

# GENIUS

## The Gaia archive



**gaia**



*X. Luri*

*Universitat de Barcelona*

# Archive current contents

## External Catalogues

• Hipparcos & Hipparcos new red.	$1.2 \times 10^6$	rows
• IGSL (Initial Gaia Source List)	$1.2 \times 10^9$	rows
• 2MASS	$4.7 \times 10^8$	rows
• Tycho2	$2.5 \times 10^6$	rows
• UCAC4	$1.1 \times 10^8$	rows
• Hubble Source Catalogue v1.0	$2.9 \times 10^7$	rows

## Gaia

• Gaia DR1 catalogue	$1.1 \times 10^9$	rows
• TGAS	$2.0 \times 10^6$	rows

## Crossmatches

- Crossmatch tables between Hipparcos, 2MASS, Tycho2... and Gaia expressed as neighbourhood and best neighbour, e.g:
- AllWise-Gaia neighbourhood  $3.1 \times 10^8$  rows



gaia



**GENIUS**

April 2017

# Archive simple form

EUROPEAN SPACE AGENCY ABOUT ESAC Jesus Salgado (jsalgado)

## gaia archive

HOME SEARCH STATISTICS VISUALIZATION HELP DOCUMENTATION VOSPACE SHARE ADMIN

Simple Form ADQL Form Query Results

Position File

Name  
 Equatorial

Target in  Circle  Box

Name  for  Radius

*pleiades resolved by Simbad*

Search in:  Gaia Source  Tycho-Gaia Astrometric Solution (TGAS)

Extra conditions

+ Add condition Filter:

Display columns

Max. number of results:

COPYRIGHT 2000 - 2016 © EUROPEAN SPACE AGENCY. ALL RIGHTS RESERVED. [v1.1.0]

# Archive ADQL form

## gaia archive



- HOME
- SEARCH
- STATISTICS
- VISUALIZATION
- HELP
- DOCUMENTATION
- VOSPACE
- SHARE
- ADMIN

- Simple Form
- ADQL Form
- Query Results



Job name:

Query examples

```

1 SELECT DISTANCE(POINT('ICRS',ra,dec), POINT('ICRS',266.41683,-29.00781)) AS dist, *
2 FROM gaiadr1.gaiadr1.gaia_source
3 WHERE 1=CONTAINS(POINT('ICRS',ra,dec),CIRCLE('ICRS',266.41683,-29.00781, 0.09333333)) ORDER BY dist ASC
    
```

Reset Form

Submit Query

- Gaia Data Release 1
- Other
- User tables
  - user\_jsalgado.cluster\_2mass
  - user\_jsalgado.dwarfs
  - user\_jsalgado.m45
  - user\_jsalgado.m45cluster
  - user\_jsalgado.m45pmfilter
  - user\_jsalgado.t147686803513o
  - user\_jsalgado.xmatch\_igal\_source
  - user\_jsalgado.xmatch\_m45cluster
- Shared to me (from fullgdr1)
  - user\_fullgdr1.allwise\_original\_valid
  - user\_fullgdr1.ospheld
  - user\_fullgdr1.ext\_phot\_zero\_point
  - user\_fullgdr1.gaia\_source
  - user\_fullgdr1.gsc23\_original\_valid
  - user\_fullgdr1.hipparcos\_newreduction
  - user\_fullgdr1.phot\_variable\_time\_series
  - user\_fullgdr1.phot\_variable\_time\_series
  - user\_fullgdr1.ppmal\_original\_valid
  - user\_fullgdr1.rfyrac
  - user\_fullgdr1.sdssdr9\_original\_valid
  - user\_fullgdr1.igal\_source
  - user\_fullgdr1.tmass\_original\_valid
  - user\_fullgdr1.tycho2
  - user\_fullgdr1.tycho2\_best\_neighbour

