



Leibniz-Institut für
Astrophysik Potsdam

Tutorials

Outline

- SQL intro
- First steps with Aladin
 - How to find images and load catalog data into Aladin
- RAVE with Topcat and Aladin
 - How to load RAVE data from the database, display them with Topcat and Aladin, overlay an image of the Milky Way
- Simulation data with CosmoSim + Topcat
 - How to use the CosmoSim query interface, how to extract simulation data like mass functions, progenitors or halo particles and visualize with Topcat
- Data Access Service (DAS, AIP cloud)
 - How to do upload and share data with the AIP cloud

VO Tutorials

- VO Applications:
 - <http://www.ivoa.netastronomers/applications.html>
- Useful material for VO tools:
 - GAVO homepage (www.g-vo.org) -> Getting Started
<http://www.g-vo.org/pmwiki/About/GettingStarted>
 - Links to general introductions for different VO tools
- RAVE tutorial:
 - <http://www.g-vo.org/tutorials/rave.pdf>
- Simulation databases tutorial:
 - <http://www.g-vo.org/tutorials/simulations.pdf>



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SQL introduction

SQL

- Most databases store information row-based
 - e.g. RAVE, main table: each row gives properties of one star, each column represents one property of the star
- Basic SQL statements consist of:
 - SELECT
 - List of fields (columns)
 - FROM
 - Database and table
 - WHERE
 - Filter results
 - GROUP/SORT/LIMIT
 - Additionally group things, order by a column or limit

SQL

- Example:

The screenshot shows a web browser window for the RAVE - the Radial Velocity Experiment website. The URL is www.rave-survey.org/query#. The page has a dark blue header with the RAVE logo and navigation links: Home, About Rave, Query, Downloads, Contact, Intranet, My Account, and Logout. The main content area is titled "Query interface". It includes a "DATABASE STATUS" box stating "There are 0 jobs in the queue." and "You are using 1.54 KB of your quota of 500 MB.". Below this is a "JOBS" box showing a single entry: "2014-12-05-12-42-12-0557" with a checkmark. There are tabs for "SQL query", "Job Details", "Results Table", "Plot", and "Download", with "SQL query" being active. A text area contains the following SQL code:

```
1 SELECT RAdeg, DEdeg, RAVEID, Obsdate
2 FROM RAVEPUB_DR4.RAVE_DR4
3 WHERE Obsdate like '2008%'
4 LIMIT 10
```

Below the code is a field labeled "Name of the new table (optional)" with an empty input box.



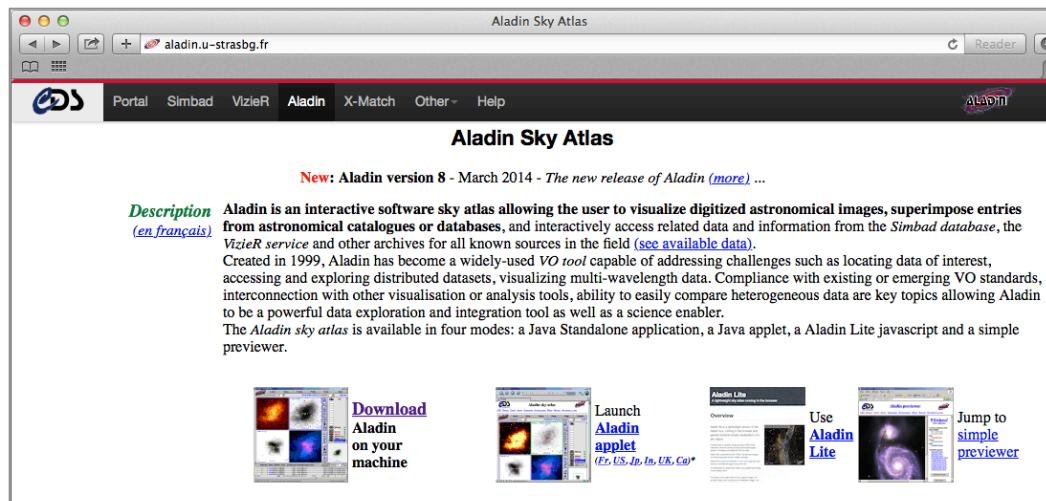
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First steps with Aladin

Aladin

- Developed by CDS (Strasbourg), <http://aladin.u-strasbg.fr>
- Interactive sky-atlas
- Useful for handling images (fits), overlaying catalog data, exchanging data with other VO tools, astrometric calibration, ...



