Visualisation tools at CDS

Montpellier TS2020 - II

Ada Nebot on behalf of the CDS team
Outline

- Aladin Desktop
  - HiPS
  - MOCS
  - T-MOCS
- Aladin Lite
  - Usage
Overview

Aladin is an interactive sky atlas allowing the user to visualize digitized astronomical images or full surveys, superimpose entries from astronomical catalogues or databases, and interactively access related data and information from the Simbad database, the VizieR service and other archives for all known astronomical objects in the field.

The Aladin sky atlas is available in two modes: Aladin Desktop, a regular application and Aladin Lite an HTML5 javascript web widget.
Desktop: New look & feel

Modern and compact layout
Desktop: New look & feel

Modern and compact layout

Access to ~22000 collections of images & catalogues
HiPS: Hierarchical Progressive Survey

- based on HEALPix (allsky tessellation)
  2015A&A...578A.114F
- Progressive display of a survey: the more you zoom, the more you see
- Images survey, but also catalogs and cubes
- HiPS are build from an image collection using HiPSgen
MOC: Multi-Order Coverage

- Sky coverage of a data set
  
  exp: MOC of the GALEX AIS survey, NUV band

- Logical operations (intersections, unions, …)

- Query by MOC (“I would like data from catalog XXX in the YYY fields”)

exp: MOC of the SDSS survey, u band
Discovery data tree

All VO collections available based on MOCserver

Filter

yes

no
Discovery data tree

Access data (HiPS & MOC)
Query data by regions (MOC)

Sources within the region

05/06/2018
Query data by X-match (CDS Xmatch)

Sources within 5 arc seconds
Query data by criteria (TAP)

Select sources using ADQL
Target history controller

Come back to a previous target

52 Cyg
M51
20:45:39.75 +30:43:11.0 ICRS
20 45 39.75360 +30 43 10.9920 ICRS
311.41564 +30.71972 ICRS
4C -01.61
20 45 41.10960 +30 42 52.3440 ICRS
311.42129 +30.71454 ICRS
311.42336 +30.71276 ICRS
311.42801 +30.70876 ICRS

05/06/2018
Related to time…

- Detection of catalogues containing temporal measurements
- Visualisation of time series data: new window in Aladin
- Cross-talk between the classical view and the Time view panels
Related to space...

- Can we have a tool to manipulate time fast, interoperable, multi-resolution...? We have the MOC in space (S-MOC)...

Welcome to 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...
Or easier, click in the main frame and enjoy the sky...
Can we have a tool to manipulate time fast, interoperable, multi-resolution...? We have the MOC in space (S-MOC)... We build T-MOC
Aladin Lite

- A lightweight sky atlas in the browser

Overview

Aladin lite is a lightweight version of the Aladin Sky Atlas, running in the browser and geared towards simple visualization of a sky region.

It allows one to visualize image surveys (JPEG multi-resolution HEALPix all-sky surveys) and superimpose tabular (VOTable) and footprints (STC-S) data.

Aladin lite is powered by the HTML5 canvas technology, currently supported by any modern browser.

Aladin lite is easily embeddable on any web page and can also be controlled through a Javascript API.
Aladin Lite usage

Aladin Lite has been integrated in the main CDS services:

- On the SIMBAD page for an individual object, it provides an interactive preview image (see example for Messier 1).
- The VizieR results page features a start Aladin Lite button to visualize the positions of listed sources (see example).

Outside CDS, Aladin Lite is used in several projects:

- ESA Sky allows for discovery and access of data observed by ESA space missions
- GW170814 interactive skymap displays the localisation on the sky of the gravitational wave event jointly detected by LIGO and Virgo observatories, and announced in September 2017.
- HEASARC Xamin system for discovery and data retrieval
- Skymap Viewer shows probability contours for gravitational wave events from LIGO/Virgo
- JVO Portal v2
- Gamma Sky, a portal to gamma-ray sky (developed by C. Deil and A. Voruganti)
- SETI uses Aladin Lite to display targets currently observed (development by J. Richards)
- J-PLUS Early Data Release
- CEFCA images navigator and images tours
- ARCHES Walker, an Outreach tool showcasing astronomical objects in different wavelengths (ARCHES project)
- MOPRA Radio Telescope Pointing and Status
- JUDO2 (JAXA Universe Data Oriented)
- Akari explore tool
- CASSIS atlas of Spitzer Infrared Spectra
- GLIMPSE 360
- CADE (Centre d’Analyse de Données Etendues) uses Aladin Lite to provide previews of the HEALPix maps they publish (Example for CGPS data)
- ADS All-Sky Survey makes use of Aladin Lite to display heatmaps of SIMBAD objects cited in the literature.

If your project is using Aladin Lite, we would be happy to have it listed here. Drop us a line!
The interactive skymap shows the localizations of the various gravitational-wave detections in the sky and helps to understand the importance of multimessenger astronomy.

Using the skymap

Click on the various options below to display information relating to each detection.

<table>
<thead>
<tr>
<th>Detection</th>
<th>Sky localisation</th>
<th>Label</th>
<th>Pop-up info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gw170817 - H1 only</td>
<td>☑</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gw170817 - L1/H1 only</td>
<td>☑</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gw170817 - L1/H1/V1</td>
<td>☑</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gw170817 - Refined skymap</td>
<td>☑</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gw170817 - (GRB170817A) Initial Fermi GBM localization</td>
<td>☑</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gw170817 - (GRB170817A) Final Fermi GBM localization</td>
<td>☑</td>
<td></td>
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<tr>
<td>Gw170817 - SSS17a/AT2017gfo Transient sky position</td>
<td>☑</td>
<td></td>
<td></td>
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<tr>
<td>Gw170814 - H1/L1</td>
<td>☑</td>
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<tr>
<td>Gw170814 - H1/L1/V1</td>
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<tr>
<td>Gw170814 - Refined skymap</td>
<td>☑</td>
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<td></td>
</tr>
<tr>
<td>Gw170608 - Refined LIGO localization</td>
<td>☑</td>
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</tr>
</tbody>
</table>

Backgrounds

If you want to see the extension of these sky regions through the constellations you can select an artistic background image. Constellations.

You can also select various background images at different wavelengths, combining the electromagnetic data with the gravitational-wave information: Mollweide (default) WISE 2MASS DSS color XMM Fermi.

http://www.virgo-gw.eu/skymap.html
Aladin Lite usage


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
50% area = 149.0 sq deg
90% area = 618.4 sq deg

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

Zoomable Multiwavelength Sky
What next?

• Query by T-MOC
• Merge spacial and temporal coverage:
  • S-MOC + T-MOC —> ST-MOC
  • Query by ST-MOC

• Proto available for tests, explorations, …

http://aladin.u-strasbg.fr/java/AladinBeta.jar