Status	Job	Creation date	Num. rows	Size	
✓	xmatch	26-Oct-2016, 17:36:52	106	40 KB	
✓	xmatch_m45cluster_tmass_original_valid	26-Oct-2016, 17:32:26		0 KB	
✓	m45clusterParallaxAvg	26-Oct-2016, 17:28:23	1	0 KB	
✗	m45clusterParallaxAvg	26-Oct-2016, 17:28:13		0 KB	
✓	m45PmFilter	26-Oct-2016, 17:27:04	106	32 KB	
✓	m45PmFilter	26-Oct-2016, 17:23:45	218	64 KB	
✓	m45	26-Oct-2016, 17:16:12	98538	17 MB	
✓	1477494376453O	26-Oct-2016, 17:06:16	157	12 KB	
✓	xmatch_igal_source_dwarfs	26-Oct-2016, 17:04:18		0 KB	
✓	1477493732281O	26-Oct-2016, 16:55:32	100	8 KB	
✓	1476954436777O	20-Oct-2016, 11:07:16	194	36 KB	

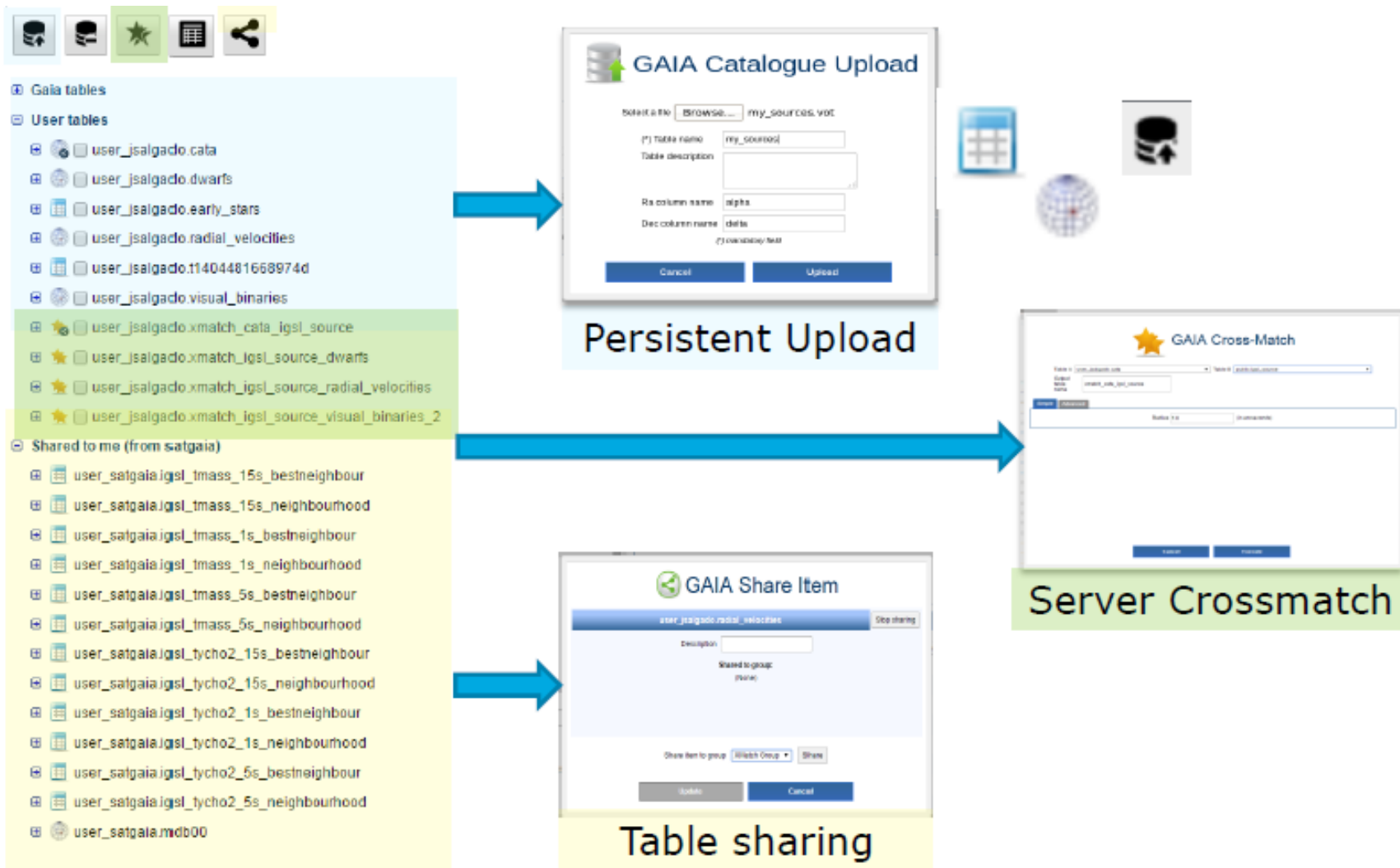
1-20 of 86

Apply jobs filter Select all jobs Delete selected jobs





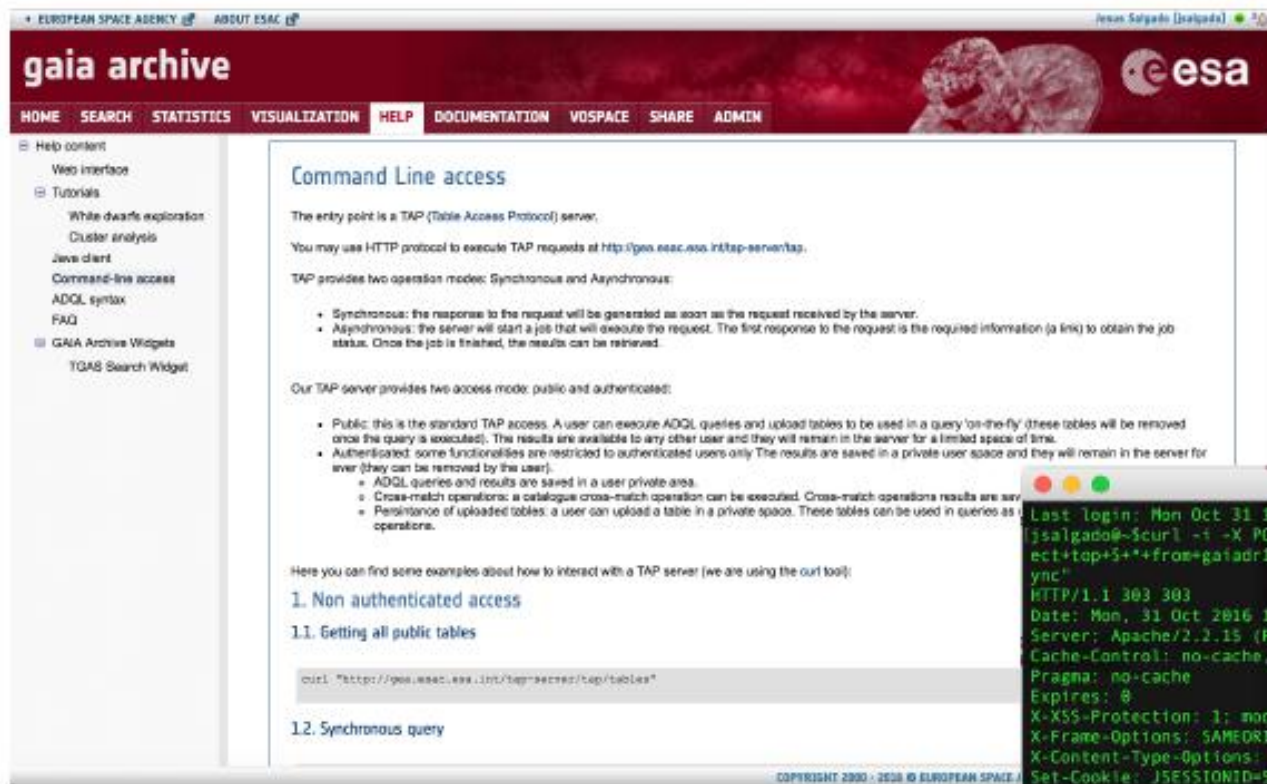
# Archive user schemas



Jesús Salgado | Gaia Archive | Gaia DR1 workshop @ ESAC | 02/11/2016 | Slide 17

ESA UNCLASSIFIED - Releasable to the Public

# Archive CLI



The screenshot shows the Gaia Archive website interface. The header includes the ESA logo and navigation links: HOME, SEARCH, STATISTICS, VISUALIZATION, HELP, DOCUMENTATION, VOSPACE, SHARE, ADMIN. The main content area is titled 'Command Line access' and provides instructions on how to use the TAP (Table Access Protocol) server. It lists two operation modes: Synchronous and