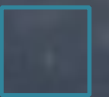


# The VO and CDS services & tools

---

Ada Nebot & the CDS team

Transient sky in 2020



# □ Outline

- The Virtual Observatory and the IVOA
  - Time Domain is a science priority
  - VOEvents
- The CDS
  - Simbad
  - VizieR
  - Aladin

# □ The Virtual Observatory

Astronomical data and archives are heterogeneous

homogenisation

definition of standards

*“The Virtual Observatory (VO) is the vision that astronomical datasets and other resources should work as a seamless whole.”*

# □ International Virtual Observatory Alliance

**Goal: Easy and efficient access and analysis of the information hosted in astronomical archives.**





# □ To keep in mind

- VO: Federation of data centres sharing data through a common set of standards.
- VO tools:
  - Not a “does-it-all” software
  - Different tools for different problems
  - VO science: A reality since 5-10 years ago.
- What is VO for?
  - For programmers, for data centres, for astronomers, for big data projects.
  - For educators, amateurs, general public.

# □ Time Domain is a priority for the IVOA

- Lots of missions specifically designed for Time Domain Astronomy:



- **Transient phenomena** >> follow-up >> Connect events/facilities/people.  
    ➡ **VOEvent** developed to facilitate transmission
- **Time Series** — collecting science cases from the astro-community. Send us yours!

# □ VOEvents

- **Transient phenomena** >> follow-up >> Connect events/facilities/people.  
➔ **VOEvent** developed to facilitate transmission:
  - **Who:** Identification of scientifically responsible Author
  - **What:** Event Characterization modeled by the Author
  - **WhereWhen:** Space-Time Coordinates of the event
  - **How:** Instrument Configuration
  - **Why:** Initial Scientific Assessment
  - **Citations:** Follow-up Observations
  - **Description:** Human Oriented Content
  - **Reference:** External Content

# □ VOEvent network architecture

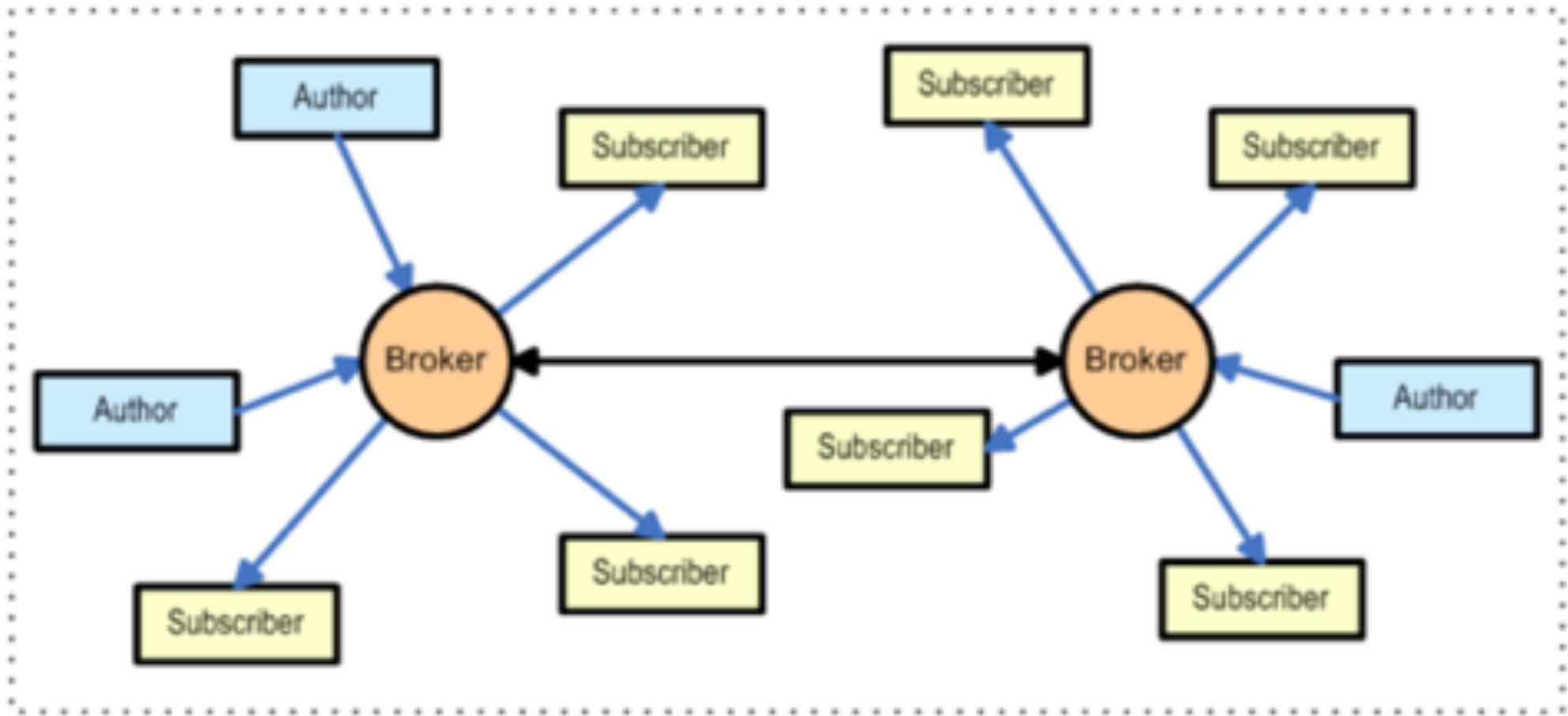
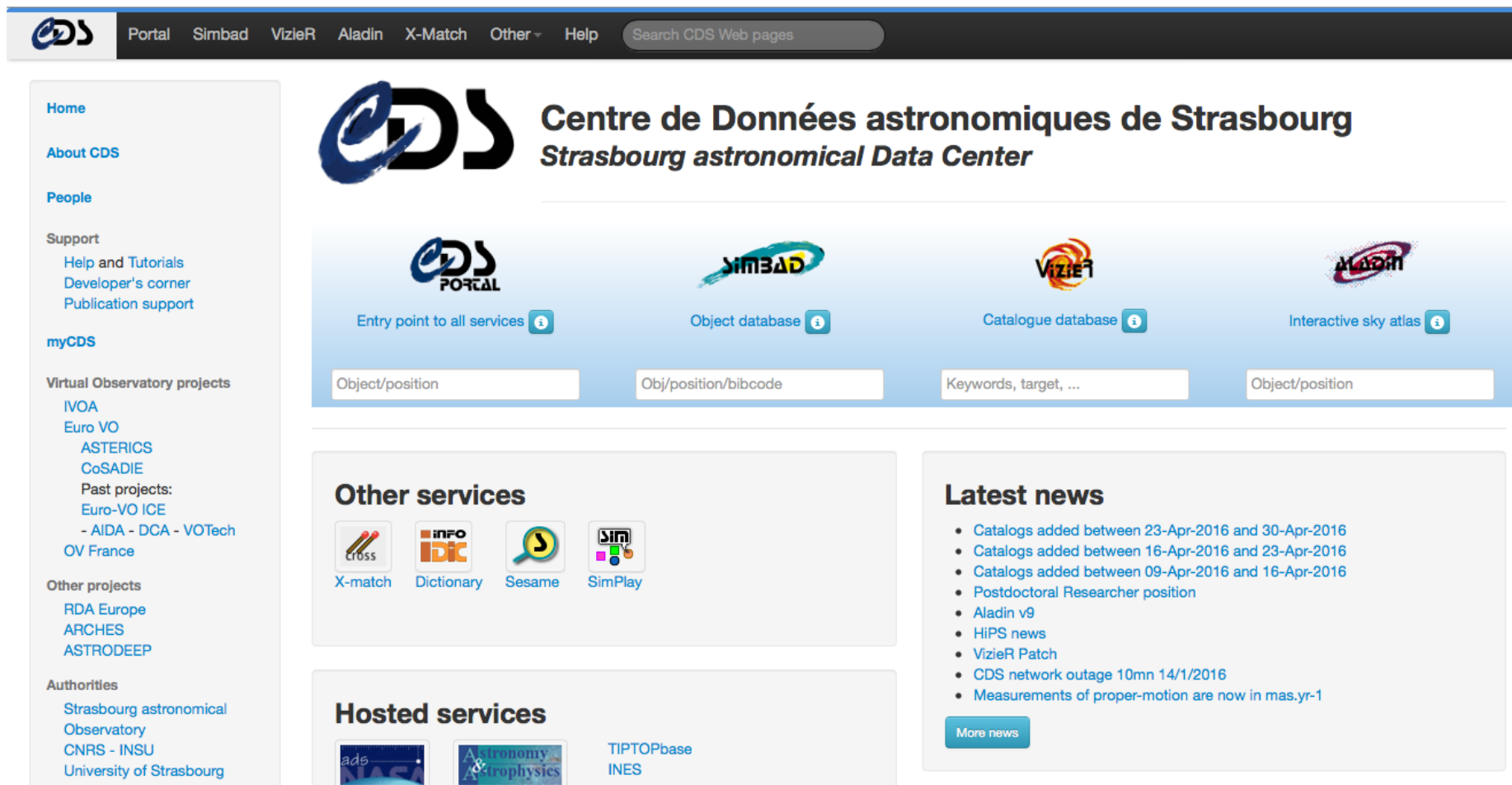