Start Aladin

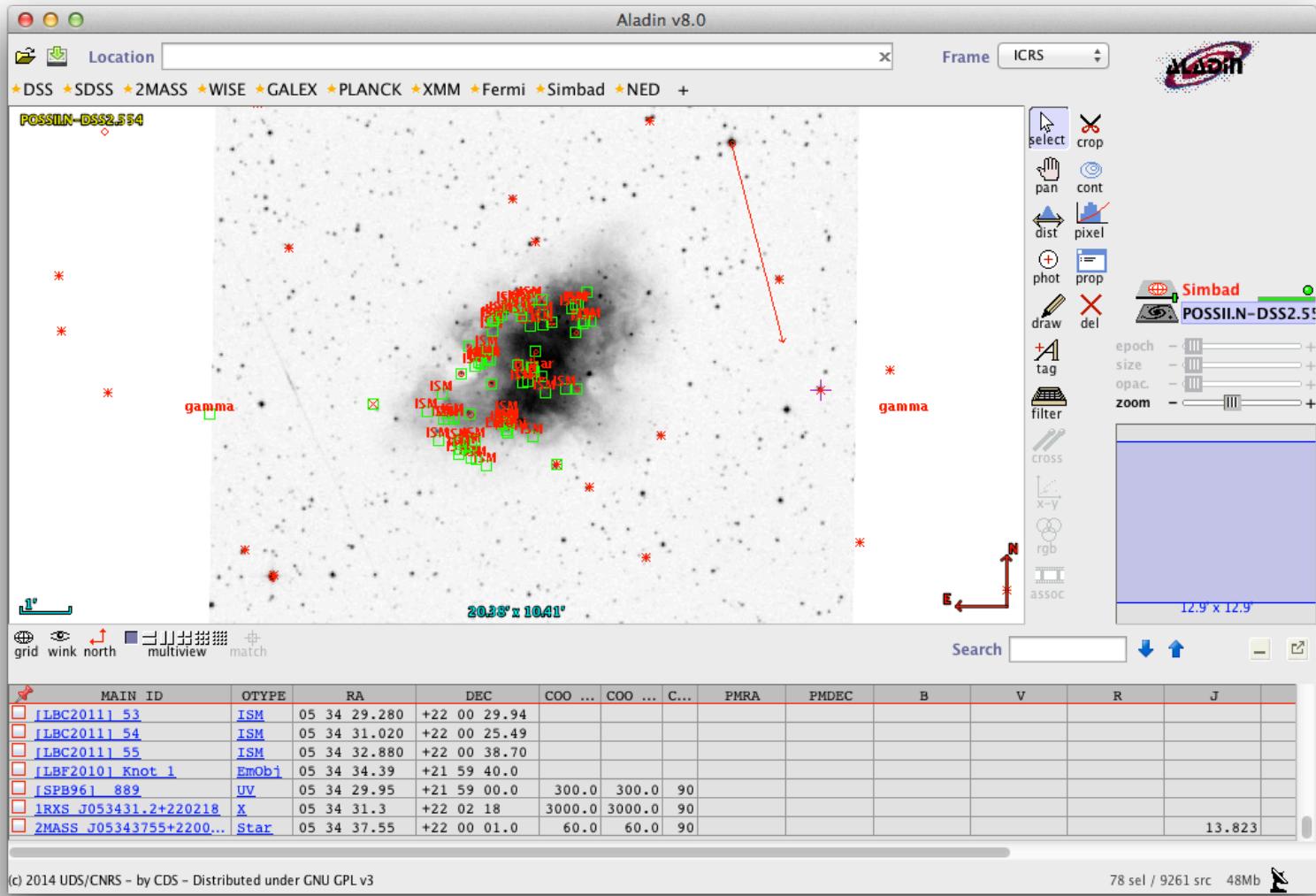
- Start Aladin with enough memory:

```
java -Xmx1024m -jar Aladin.jar
```



