observatorio Virtual Español

(Admin)

Tweets by @ObsVirtEsp



ObsVirtEsp

@ObsVirtEsp

@ObsVirtEsp estará presente en el IX Ciclo de Conferencias "Jornadas de Astronomía" de @astrocuencia

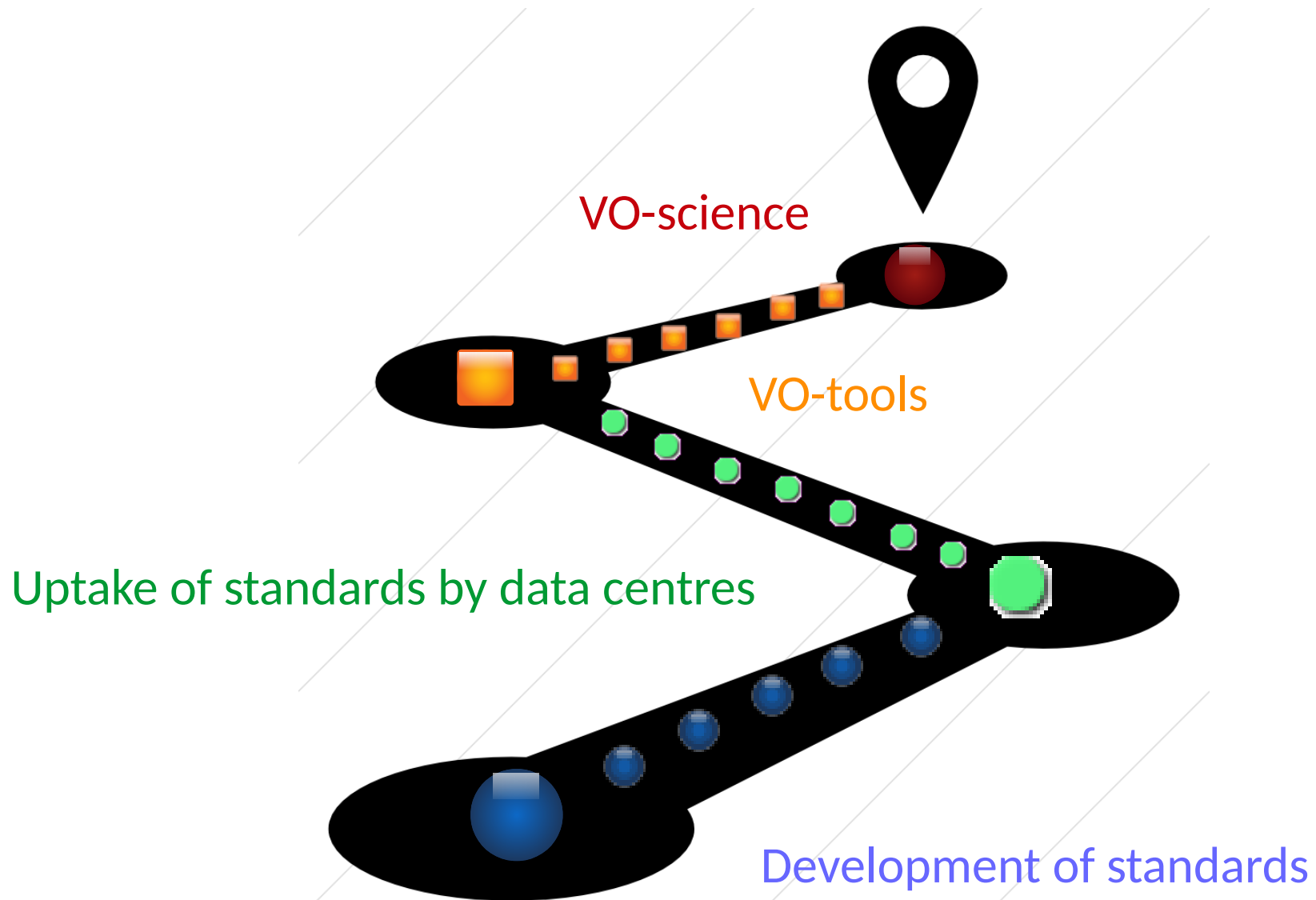


Embed

View on Twitter

<http://svo.cab.inta-csic.es>

The Virtual Observatory roadmap



FAIR. The power of VO

The screenshot displays the Aladin v10.0 interface. The main window shows a star field with a central bright star and a red crosshair. The interface includes a menu bar (File, Edit, Image, Catalog, Overlay, Coverage, Tool, View, Interop, Help), a Command bar, and a toolbar. The left panel shows a 'Data discovery tree' with a list of collections, including 'CDS/P/DSS2/color'. The right panel shows a 'Data discovery tree' with a list of collections and a 'Data discovery tree' section. The bottom status bar shows '0 sel / 0 src 34fps / 299MB'.