Figure 1. VOEvent network architecture showing node roles

# □ VOEvent tools

- There are tools for...
  - **Generating, Reading and Manipulating VOEvents:**
    - VOEventLib
    - voevent-parse
  - **Working with the VOEvent Transport Protocol:**
    - The Dakota VOEvent Tools
    - Comet
    - PyGCN
  - **VOEvent Databases:** voeventdb





The screenshot shows the homepage of the Centre de Données astronomiques de Strasbourg (CDS). At the top, there is a navigation bar with links for Portal, Simbad, VizieR, Aladin, X-Match, Other, and Help, along with a search box for CDS Web pages. The main header features the CDS logo and the text "Centre de Données astronomiques de Strasbourg" and "Strasbourg astronomical Data Center". Below this, there are four main service tiles: "CDS PORTAL" (Entry point to all services), "SIMBAD" (Object database), "VizieR" (Catalogue database), and "Aladin" (Interactive sky atlas). Each tile includes a search input field. The left sidebar contains a menu with categories like Home, About CDS, People, Support, myCDS, Virtual Observatory projects, Other projects, and Authorities. The bottom section is divided into "Other services" (X-match, Dictionary, Sesame, SimPlay) and "Hosted services" (ADS, Astronomy & Astrophysics, TIPTOPbase, INES). A "Latest news" section lists recent updates, such as catalog additions and network outages, with a "More news" button.

<http://cds.u-strasbg.fr>



# □ CDS services



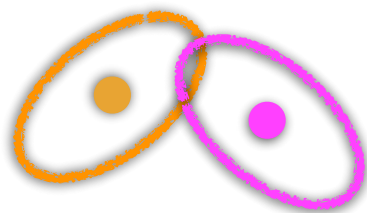
- Astronomical Objects : IDs, bibliography, measurements



- Catalogue Service : Catalogues, published tables, observation logs, surveys, associated data



- Visualisation and integration : images, catalogues, archives, VO portal, All-sky capabilities



- X-Match : Catalogue cross-match

# Simbad

## M31

[other query modes](#) :
 [Identifier query](#)
[Coordinate query](#)
[Criteria query](#)
[Reference query](#)
[Basic query](#)
[Script submission](#)
[TAP](#)
[Output options](#)
[Help](#)

Query : M31

C.D.S. - SIMBAD4 rel 1.3 - 2015.12.14CET22:29:12

[Available data](#) :
 [Basic data](#) •
 [Identifiers](#) •
 [Plot & images](#) •
 [Bibliography](#) •
 [Measurements](#) •
 [External archives](#) •
 [Notes](#) •
 [Annotations](#)

### Basic data :

#### M 31 -- Galaxy

Other object types: **LIN** ( ), **G** ([Ref](#), LEDA, 2MASX, MCG, UGC, UZC, Z, [M98c]), **QSO** ([Ref](#), [VV2006], [VV2010]), **AGN** ([VV2000c], [VV2003c], [VV98c]), **Rad** (2C, DA, [DGW65]), **IR** (IRAS, IRC, RAFGL), **GiC** (GIN), **GiG** (K79), **X** (XSS)

**ICRS coord.** (*ep=J2000*) : 00 42 44.330 +41 16 07.50 ( **Infrared** ) [ ] **B** [2006AJ....131.1163S](#)

**FK5 coord.** (*ep=J2000 eq=2000*) : 00 42 44.330 +41 16 07.50 [ ]

**FK4 coord.** (*ep=B1950 eq=1950*) : 00 40 00.09 +40 59 41.7 [ ]

**Gal coord.** (*ep=J2000*) : 121.1743 -21.5733 [ ]

**Radial velocity / Redshift / cz** : **V**(km/s) -300.0 [4.0] / **z**(spectroscopic) -0.001000 [0.000013] / **cz** -299.85 [4.00] (-) **C** [2012AJ....144....4M](#)

**Morphological type**: **SA(s)b** D [2013AJ....146...67B](#)

**Angular size (arcmin)**: 129 25 45 (-) (-) C -

**Fluxes (6)** :

<b>U</b>	4.86	[0.03]	D	<a href="#">2007ApJS..173..185G</a>
<b>B</b>	4.36	[0.02]	D	<a href="#">2007ApJS..173..185G</a>
<b>V</b>	3.44	[0.03]	D	<a href="#">2007ApJS..173..185G</a>
<b>J</b>	2.094	[0.016]	C	<a href="#">2006AJ....131.1163S</a>
<b>H</b>	1.283	[0.017]	C	<a href="#">2006AJ....131.1163S</a>
<b>K</b>	0.984	[0.017]	C	<a href="#">2006AJ....131.1163S</a>

SIMBAD  with radius  arcmin

Interactive [AladinLite](#) view

FoV: 2.14°

2MASS DSS SDSS

VizieR [photometry viewer](#) ?

Search within radius  arcsec

# □ Simbad

notes:

- See GALEX UV data in [GALEX data](#)

**Hierarchy** : number of linked objects

whatever the membership probability is (see description [here](#)) :

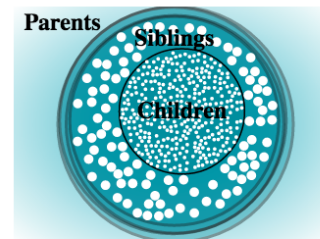
parents : 3

children : 10318

siblings : 102

Display criteria :

All



**Identifiers (30) :**

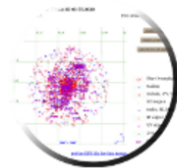
[M](#) 31  
[2C](#) 56  
[DA](#) 21  
[GIN](#) 801  
[IRAS](#) F00400+4059  
[IRAS](#) 00400+4059  
[IRC](#) +40013  
[K79](#) 1C

[LEDA](#) 2557  
[2MASX](#) J00424433+4116074  
[2MAXI](#) J0043+412  
[MCG+07-02-016](#)  
[NAME](#) ANDROMEDA Nebula  
[NAME](#) AND Nebula  
[NAME](#) ANDROMEDA  
[NAME](#) ANDROMEDA Galaxy

[NGC](#) 224  
[RAFGL](#) 104  
[UGC](#) 454  
[UZC](#) J004244.3+411608  
[XSS](#) J00425+4102  
[Z](#) 535-17  
[Z](#) 0040.0+4100  
[\[DGW65\]](#) 4

[\[M98c\]](#) 004000.1+405943  
[\[VV2000c\]](#) J004244.3+411610  
[\[VV2003c\]](#) J004244.3+411610  
[\[VV2006\]](#) J004244.3+411610  
[\[VV2010\]](#) J004244.3+411610  
[\[VV98c\]](#) J004245.1+411622

**Plots and Images**

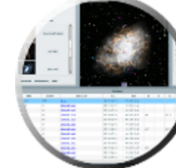


plot

radius  arcmin



CDS portal



CDS Simplay  
(requires flash)



Aladin applet

## References (9034 between 1850 and 2016)

Simbad bibliographic survey began in 1950 for stars (at least bright stars) and in 1983 for all other objects (outside the solar system).

[Follow](#) new references on this object

sort references

display reference summary

from: 1850 to: \$currentYear

Sort reference summaries by : (not exhaustive, [explanation here](#))

Date | Title|Abstract|Keyword | In table | Score

## Measurements (11 types) :

distance : 7  IRAS : 1  IRC : 1  ISO : 156  IUE : 13  posa : 1  rVel : 4  velocities : 7  XMM : 22  z : 1  ze : 1

display selected measurements

display all measurements

clear

## External archives :

Archive data at [HEASARC - High-Energy Astrophysics Science Archive Research Center](#)

Data at [NED - NASA/IPAC Extragalactic Database : M31](#)

Link by name to the catalogue in [VizieR](#) :

[IRAS F00400+4059](#)  
[RAFGL 104](#)

[IRAS 00400+4059](#)  
[UGC 454](#)

[IRC +40013](#)

[2MASX J00424433+4116074](#)

[NGC 224](#)

Search by coordinates in [Vizier \(radius: 30 arcsec\)](#)

## Annotations :

Annotations allow a user to add a note or report an error concerning the astronomical object and its data. It requires registration to post a note. See [description](#) .  
The list of all annotations to SIMBAD objects can be found [here](#) .

Currently no annotations available

[add an annotation to this object](#)

[report an error concerning the data of this object](#)



# Simbad: TAP



Portal

Simbad

VizieR

Aladin

X-Match

Other

Help



## Simbad: TAP Service

Refreshing...