Load image

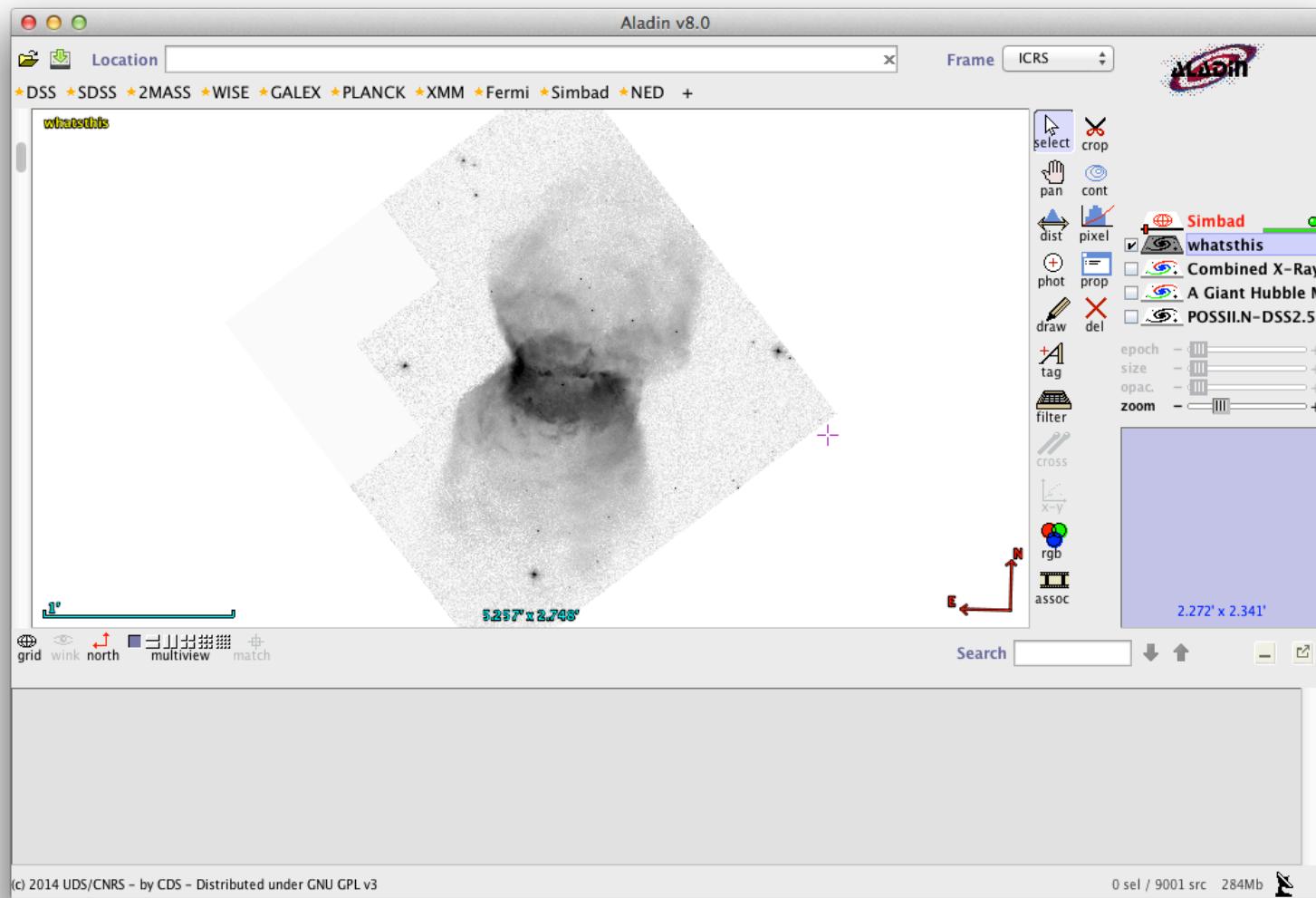
- Load first image
 - File -> Load astronomical image -> Aladin image server
 - Target: „M1“ or „Crab nebula“; Submit
 - Sort the results by date, pick the most recent image from the Palomar Observatory, 1998
- Overlay Simbad objects
 - In main window, below the menu, click Simbad to load objects from Simbad
- Overlay Hubble images:
 - Load astronomical image -> Others -> Hubble press release images
 - Select the Giant Mosaic
 - Select the Combined X-ray and Optical Images
 - Click on bottom plane in Aladin's image stack
 - Adjust opacity-slider for the images above





Load your own fits image

- Download image
 - <http://docs.g-vo.org/whatsthis.fits>
- Load image in Aladin
 - File -> Open local file
- Load PPMXL catalog
 - File -> Load catalog -> Surveys in VizieR -> PPMXL; Submit
- Experiment with overlaying other images as well