Annotations in the image:

- Arrow pointing to the 'Available data' section: **Discovery of 1000s of archives / services**
- Arrow pointing to the 'CDS/P/DSS2/color' collection: **Data available in the FoV → Green**

FAIR. The power of VO

Aladin v10.0

File Edit Image Catalog Overlay Coverage Tool View Interop Help

Command [x] Frame ICRS Projection Spheric

Available data → 24028 / 24029
in view out view

- HST-wideV includes the following
 - GTC Public Archive
 - DECaLS → 4
 - DECaPS → 2
 - DES → 5
 - HSC → 2
 - IPHAS → 3
 - MAMA → 3
 - PanSTARRS → 6
 - PanSTARRS DR1 color (from b...
 - PanSTARRS DR1 g
 - PanSTARRS DR1 i
 - PanSTARRS DR1 r
 - PanSTARRS DR1 v
 - PanSTARRS DR1 z
 - J-PLUS-DR1 (July, 2018)
 - MINI-PAS-PDR201912 (December...
 - BASS → 2
 - DES DR1 LineA color
 - Swift → 6
 - UVOT → 6
 - Combined Swift UVOT counts: ba...
 - Combined Swift UVOT counts: ba...
 - Combined Swift UVOT exposure:...
 - Combined Swift UVOT exposure:...
 - Combined Swift UVOT intensities
 - Combined Swift UVOT intensities
 - Infrared → 179
 - Radio → 67
 - Gas-lines → 45
 - X-ray → 1
 - Swift → 1
 - XRT → 1
 - Combined Swift XRT exposure
 - X-ray → 16
 - Swift → 8
 - INTEGRAL → 4
 - INTEGRAL/IBIS 14-year 17-60keV
 - INTEGRAL/IBIS 9-year 17-35keV
 - INTEGRAL/IBIS 9-year 17-60keV
 - INTEGRAL/IBIS 9-year 35-80keV
 - XMM → 4
 - False color X-ray images (Red=0)
 - X-ray images on band 0.5-1KeV
 - X-ray images on band 1-2KeV
 - X-ray images on band 2-4.5KeV
 - Data base → 59
 - Catalog → 22530
 - VizieR → 21095

select [input]
from --all collections--

grid study view north hidr multiview match

0 2017 Université de Strasbourg/CNRS - by CDS - Distributed under GNU GPL v3

0 sel / 0 src - 144fps / 639Mb

Interoperability (same orientation and scale).

[View B2] - CDS/P/2MASS/color

085 20421 = 01 96207 ICRS
05:40:49.97 - 01:57:57.9
1.95° x 1.319°

FAIR. The power of VO

TOPCAT

File Views Graphics Joins Windows VO Interop Help

Table List
4: TAP_4_gaiadr1.tgas_soi

Current Table Properties
Label: TAP_4_gaiadr1.tgas_source,gaiadr1.tmass_best_nei...
Location: TAP_4_gaiadr1.tgas_source,gaiadr1.tmass_best_neighbour,gaiadr1.tmass_best_neighbour,gaiadr1.tmass_best_neighbour
Name: sync
Rows: 10,000
Columns: 3
Sort Order:
Row Subset: All
Action: (no action) Broadcast Row

SAMP
Messages: Clients:

330 / 3547 M

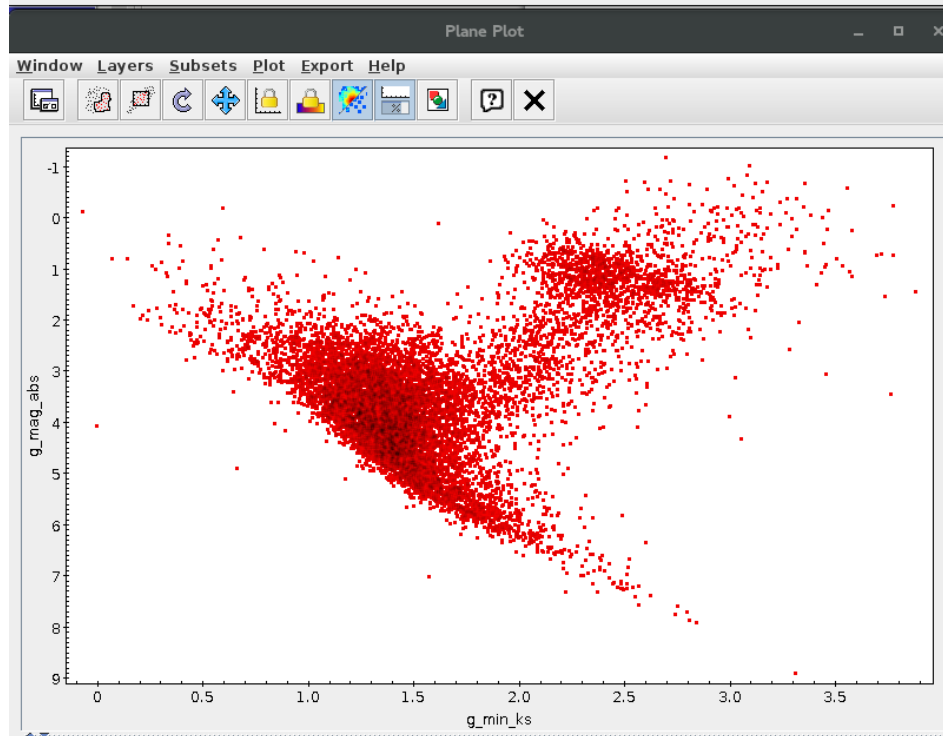


Table Access Protocol (TAP) Query

Window TAP Registry Edit Interop Help

Select Service Use Service Resume Job Running Jobs

Metadata

Find:

Name	Descr	Or	Service	Schema	Table	Columns	FKeys	Hints
gaidr2.dr1_nei								
gaidr2.gaiadr1.tgas_soi								
gaidr2.gsc23_b								
gaidr2.gsc23_n								
gaidr2.hipparc								
gaidr2.hipparc								
gaidr2.panstar								
gaidr2.panstar								
gaidr2.panstar								
gaidr2.ppmxl_b								
gaidr2.ppmxl_n								
gaidr2.ravedr5								
gaidr2.ravedr5								
gaidr2.ruwe								
gaidr2.sdssdr9								
gaidr2.sdssdr9								
gaidr2.cso_abc								

Service Capabilities
Query Language: ADQL-2.0 Max Rows: 3000000 (default) Uploads: 100Mb

ADQL Text
Mode: Synchronous

```
1  
SELECT TOP 10000 gaia.source_id,  
gaia.phot_g_mean_mag + 5 * log10(gaia.parallax) - 10 AS g_mag_abs ,  
gaia.phot_g_mean_mag - tmass.ks_m AS g_min_ks  
FROM gaiadr1.tgas_source AS gaia  
INNER JOIN gaiadr1.tmass_best_neighbour AS xmatch  
ON gaia.source_id = xmatch.source_id  
INNER JOIN gaiadr1.tmass_original_valid AS tmass  
ON tmass.tmass_oid = xmatch.tmass_oid  
WHERE gaia.parallax/gaia.parallax_error >= 5 AND  
ph_qual = 'AAA' AND  
sqrt(power(2.5 / log(10) * gaia.phot_g_mean_flux_error  
/ gaia.phot_g_mean_flux, 2)) <= 0.05 AND  
sqrt(power(2.5/log(10)*gaia.phot_g_mean_flux_error  
/ gaia.phot_g_mean_flux, 2)  
+ power(tmass.ks_msgcom, 2)) <= 0.05
```

Complex queries.

Run Query

The VO Schools

- >20 schools at national and european level since 2009. >500 participants



The school: Goals

- **Goals:**
 - Teach participants on how to efficiently use the VO tools for their own research.
 - Gather your feedback and requirements on VO tools and services.
- **Methodology:**
 - Tutorials based on real science cases.

The school: Schedule

Day 1. Monday 9 March

- 12:00 - 12:05 Welcome (Rainer?)
- 12:05 - 12:30 Introduction to the VO and the school (Enrique Solano)
- 12:30 - 13.30 Tutorial #1
 - Title: **Discovery of Brown Dwarfs mining the 2MASS and SDSS databases**
 - VO-tools: Aladin, TOPCAT
 - Tutor: Miriam Cortés
- 13:30 - 15:00 Lunch
- 15:00 - 15:45 Tutorial #1 (cont.)
- 15:45 - 16:45 Tutorial #2
 - Title: **Determination of stellar physical parameters using Clusterix and VOSA**
 - VO-tools: VOSA, Clusterix
 - Tutor: Enrique Solano
- 16:45 - 17:15 Coffee break
- 17:15 - 18:00 Tutorial #2 (cont.)

The school: Schedule

Day 2. Tuesday 10 March

- 09:30 - 11:15 Tutorial #3
 - Title: **Exploring Gaia data with TOPCAT and STILTS**
 - VO-tools: TOPCAT, STILTS
 - Tutor: Francisco Jiménez.
- 11:15 - 11:45 Coffee break
- 11:45 - 13:30 Tutorial #4
 - Title: **ADQL**
 - Tutor: Enrique Solano
- 13:30 - 15:00 Lunch
- 15:00 - 16:45 Tutorial #5
 - Title: **Advanced Aladin & TOPCAT**
 - Tutor: Miriam Cortés
- 16:45 - 17:15 Coffee break
- 17:15 - 18:15 Tutorial #6
 - Title: **Advanced VOSA**
 - Tutor: Enrique Solano

The school: Schedule

Day3. Wednesday 11 March

- 09:30 - 11:15 Participant's projects
- 11:15 - 11:45 Coffee break
- 11:45 - 12:15 Participant's projects (cont.)
- 12:15 - 13:00 Project presentations
- 13:00 - 13:30 Feedback and wrap up.

#SVOGranada2020