**Execution options**

Query name:  
Example 1

Format:  
Text

Max records:  
1000

Batch mode

Check before start

Upload(0)

TAP resources

**Help**

- What is TAP ?
- ADQL cheat sheet
- Simbad tables

More links

ADQL QUERY TO EXECUTE (or choose an example: Get object by identifier)

```
-- Basic data from an object given one of its identifiers.
SELECT basic.OID,
       RA,
       DEC,
       main_id AS "Main identifier",
       coo_bibcode AS "Coord Reference",
       nbref AS "NbReferences",
       plx_value as "Parallax",
       rvz_radvel as "Radial velocity",
       galdim_majaxis,
       galdim_minaxis,
       galdim_angle AS "Galaxy ellipse angle"
FROM basic JOIN ident ON oidref = oid
WHERE id = 'm13';
```

Check!

Start !

Clear

LIST OF YOUR TAP BATCH QUERIES

Catalogues, published tables, observation logs, surveys, **associated data**

- Heterogeneous tables described by standardised metadata
- Curated by professional ‘documentalists’
- Cooperation with major journals
- Added value - interoperability, usability, services
  - e.g. X-Match, visualisation, complex queries



# VizieR renewed interface

The screenshot displays the VizieR web interface. At the top, a navigation bar includes the CDS logo and menu items: Portal, Simbad, VizieR (selected), Aladin, X-Match, Other, and Help. The VizieR logo is also present in the top right corner.

The main content area features the VizieR logo and a descriptive paragraph: "VizieR provides access to the most complete library of published astronomical catalogues and data tables available on line organized in a self-documented database. Query tools allow the user to select relevant data tables and to extract and format records matching given criteria. Currently, 13348 catalogues are available. [more info](#)".

Below the description are three search options:

- Free text search:** A text input field containing "catalogue name, author, ..." and a blue "Find catalogues" button.
- Position:** A text input field containing "position or object name", a numeric input field with "10", a quote button, a blue "Find catalogues" button, and a "Photometry" button with a camera icon.
- Go to the classic form:** A button labeled "Advanced search".

At the bottom, there are three columns of navigation links:

- VizieR:** How to publish my catalog, Help and tutorials, View large catalogs, Rules of usage, Mirrors.
- Other related services:** TAPVizieR, Photometry viewer, CDS cross-match service, VizieR using the batch mode, VO compatibility.
- Simple browsing modes:** By hierarchical organisation, By acronyms or abbreviations, By popularity, Recently entered into VizieR, Catalogs having images, spectra...

## Search by keyword

## VizieR Service

## Search by mission

[VizieR photometry viewer](#)

**new** The [CMC15](#) and [IGSL3](#) catalogues are available in VizieR.

### Search Criteria

#### Preferences

max: 50

HTML Table

All columns

[Compute](#)

#### Mirrors

CDS, France

### Find catalogs among 12396 available

Clear  Find...

Expand search

**?** *Catalog, author's name, word(s) from title, description, etc. e.g.: AGN, Veron, I/239, or bibcodes...*

▶ [Search for catalogs by column descriptions \(UCD\)](#) **?**

▶ [Search for catalogs containing additional data](#)

#### Wavelength

Radio  
IR  
optical  
UV  
EUV  
X-ray  
Gamma-ray

#### Mission

AKARI  
ANS  
ASCA  
BeppoSAX  
CGRO  
Chandra  
COBE

#### Astronomy

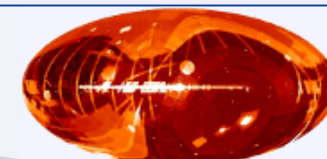
Abundances  
Ages  
AGN  
Associations  
Atomic\_Data  
Binaries:cataclysmic  
Binaries:eclipsing

### Search by Position across 13000 tables

Target Name (resolved by [Sesame](#)) or Position:

Clear  J2000  arcmin

Radius  Box size



**i** [More about VizieR](#)

~ 3 matching catalogs

Find Catalogs

Browsing modes: [Designation](#), [Acronyms](#), [Favorites](#), [Dates](#), [Image.spectra](#), [Kohonen](#)

Or list [the large surveys](#)

### Tools related to VizieR

- **new** [Photometry viewer](#) : Plot photometry (sed) including all VizieR
- [TAP VizieR](#) : query VizieR using ADQL (a SQL extension dedicated for astronomy)
- [CDS cross-match service](#) : fast cross-identification between any 2 tables, including VizieR catalogues, SIMBAD



## Search by keyword **VizieR Service**

[VizieR photometry viewer](#)

**new** The [CMC15](#) and [IGSL3](#) catalogues are available in VizieR.

### Search Criteria

**Preferences**  
 max: 50  
 HTML Table  
 All columns  
 Compute  
**Mirrors**  
 CDS, France

### Find catalogs among 12396 available

Clear  Find...

Expand search

**expand search**

**?** *Catalog, author's name, word(s) from title, description, etc. e.g.: AGN, Veron, I/239, or bibcodes...*

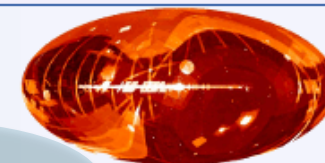
- ▶ Search for catalogs by column descriptions (UCD) **?**
- ▶ Search for catalogs containing additional data

Wavelength	Mission	Astronomy
Radio	AKARI	Abundances
IR	ANS	Ages
optical	ASCA	AGN
UV	BeppoSAX	Associations
EUV	CGRO	Atomic_Data
X-ray	Chandra	Binaries:cataclysmic
Gamma-ray	COBE	Binaries:eclipsing

### Search by Position across 13000 tables

Target Name (resolved by [Sesame](#)) or Position: Clear  J2000  arcmin  Go!

Radius  Box size



**i** [More about VizieR](#)

~ 191 matching catalogs Find Catalogs

Browsing modes: [Designation](#), [Acronyms](#), [Favorites](#), [Dates](#), [Image.spectra](#), [Kohonen](#)

Or list [the large surveys](#)

### Tools related to VizieR

- **new** [Photometry viewer](#) : Plot photometry (sed) including all VizieR
- [TAP VizieR](#) : query VizieR using ADQL (a SQL extension dedicated for astronomy)
- [CDS cross-match service](#) : fast cross-identification between any 2 tables, including VizieR catalogues, SIMBAD



## list of catalogues and tables available

Portal Simbad VizieR Aladin X-Match Other Help

### Catalog Selection Page

**source density maps**

**new** The [CMC15](#) and [IGSL3](#) catalogues are available in VizieR.  
5 catalogs found

**Search Criteria**

Keywords  
xmm

Tables Add

- ..xmm1cros
- IX/41
- ..xmm2ir3s
- B/xmm
- ..xmmlog

[Enlarge](#)

**Preferences**

max: 50

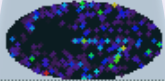
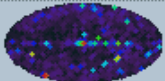
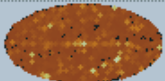
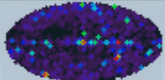
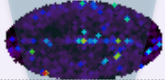
HTML Table

All columns

[Compute](#)

**Mirrors**

CDS, France

<input type="checkbox"/>	<a href="#">IX/37/xmm1src</a>	(c)Sources detected in the EPIC images – see also the <a href="#">1XMM Public SSC Interface at Strasbourg</a> (56711 rows)	<a href="#">ReadMe+ftp</a>	<a href="#">Similar Catalogs</a>	
<input type="checkbox"/>	<a href="#">IX/37/xmm1obs</a>	Details of observations and processing (585 rows)			
<input type="checkbox"/>	<a href="#">IX/37/xmm1cros</a>	Cross-correlations of XMM sources (193258 rows)			
<input type="checkbox"/>	<a href="#">IX/41/xmm2ir3s</a>	(c)The 2XMMi-DR3 Catalog, "slim" version (262902 rows)	<a href="#">ReadMe+ftp</a>	<a href="#">Similar Catalogs</a>	
<input type="checkbox"/>	<a href="#">B/xmm/xmmlog</a>	(c)The XMM-Newton Observation log (2014-06-02) (10988 rows)	<a href="#">ReadMe+ftp</a>	<a href="#">image/fits</a> <a href="#">Similar Catalogs</a> <a href="#">2002yCat....102009X</a>	
<input type="checkbox"/>	<a href="#">IX/39/xmm2slim</a>	(c)The 2XMM catalog, "slim" version – see also the <a href="#">2XMM Public SSC Interface at Strasbourg</a> (191870 rows)	<a href="#">ReadMe+ftp</a>	<a href="#">Similar Catalogs</a>	
<input type="checkbox"/>	<a href="#">IX/40/xmm2is</a>	(c)The 2XMMi catalog, "slim" version (221012 rows)	<a href="#">ReadMe+ftp</a>	<a href="#">Similar Catalogs</a>	
<input type="checkbox"/>	<a href="#">Reset All</a>		<a href="#">Query selected Tables</a>	<a href="#">Join selected Tables</a>	


ALL

(c) indicates tables which contain celestial coordinates

→ Thanks for acknowledging the VizieR Service

© UDS/CNRS  
[Contact](#)

## query on columns or in combinations of columns

[CDS](#) Portal Simbad **VizieR** Aladin X-Match Other Help 

### VizieR Search Page

[Simple Target](#) [List Of Targets](#) [Fast Xmatch with large catalogs or Simbad](#)