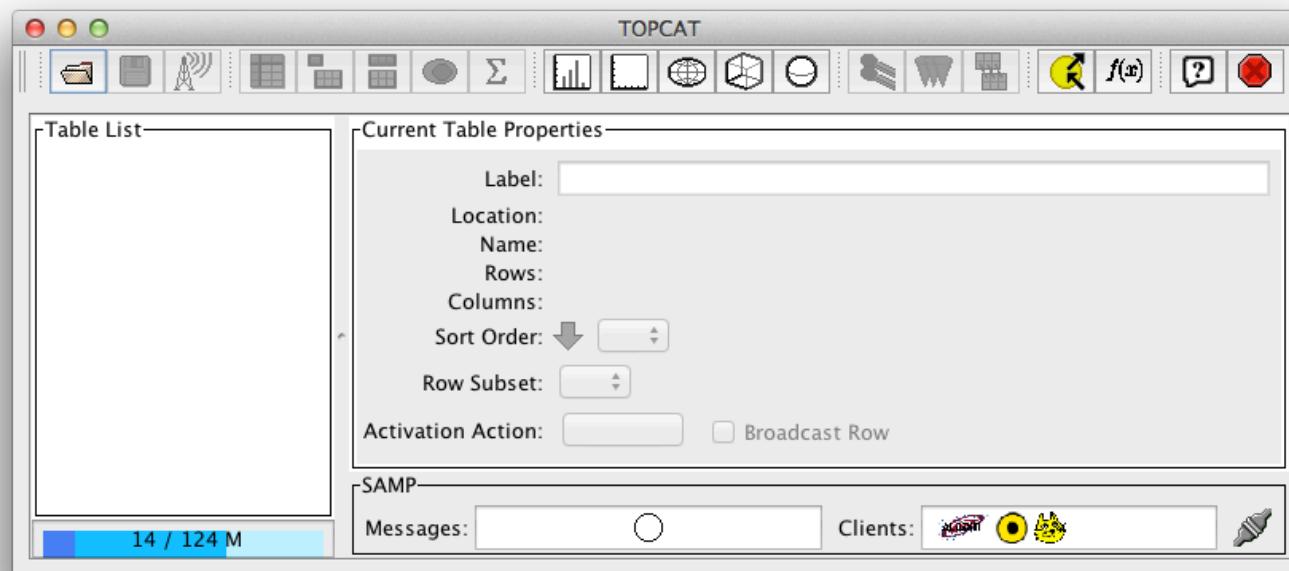
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RAVE in TOPCAT and Aladin

Topcat

- Developed by Mark Taylor,
<http://www.star.bris.ac.uk/~mbt/topcat/>
- Tool for reading, manipulating, writing tabular data
- Plotting tools: 2D plot, histograms, 3D plot, sky plot



RAVE database

- Open <http://www.rave-survey.org/query>
- Login with your user account or use demo user:

username: ravedemo, password: tutorial

- Submit following query:

```
SELECT RAdeg, DEdeg, HRV, Teff_K, logg_K, dist,
       Met_K, Obsdate, pmRA_PPMXL, pmDE_PPMXL
  FROM RAVEPUB_DR4.RAVE_DR4
 WHERE Obsdate like '2008%'
```

- Click on the job when it finished, go to Results
- Below the table, click „Register with SAMP“, enter your password and submit to Topcat

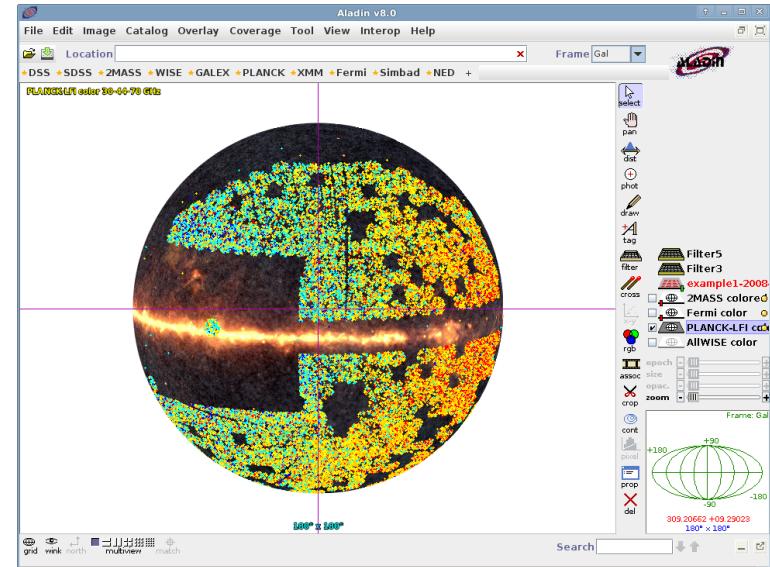
RAVE in Topcat

- View data as „Sky Plot“
- Add proper motions
 - Choose in Sky Plot: Form, Arrow-smbol (add new vector form)
 - Choose pmRA, pmDE for the proper motion
 - Choose nice coloring (Aux)
- Add extra column for hrvbins
 - Views -> Column info, Add new column
 - Use following expression:

```
(HRV > 50)?1:( (HRV > 10)?2:( (HRV>-10)?3:( (HRV>-50)?4:5 ) ) )
```
 - In Sky plot: use new column as Aux axis
- Send table to Aladin
 - InterOp -> Send table to -> Aladin