Asynchronous. The Synchronous mode generates a response as soon as the request is received, while the Asynchronous mode starts a job that will be executed later, with the first response providing a link to check the job status. The page also mentions that the TAP server provides two access modes: public and authenticated. A list of public access capabilities is provided, including ADQL queries, cross-match operations, and persistence of uploaded tables. A terminal window is overlaid on the bottom right of the screenshot, showing a curl command being executed to query the TAP server for public tables.

gaia archive

HOME SEARCH STATISTICS VISUALIZATION HELP DOCUMENTATION VOSPACE SHARE ADMIN

## Command Line access

The entry point is a TAP (Table Access Protocol) server.

You may use HTTP protocol to execute TAP requests at <http://gea.esac.esa.int/tap-server/tap>.

TAP provides two operation modes: Synchronous and Asynchronous:

- Synchronous: the response to the request will be generated as soon as the request received by the server.
- Asynchronous: the server will start a job that will execute the request. The first response to the request is the required information (a link) to obtain the job status. Once the job is finished, the results can be retrieved.

Our TAP server provides two access mode: public and authenticated:

- Public: this is the standard TAP access. A user can execute ADQL queries and upload tables to be used in a query 'on-the-fly' (these tables will be removed once the query is executed). The results are available to any other user and they will remain in the server for a limited space of time.
- Authenticated: some functionalities are restricted to authenticated users only. The results are saved in a private user space and they will remain in the server forever (they can be removed by the user).
  - ADQL queries and results are saved in a user private area.
  - Cross-match operations: a catalogue cross-match operation can be executed. Cross-match operations results are saved in a user private area.
  - Persistence of uploaded tables: a user can upload a table in a private space. These tables can be used in queries as tables.

Here you can find some examples about how to interact with a TAP server (we are using the curl tool):

### 1. Non authenticated access

#### 1.1. Getting all public tables

```
curl "http://gea.esac.esa.int/tap-server/tap/tables"
```

#### 1.2. Synchronous query

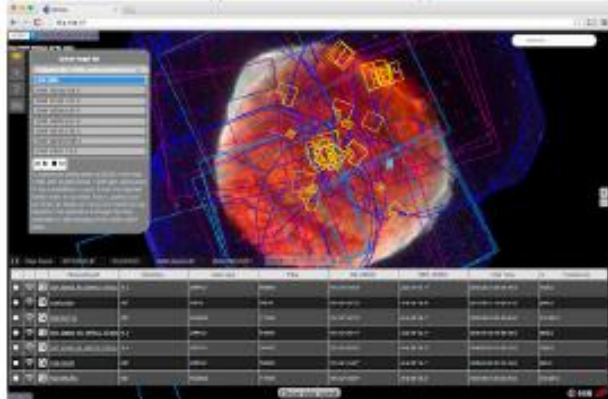
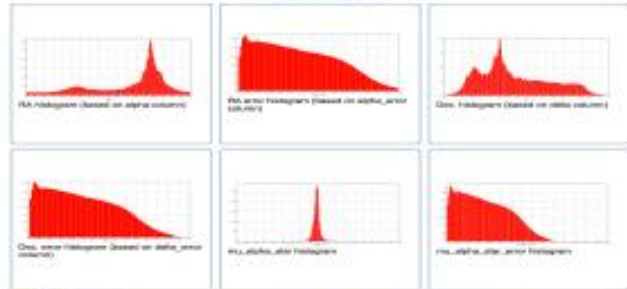
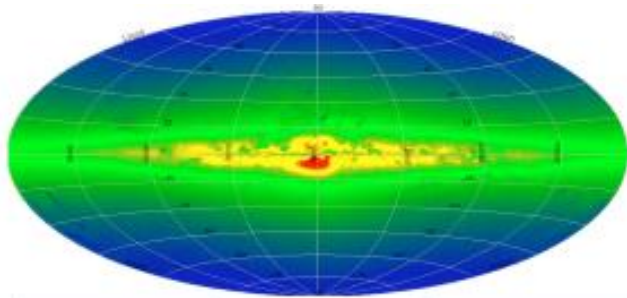
COPYRIGHT 2000 - 2016 © EUROPEAN SPACE AGENCY