Target Name (resolved by [Sesame](#)) or Position:  J2000  2  arcmin 
  
 Radius  Box size

XMM-Newton Serendipitous Source Catalogue 2XMMi-DR3 (XMM-SSC, 2010) [ReadMe+ftp](#)
  
 Detailed description and explanations are available in the [User Guide](#) of the 2XMMi-DR3 Catalogue [Similar Catalogs](#)
  
 1.IX/41/xmm2ir3s The 2XMMi-DR3 Catalog, "slim" version (262902 rows)

[Simple Constraint](#) [List Of Constraints](#)

Query by [Constraints](#) applied on Columns (Output Order:  +  -)

Show	Sort	Column	Constraint	Explain (UCD)
<input type="checkbox"/>	<input type="radio"/>	Source	<input type="text"/>	[1,263230] (SRCID) Unique source index ( <a href="#">meta.id</a> )
<input checked="" type="checkbox"/>	<input type="radio"/>	2XMMi	<input type="text"/> (char)	(IAUNAME) Unique source name ( <a href="#">Note 8</a> ) ( <a href="#">meta.id;meta.main</a> )
<input checked="" type="checkbox"/>	<input type="radio"/>	RAJ2000	<input type="text"/> deg	(SC_RA) Mean source right ascension (ICRS) ( <a href="#">pos.eq.ra;meta.main</a> )
<input checked="" type="checkbox"/>	<input type="radio"/>	DEJ2000	<input type="text"/> deg	(SC_DEC) Mean source declination (ICRS) ( <a href="#">pos.eq.dec;meta.main</a> )
<input type="checkbox"/>	<input type="radio"/>	ePos	<input type="text"/> arcsec	(SC_POSEERR) Mean error on position ( <a href="#">stat.error</a> )
<input checked="" type="checkbox"/>	<input type="radio"/>	srcML	<input type="text"/>	(SC_DET_ML) Source detection likelihood (Sources with likelihood<8 may be spurious) ( <a href="#">Note 2</a> ) ( <a href="#">stat.likelihood;instr.saturation</a> )
<input type="checkbox"/>	<input type="radio"/>	Flux1	<input type="text"/> mW/m2	(SC_EP_1_FLUX) Mean flux in 0.2-0.5keV band ( <a href="#">phot.flux;em.X-ray</a> )
<input type="checkbox"/>	<input type="radio"/>	e_Flux1	<input type="text"/> mW/m2	(SC_EP_1_FLUX_ERR) Mean error on Flux1 ( <a href="#">stat.error</a> )
<input type="checkbox"/>	<input type="radio"/>	Flux2	<input type="text"/> mW/m2	(SC_EP_2_FLUX) Mean flux in 0.5-1.0keV band ( <a href="#">phot.flux;em.X-ray</a> )



## VizieR Result Page

Send to VO tools

external links 

**Search Criteria**

[Save in CDSportal](#)

Keywords

Tables

IX/41  
..xmm2ir3s

Constraints

**Preferences**

max:

HTML Table

All columns

Compute

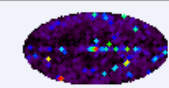
**Mirrors**


CDS, France

- Show the target form
- Show constraint information

The 2 columns in *color* are computed by VizieR, and are *not part of the original data*.

[IX/41/xmm2ir3s](#) [XMM-Newton Serendipitous Source Catalogue 2XMMi-DR3 \(XMM-SSC, 2010\)](#) [ReadMe+ftp](#)  
[Post annotation](#) The 2XMMi-DR3 Catalog, "slim" version (262902 rows)



 [start AladinLite](#)

Full	2XMMi	RAJ2000 deg	DEJ2000 deg	srcML	Flux8 mW/m2	e_ (...)	HR1	HR2	HR3	HR4	ext arcsec	V	S	Nd	fl	xcatDB	LEDAS
1	<a href="#">2XMM J000000.2-250631</a>	000.0012	-25.1088	8.93e+00	5.4921e-15	3.24e-15	0.930	-0.360	0.018	-0.606	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
2	<a href="#">2XMM J000000.9-321353</a>	000.0041	-32.2315	1.01e+01	6.2016e-15	3.73e-15	0.361	-0.284	-0.418	0.621	0.0	0.1	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
3	<a href="#">2XMM J000001.1-251022</a>	000.0049	-25.1730	1.04e+01	9.0374e-15	5.57e-15	0.161	0.536	-0.346	-0.734	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
4	<a href="#">2XMM J000001.5-321311</a>	000.0065	-32.2199	3.19e+02	1.5689e-14	1.99e-15	-0.038	-0.047	-0.338	-0.864	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
5	<a href="#">2XMM J000001.6-251706</a>	000.0069	-25.2852	2.65e+01	1.4785e-14	1.44e-14	0.113	-0.196	0.087	-1.000	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
6	<a href="#">2XMM J000002.2-245944</a>	000.0096	-24.9956	8.52e+00	3.8598e-15	5.20e-15	-0.104	0.359	-0.348	-0.873	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
7	<a href="#">2XMM J000002.6-321530</a>	000.0110	-32.2586	3.24e+02	2.2391e-14	4.85e-15	0.011	-0.081	-0.486	-0.311	0.0	0.1	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
8	<a href="#">2XMM J000002.6-322201</a>	000.0110	-32.3670	2.47e+01	6.3579e-14	7.25e-14	0.598	-0.706	-1.000	1.000	31.6	0.4	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
9	<a href="#">2XMM J000002.7-251136</a>	000.0113	-25.1936	3.26e+02	6.6736e-14	1.17e-14	0.118	0.036	-0.238	-0.353	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
10	<a href="#">2XMM J000003.1-321404</a>	000.0132	-32.2346	4.17e+01	2.0825e-14	8.64e-15	0.429	0.138	0.005	-0.749	11.5	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
11	<a href="#">2XMM J000003.3-251550</a>	000.0139	-25.2641	<b>6.84e+00</b>	6.1700e-15	1.08e-14	0.868	0.006	-0.873	0.694	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
12	<a href="#">2XMM J000003.3-251656</a>	000.0142	-25.2823	9.81e+00	9.3033e-15	7.18e-15	0.450	-0.646	-0.551	0.895	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
13	<a href="#">2XMM J000003.3-250819</a>	000.0142	-25.1388	4.40e+01	1.4694e-14	6.66e-15	0.121	-0.794	0.110	-0.134	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
14	<a href="#">2XMM J000003.7-320035</a>	000.0154	-32.0099	3.33e+01	1.7884e-14	8.27e-15	0.164	0.671	-0.034	0.167	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
15	<a href="#">2XMM J000003.9-320001</a>	000.0166	-32.0005	2.63e+01	9.6139e-15	5.47e-15	-0.185	0.033	-0.823	0.884	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
16	<a href="#">2XMM J000004.4-321445</a>	000.0185	-32.2460	3.34e+01	5.2527e-15	2.99e-15	0.356	-0.354	0.100	-0.290	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
17	<a href="#">2XMM J000007.1-250258</a>	000.0298	-25.0497	1.50e+02	1.4132e-14	3.10e-15	0.120	-0.324	-0.402	-0.971	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
18	<a href="#">2XMM J000007.3-320159</a>	000.0308	-32.0333	1.64e+01	2.3055e-14	9.46e-15	0.251	0.291	0.531	-0.244	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
19	<a href="#">2XMM J000008.0-250718</a>	000.0336	-25.1219	9.00e+01	2.0934e-14	5.50e-15	0.431	-0.129	-0.203	-0.172	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
20	<a href="#">2XMM J000008.2-320247</a>	000.0343	-32.0464	2.55e+01	1.1849e-14	7.38e-15	0.015	0.171	-0.665	0.968	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
21	<a href="#">2XMM J000008.2-320730</a>	000.0344	-32.1251	4.39e+01	1.0974e-14	4.53e-15	0.711	0.643	-0.251	-0.361	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
22	<a href="#">2XMM J000008.6-321035</a>	000.0361	-32.1765	<b>6.51e+00</b>	1.8824e-15	1.63e-15	0.467	0.376	-0.867	0.558	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	
23	<a href="#">2XMM J000009.8-251920</a>	000.0412	-25.3224	7.39e+01	2.9028e-14	1.68e-14	0.318	-0.795	0.145	0.358	0.0	0.0	1	1	<a href="#">xcatDB</a>	<a href="#">LEDAS</a>	