RAVE in Aladin

- Add Milky Way
 - click on e.g. 2MASS
- Add colors
 - Catalog -> Create a filter
 - Enter this expression:



```
 ${HRV}>=50 { draw red circle(150) }
 ${HRV}>=10 && ${HRV}<50 { draw orange circle(150) }
 ${HRV}>=-10 && ${HRV}<10 { draw yellow circle(150) }
 ${HRV}>=-50 && ${HRV}<-10 { draw cyan circle(150) }
 ${HRV}<-50 { draw blue circle(150) }
```

- Click on star to get Simbad information



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CosmoSim and TOPCAT

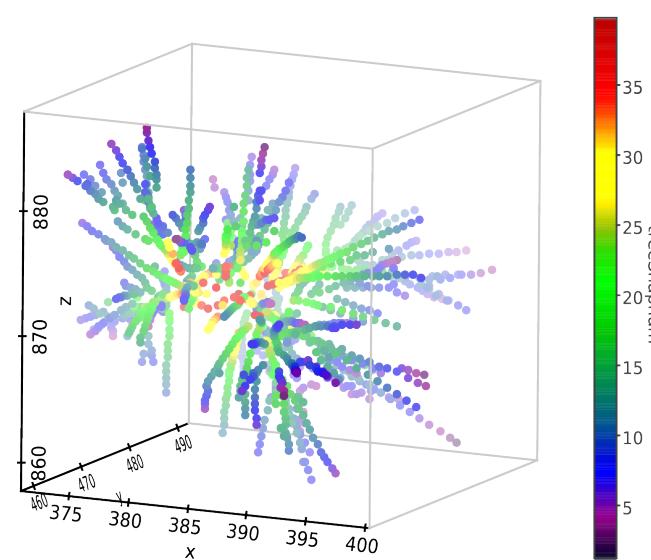
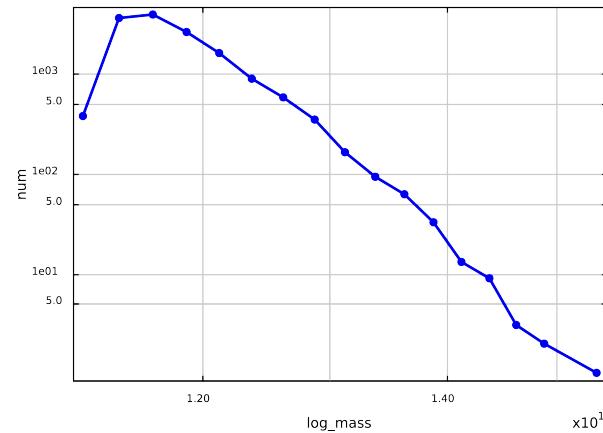
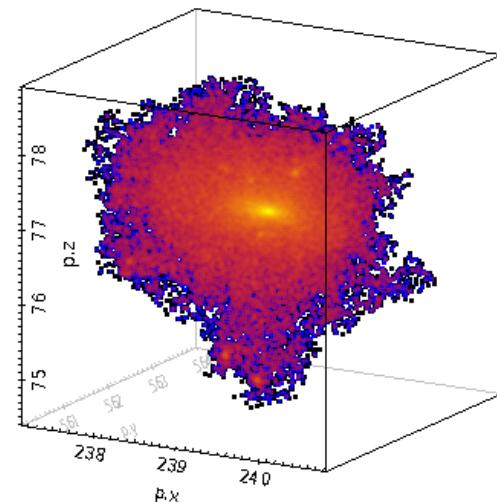
CosmoSim

- Database with cosmological simulations
 - <http://www.cosmosim.org>
- Login or use demo user:

username: cosmodemo, password: tutorial
- Browse through documentation
- Query interface
 - Data browser below query form
 - Below the query form, pick an example query
 - Submit
 - When job is finished, click on the table name
 - Go to Results tab, click Register with SAMP below table
 - Enter password + Send table to Topcat (start Topcat before!)

CosmoSim in Topcat

- Choose table in Topcat
- Experiment with plotting these data, depending on the chosen example
- Use e.g. coloring by density, let dot-size correspond to halo radius etc.





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Data Access Service

Data Access Service

- Based on OwnCloud
- File sharing system for AIP
- Inviting collaborators outside AIP is possible as well
- <https://cloud.aip.de>