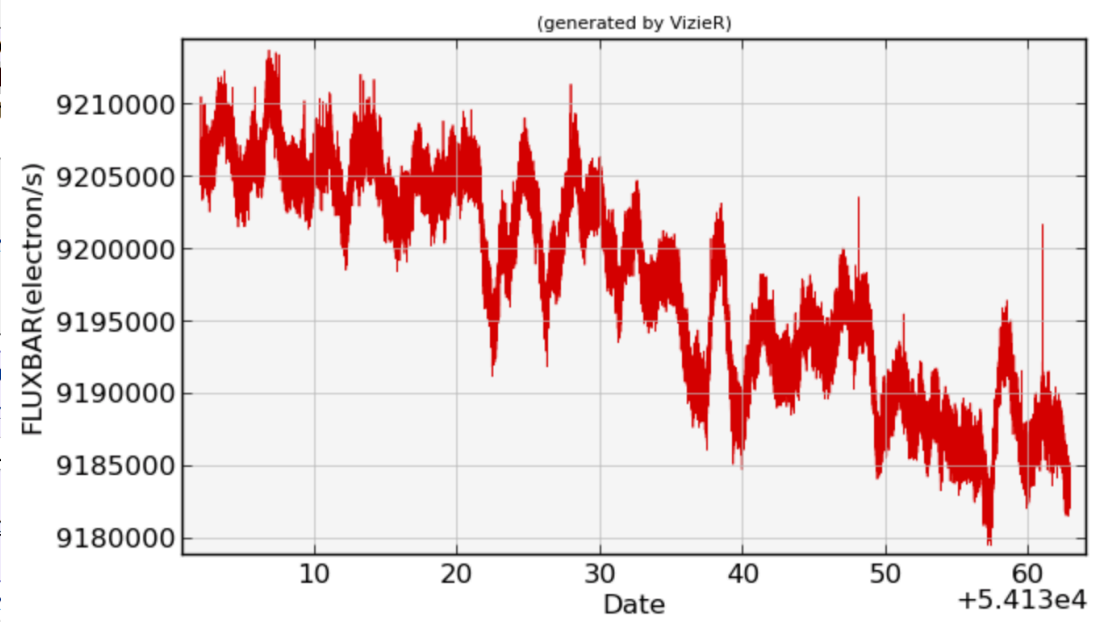
## VizieR Result Page

Send to VO tools

- Search
- Save in
- Keywords
- B/co
- Tables
- B/co
- ..Bright
- ..Faint
- Constr
- Prefer
- HTML
- All
- Con
- Mirror
- CDS,

### VizieR time serie [B/corot](#)

B/corot Light curves of CoRoT 20



Filters :

Period  Center

Adjust plot :  < X <  Xlog

< Y <  Ylog

### Light curves LINK to SIMBAD

the original data.

[\(6\) rows\)](#)
[2014yCat....102028C](#)
[ReadMe+ftp](#)
[timeSerie/fits](#)


query using [TAP/SQL](#)

	<a href="#">CoRoT</a>	<a href="#">SpT</a>	<a href="#">Run</a>	<a href="#">RAJ2000</a> deg	<a href="#">DEJ2000</a> deg	<a href="#">size</a> Mbyte	<a href="#">Star</a>	
02	20	F2V	IRa01	102.70800	-00.54088	14.460	<a href="#">HD 49933</a>	<a href="#">AN</a>
02	116	A4IV	IRa01	103.60300	-01.12698	14.460	<a href="#">HD 50747</a>	<a href="#">AN</a>
02	214	A3	IRa01	103.97600	-01.58537	14.460	<a href="#">HD 51106</a>	<a href="#">AN</a>
02	223	F2	IRa01	102.96600	-02.17604	14.460	<a href="#">HD 50170</a>	<a href="#">AN</a>
02	83	A2	IRa01	103.65400	-00.45264	13.726	<a href="#">HD 50773</a>	<a href="#">AN</a>
02	123	A2	IRa01	103.70900	-01.07078	13.726	<a href="#">HD 50844</a>	<a href="#">AN</a>
02	156	B5	IRa01	103.72800	-01.37579	13.726	<a href="#">HD 50846</a>	<a href="#">AN</a>

# Widget

vizier.u-strasbg.fr

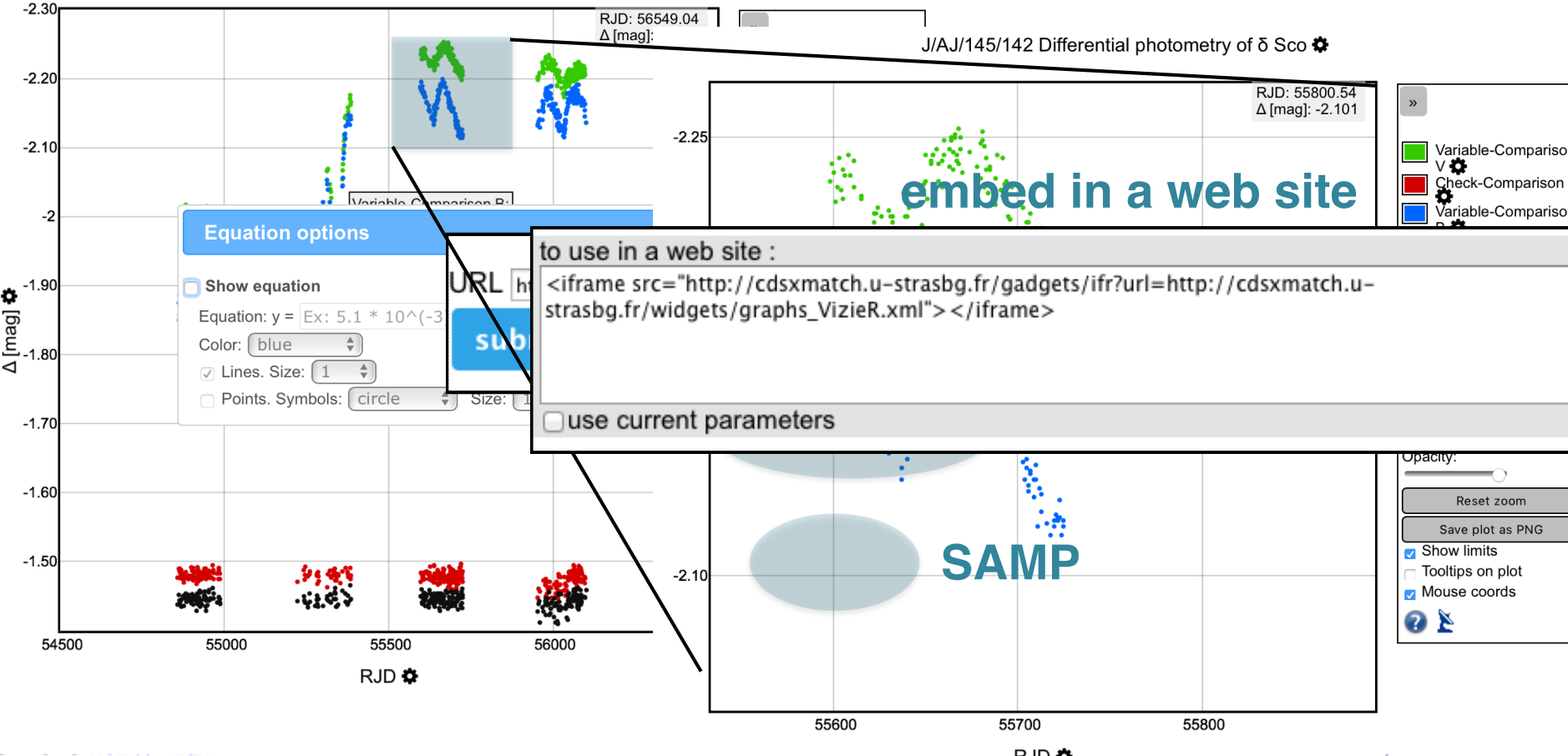
**Plot catalogue J/AJ/145/142**

 CENTRE DE DONNÉES ASTRONOMIQUES DE STRASBOURG

[▶ settings](#) [▶ share](#)

## Zoom

J/AJ/145/142 Differential photometry of  $\delta$  Sco ⚙



RJD: 56549.04  
 $\Delta$  [mag]:

J/AJ/145/142 Differential photometry of  $\delta$  Sco ⚙

RJD: 55800.54  
 $\Delta$  [mag]: -2.101

embed in a web site

to use in a web site :

```
<iframe src="http://cdsxmatch.u-strasbg.fr/gadgets/ifr?url=http://cdsxmatch.u-strasbg.fr/widgets/graphs_VizieR.xml"> </iframe>
```

use current parameters

Equation options

- Show equation
- Equation:  $y =$
- Color:
- Lines. Size:
- Points. Symbols:  Size:

Variable-Comparison  
Check-Comparison B  
Variable-Comparison

Opacity:

Reset zoom

Save plot as PNG

Show limits

Tooltips on plot

Mouse coords

SAMP

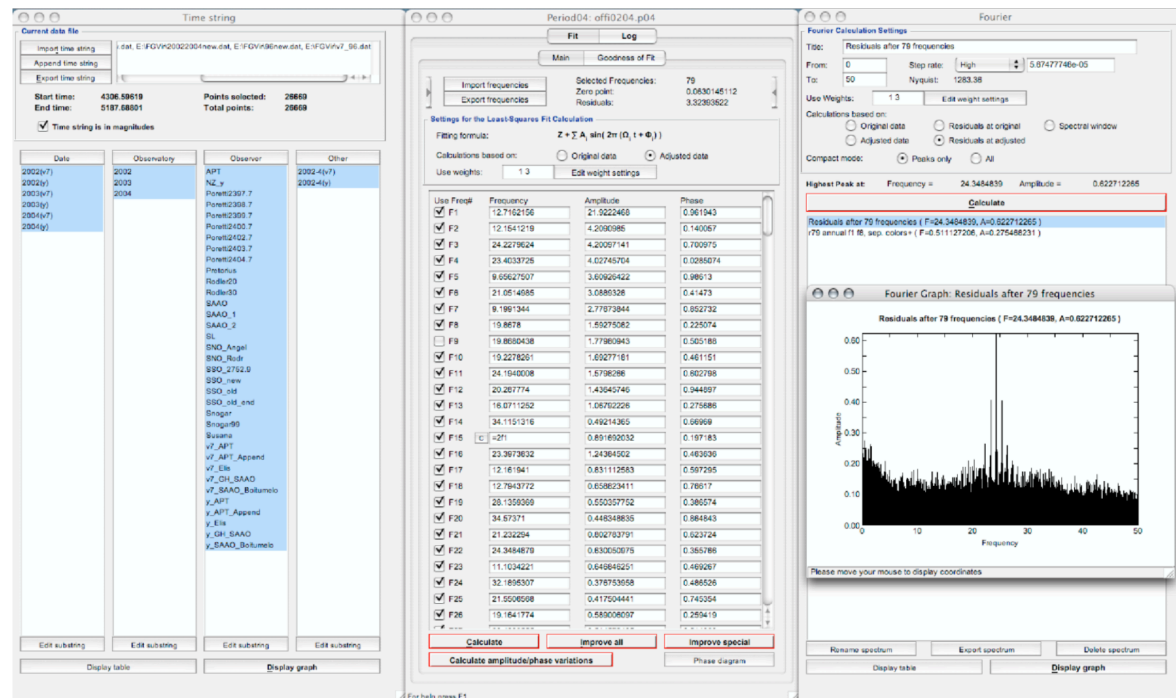
RJD



# Further visualisation & analysis

## Send data through SAMP to other VO tools

- Period04 for further analysis



- TOPCAT (time plot option for time series and spectrograms)

- SPLAT

# VizieR Photometric viewer

## VizieR Service

[VizieR home](#) · [Photometry viewer](#) · [Query VizieR using TAP](#) · [X-match tables](#) · [Query images/spectra](#)

### Search Criteria

#### Preferences

max: 50

HTML Table

All columns

[Compute](#)

#### Mirrors

CDS, France

### Find catalogs among 16106 available

Clear  Find...

Expand search

**?** *Catalog, author's name, word(s) from title, description, etc. e.g.: AGN, Veron, I/239, or bibcodes...*

- ▶ [Search for catalogs by column descriptions \(UCD\)](#)
- ▶ [Search for catalogs containing additional data](#)

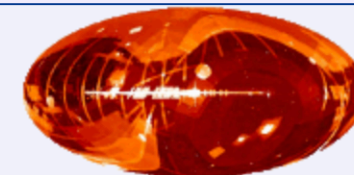
Wavelength	Mission	Astronomy
Radio	AKARI	Abundances
IR	ANS	Ages
optical	ASCA	AGN
UV	BeppoSAX	Associations
EUV	CGRO	Atomic_Data
X-ray	Chandra	Binaries:cataclysmic
Gamma-ray	COBE	Binaries:eclipsing

### Search by Position across 17193 tables


Target Name (resolved by [Sesame](#)) or Position:

Clear  J2000  Target dimension: 2 arcmin  Go!


Radius  Box size



[More about VizieR](#)

Find Catalogs 

### Tools related to VizieR

-  [CDS Portal](#) : Access CDS data including VizieR, Simbad and Aladin using the CDS portal
- [Spectra, images in VizieR](#) : Search Spectra, images in VizieR
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→ [Thanks for acknowledging the VizieR Service](#)  
→ [Rules of usage of VizieR data](#)

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# ☐ VizieR Photometric viewer



Portal Simbad **VizieR** Aladin X-Match Other Help



## VizieR Photometry viewer

[? Documentation](#)

[▼ settings](#) [▶ share](#)

Target

Radius (in arcsec)

**Search by object name or by coordinates**

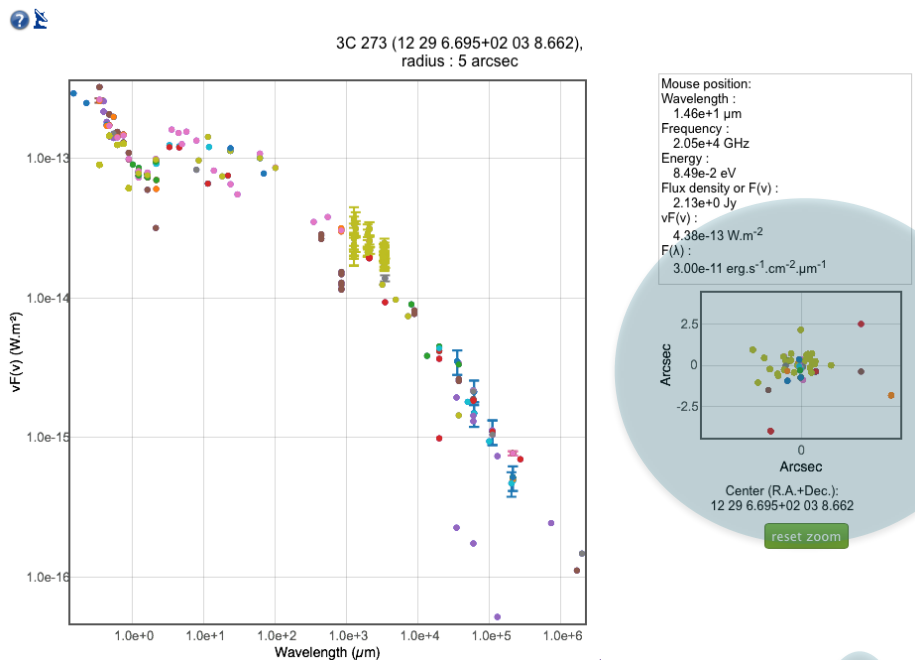


# VizieR Photometric viewer

Target

Radius (in arcsec)

[settings](#) [share](#)



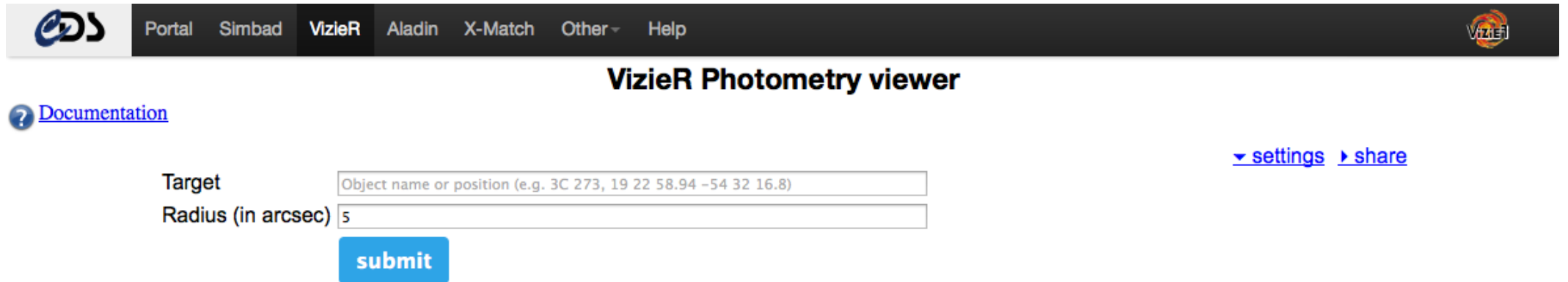
- url / embed in web
- distance between mouse position catalogue and input coordinates
- SAMP
- display options

show	source	RAJ2000 (deg)	DEJ2000 (deg)	tabname	_sed_freq (GHz)	wavelength ( $\mu\text{m}$ )	_sed_flux (Jy)	_sed_efflux (Jy)	_sed_filter
<input checked="" type="checkbox"/>	recno=34778303	187.278077	+02.052145	<a href="#">II/312/ais</a>	1.9607e+6	1.53e-1	14.8e-3	0.1e-3	GALEX:FLU
<input checked="" type="checkbox"/>	II/314/las8								
<input checked="" type="checkbox"/>	-c=hlarg(187.277938+02.052428,eq=J2000)&c.rs=0.004	187.277938	+02.052428	<a href="#">II/314/las8</a>	136.21e+3	2.20e+0	51.1e-3	0.0e-3	UKIDSS:K
<input checked="" type="checkbox"/>	-c=hlarg(187.277938+02.052428,eq=J2000)&c.rs=0.004	187.277938	+02.052428	<a href="#">II/314/las8</a>	183.78e+3	1.63e+0	41.7e-3	0.0e-3	UKIDSS:H
<input checked="" type="checkbox"/>	II/319/las9								
<input checked="" type="checkbox"/>	recno=53344062	187.277918	+02.052421	<a href="#">II/319/las9</a>	136.21e+3	2.20e+0	51.1e-3	0.0e-3	UKIDSS:K
<input checked="" type="checkbox"/>	recno=53344062	187.277918	+02.052421	<a href="#">II/319/las9</a>	183.78e+3	1.63e+0	41.7e-3	0.0e-3	UKIDSS:H
<input checked="" type="checkbox"/>	recno=53344062	187.277918	+02.052421	<a href="#">II/319/las9</a>	240.16e+3	1.25e+0	35.4e-3	0.0e-3	UKIDSS:J
<input checked="" type="checkbox"/>	recno=53344062	187.277918	+02.052421	<a href="#">II/319/las9</a>	290.92e+3	1.03e+0	30.9e-3	0.0e-3	UKIDSS:Y
<input checked="" type="checkbox"/>	II/328/allwise								
<input checked="" type="checkbox"/>	AllWISE==J122906.69+020308.6	187.277907	+02.052393	<a href="#">II/328/allwise</a>	13.571e+3	2.21e+1	0.552	0.011	WISE:W4
<input checked="" type="checkbox"/>	AllWISE==J122906.69+020308.6	187.277907	+02.052393	<a href="#">II/328/allwise</a>	138.55e+3	2.16e+0	68.0e-3	1.4e-3	2MASS:Ks
<input checked="" type="checkbox"/>	AllWISE==J122906.69+020308.6	187.277907	+02.052393	<a href="#">II/328/allwise</a>	181.75e+3	1.65e+0	40.0e-3	1.0e-3	2MASS:H

Showing 1 to 391 of 391 entries

list of catalogues and filter information associated magnitudes

# □ VizieR: towards a time series viewer?



Portal Simbad **VizieR** Aladin X-Match Other Help

**VizieR Photometry viewer**

[? Documentation](#)

Target

Radius (in arcsec)

[settings](#) [share](#)

- Requirements of time series viewer:
  - Photometric data should be associated to time of observation
  - Standardisation of time - partly done
  - Any other requirement?
- Access to data by:
  - Name
  - Cone search, radius

# VizieR TAP



Portal Simbad VizieR Aladin X-Match Other Help



## VizieR Service

[VizieR home](#) · [Photometry viewer](#) · [Query VizieR using TAP](#) · [X-match tables](#) · [Query images/spectra](#)

### Search Criteria

#### Preferences

max: 50

HTML Table

All columns

[Compute](#)

#### Mirrors

CDS, France

### Find catalogs among 16106 available

Clear  Find...

Expand search

**?** *Catalog, author's name, word(s) from title, description, etc. e.g.: AGN, Veron, I/239, or bibcodes...*

- ▶ [Search for catalogs by column descriptions \(UCD\)](#)
- ▶ [Search for catalogs containing additional data](#)

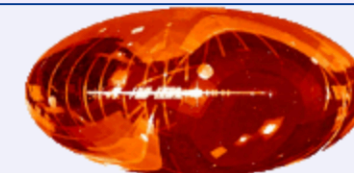
Wavelength	Mission	Astronomy
Radio	AKARI	Abundances
IR	ANS	Ages
optical	ASCA	AGN
UV	BeppoSAX	Associations
EUV	CGRO	Atomic_Data
X-ray	Chandra	Binaries:cataclysmic
Gamma-ray	COBE	Binaries:eclipsing

### Search by Position across 17193 tables

Target Name (resolved by [Sesame](#)) or Position:

Clear  J2000  Target dimension: 2 arcmin  Go!

Radius  Box size



[More about VizieR](#)

Find Catalogs

### Tools related to VizieR

- **NEW** [CDS Portal](#) : Access CDS data including VizieR, Simbad and Aladin using the CDS portal
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## query using TAP

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→ [Rules of usage of VizieR data](#)

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# VizieR associated data

## VizieR Service

[VizieR home](#) · [Photometry viewer](#) · [Query VizieR using TAP](#) · [X-match tables](#) · [Query images/spectra](#)

### Search Criteria

#### Preferences

max: 50

HTML Table

All columns

[Compute](#)

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CDS, France

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Clear

Find...

Expand search

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- ▶ [Search for catalogs by column descriptions \(UCD\)](#)
- ▶ [Search for catalogs containing additional data](#)

#### Wavelength

Radio  
IR  
optical  
UV  
EUV  
X-ray  
Gamma-ray

#### Mission

AKARI  
ANS  
ASCA  
BeppoSAX  
CGRO  
Chandra  
COBE

#### Astronomy

Abundances  
Ages  
AGN  
Associations  
Atomic\_Data  
Binaries:cataclysmic  
Binaries:eclipsing

### Search by Position across 17193 tables

Target Name (resolved by [Sesame](#)) or Position:

Clear

J2000

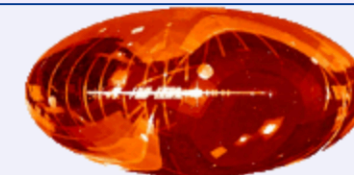
Target dimension:

2

arcmin

Go!


Radius  Box size



[More about VizieR](#)

Find Catalogs

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[query images/spectra](#)

→ [Thanks for acknowledging the VizieR Service](#)  
→ [Rules of usage of VizieR data](#)

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# VizieR: Associated Data

## Time-series / Spectra / Images

The screenshot displays the VizieR web interface. At the top, there is a navigation bar with links for Portal, Simbad, VizieR, Aladin, X-Match, Other, and Help. The main heading is "Search associated data among the VizieR catalogues". Below this, there is a descriptive paragraph and logos for Sga da and VizieR. A search form is visible with fields for position, spectral band, and time data. To the right, a circular visualization shows a star field with many yellow squares representing data points. Below the search form, there are options to show 10 entries and a filter box. At the bottom, a table lists search results for NGC1055 and NGC1068.

Search associated data among the VizieR catalogues

This web page is an access to the VizieR Associated data (images, spectra, timeseries, SED) which comes from publications. This tool is the result of the documentation assigned by the authors of the catalogues (in particular by A&A authors) and supervised by the CDS documentalist team (see the VizieR ingestion tool).

**VO compatibility**  
The meta-data and the search engine are built according to the VO framework (SIA, SSA, ObsTAP) and can so be queried by VO softwares. The data are gathered with the Saada engines, and the VO data model ObsCore has been chosen for the documentation.

Simple search  ObsTAP Query

Search by position : 40.6698792 -0.0132889 radius 1 deg

Search by spectral band : min max  $\mu\text{m}$

Search by time data : start stop (MJD)

Search by catalog/Identifier:

Spectrum / Time series  Image

500 entries max

Show 10 entries

500 entries

Preview	Target	Data collection	Ra	Dec	Band min (nm)	Band max (nm)	Begin time (MJD)	End time (MJD)	Facility
	NGC1055	J/A+A/569/A91	40.437	0.443	315.000	390.000			SDSS
	NGC1068	J/A+A/569/A91	40.670	-0.013	315.000	390.000			SDSS



## VizieR Service

[VizieR home](#) · [Photometry viewer](#) · [Query VizieR using TAP](#) · [X-match tables](#) · [Query images/spectra](#)

### Search Criteria

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HTML Table

All columns

[Compute](#)

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- ▶ [Search for catalogs containing additional data](#)

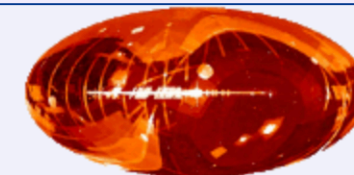
Wavelength	Mission	Astronomy
Radio	AKARI	Abundances
IR	ANS	Ages
optical	ASCA	AGN
UV	BeppoSAX	Associations
EUV	CGRO	Atomic_Data
X-ray	Chandra	Binaries:cataclysmic
Gamma-ray	COBE	Binaries:eclipsing

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Clear  J2000  Target dimension: 2 arcmin  Go!

Radius  Box size



[More about VizieR](#)

Find Catalogs

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- [Spectra, images in VizieR](#) : Search Spectra, images in VizieR
- [Photometry viewer](#) : Plot photometry (sed) including all VizieR
- [TAP VizieR](#) : query VizieR using ADQL (a SQL extension dedicated for astronomy)
- [CDS cross-match service](#) : fast cross-identification between any 2 tables, including VizieR catalogues, SIMBAD

## X-match service

# □ X-Match service

CDS X-Match Service [X-match](#) [Tables management](#) [Documentation](#) [Login](#) [Preferences](#) [Register](#)

Select below the two tables to cross-match.  
Then, choose cross-match method and sky area in options.  
Finally, click on Begin the X-Match to launch the computation.

### Choose tables to cross-match

e.g. VII/260/dr7qso, or select in list  e.g. VII/233/xsc, or select in list

[VizieR](#) [SIMBAD](#) [My store](#) [VizieR](#) [SIMBAD](#) [My store](#)

[Show options](#)

[Begin the X-Match](#)

### Visualize and manage your cross-match jobs

Table 1	Table 2	Options	Begin	Status	Actions
No job in list					

For the selected job(s): [Delete](#)

- **Positional cross-correlation of sources in 2 tables among:**
  - > 17 000 VizieR tables
  - SIMBAD data
  - user-uploaded list
- **Result in VOTable, CDS or ASCII**

# □ X-match service

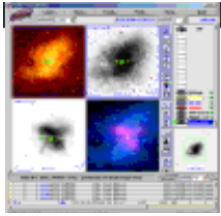
- Available through: Web interface, HTTP API (programmatic access), TOPCAT

## Performances

Table 1	Table 2	Computation time	Result generation	Result size	Total time
<b>SDSS DR7</b> <i>357M rows</i>	<b>2MASS</b> <i>470M rows</i>	7 min	11 min	13 GB	18 min
<b>DENIS</b> <i>355M</i>	<b>2MASS</b> <i>470M</i>	11 min	51 min	58 GB	1 hour 2 min
<b>GLIMPSE</b> <i>104M</i>	<b>NOMAD</b> <i>1.1 billion</i>	6 min	17 min	19 GB	23 min
<b>SIMBAD</b> <i>7M</i>	<b>USNOBI</b> <i>1 billion</i>	3 min	1 min	1 GB	4 min
<b>List of</b> <i>40k positions</i>	<b>SIMBAD</b> <i>7M</i>	1 second	4 seconds	10 MB	5 sec

<http://cdsxmatch.u-strasbg.fr/xmatch/doc/>

# □ Aladin Sky Atlas, one in two!



## Aladin Desktop

- High level features desktop
- access images, catalogs, footprints
- **full range of functionalities**
- interoperable with VO tools
  - Aladin is a VO portal
  - used to validate most stds
- Used for observation preparation tools (APT, GuideCam)
- Going all hierarchical now (HiPS)



## Aladin Lite

- **Web HiPS visualizer**
- preview mode
- embed in any webpage
- **easy appropriation**
- **highly used in wide range of sites/services**
- basic function... but more and more!

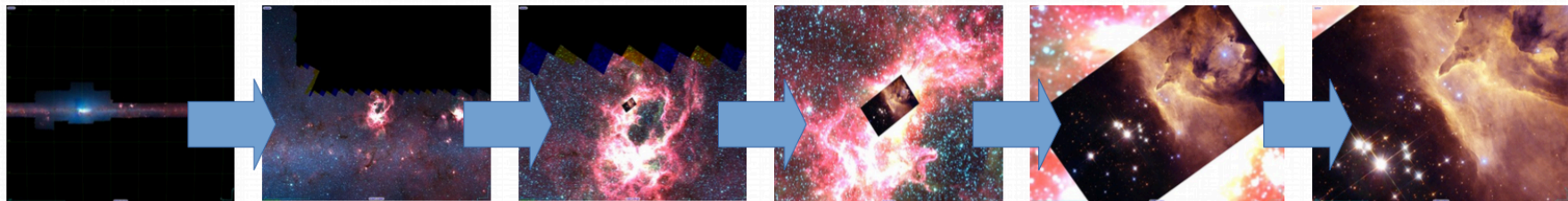


# □ Aladin: HiPS

## HiPS Hierarchical Progressive Survey

*“The more you zoom in on a particular area, the more details show up”*

- Multi-resolution on HEALPix data structure for Images, catalogues, 3-dimensional data cubes, ...
- Conserves scientific data properties alongside visualisation considerations.
- No databases or dedicated servers are required, just HTTP.
- **350+** HiPS for **120TB** data (CDS 95%, CADC 4%, ESAC 1%, ...)  
**300 000+ HiPS tiles requested/day.**





# Aladin: cubes

QuickTime Player File Edit View Window Help 100% Tue 14:54 ada nebot

Aladin v9.6 \*\*\* PROTOTYPE VERSION (based on v9.604) \*\*\*

Filter default Location Frame ICRS Projection Sinus

★DSS ★SDSS ★2MASS ★WISE ★GALEX ★PLANCK ★AKARI ★XMM ★Fermi ★Gaia ★Simbad ★NED +

- Collections → 19871
  - Image → 301
  - Data base → 2
  - Catalog → 17225
  - Cube → 6
  - Outreach → 1
  - Unsupervised → 2336


Potsc InterSe

**Aladin Sky Atlas - prototype based on v9.6**

ALADIN is an interactive software sky atlas developed by the CDS, allowing one to visualize digitized images of any part of the sky, to superimpose entries from astronomical catalogs, and to interactively access related data and information.

**WARNING: THIS VERSION IS A PROTOTYPE RELEASE**  
SOME FEATURES HAVE BEEN ADDED FOR DEMONSTRATION PURPOSES.  
USE IT AT YOUR OWN RISKS

Or take the official version for a real usage  
(from <http://aladin.u-strasbg.fr>).



Aladin is developed by Pierre Fernique,  
Thomas Boch, Anaïs Oberto and François Bonnarel.

select pan zoom dist phot draw tag spect filter cross x-y rgb assoc crop cont pixel prop del

**Bienvenue on Aladin, your professional sky atlas.**

- Discover all astronomical data available over the net!
- Compare them with your own data.
- Prepare your observation missions.

To start, type any object name, such as M1, and press ENTER...

epoch size opac zoom

exp inside grid look wink north hdr multiview match

flowers.psd  
B  
Adware Removal Tool  
DetectX  
varios  
GZ  
WirelessDiagnosti  
cs\_C02Q...41.tar.gz  
JDS\_Nebot

(c) 2017 Université de Strasbourg/CNRS – by CDS – Distributed under GNU GPL v3 0 sel / 0 src 0Mb



# Aladin Lite: Skymap viewer

## Skymap Viewer

A sky atlas for understanding LIGO-Virgo skymaps. Help [here](#), or watch a [video about Skymap Viewer](#). Plenty simulated skymaps [here](#). If you do not see the big dark sky map, look below and widen your browser. Zoom with the + and - at the right of the sky.



This is OBSERVED (real) data

**GW150914:LALI**

[json](#)

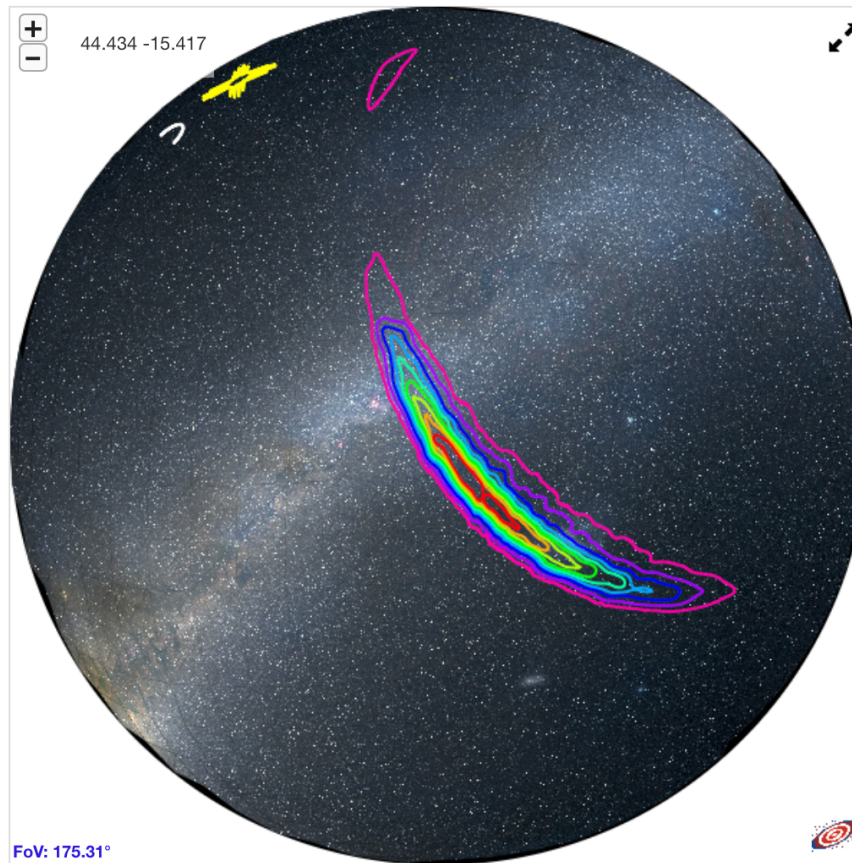
50% area = 149.0 sq deg

90% area = 616.4 sq deg

### Observation Targets ?

- Gravitational Wave Galaxy Catalogue (White+ 2011)
- X-ray emission of RASS Abell clusters (Ledlow+, 2003)
- RASS-SDSS galaxy cluster survey. V. (Popesso+, 2007)
- GLADE (Galaxy List for the Advanced Detector Era) (Dalya+ 2016)
- WISExSCOS Photometric Redshift Catalogue (Bilicki+, 2016)
- MCXC Meta-Catalogue X-ray galaxy Clusters (Piffaretti+, 2011)
- Planck catalogue of Sunyaev-Zeldovich sources (Planck collab 2015)

- Choose one or more catalogs above
- Double-click in any Target square for source information (pink box above) and a centered display for zooming
- Make Target squares [smaller](#) [larger](#)
- Observation priorities as a [table](#)



Skymap Viewer Authors: Roy Williams, Thomas Boch, and Kunyang Li.



# □ Aladin Lite: gamma sky