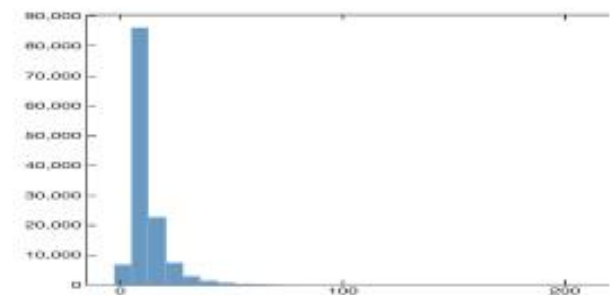
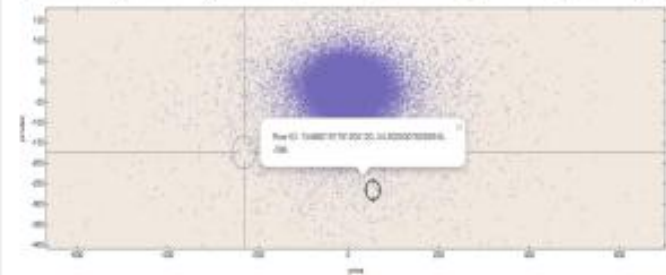
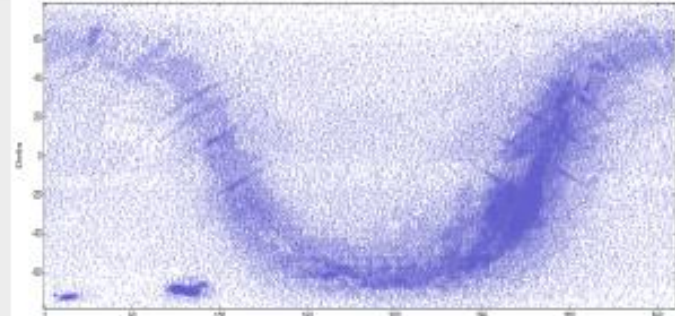
```
jsalgado ~ — bash — 80x24
Last login: Mon Oct 31 12:01:12 on ttys004
jsalgado@~$ curl -i -X POST --data "PHASE=run&LANG=ADQL&REQUEST=doQuery&QUERY=select+top+5+*+from+gaiadr1.gaia_source" "http://gea.esac.esa.int/tap-server/tap/async"
HTTP/1.1 303 303
Date: Mon, 31 Oct 2016 16:28:26 GMT
Server: Apache/2.2.15 (Red Hat)
Cache-Control: no-cache, no-store, max-age=0, must-revalidate
Pragma: no-cache
Expires: 0
X-XSS-Protection: 1; mode=block
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
Set-Cookie: JSESSIONID=571AA9438CE1329D0646FF917F748201:path=/tap-server/:HttpOnly
Location: http://gea.esac.esa.int/tap-server/tap/async/14779313069470
Connection: close
Transfer-Encoding: chunked
Content-Type: text/plain;charset=ISO-8859-1

jsalgado@~$
```

# Archive visualization



- ❑ Visualization is a need
- ❑ Statistics provide holistic views. Big data techniques
- ❑ Validated static stats
- ❑ On-the-fly visualization (Lisbon University)
- ❑ ESASky





# gaia archive visualization



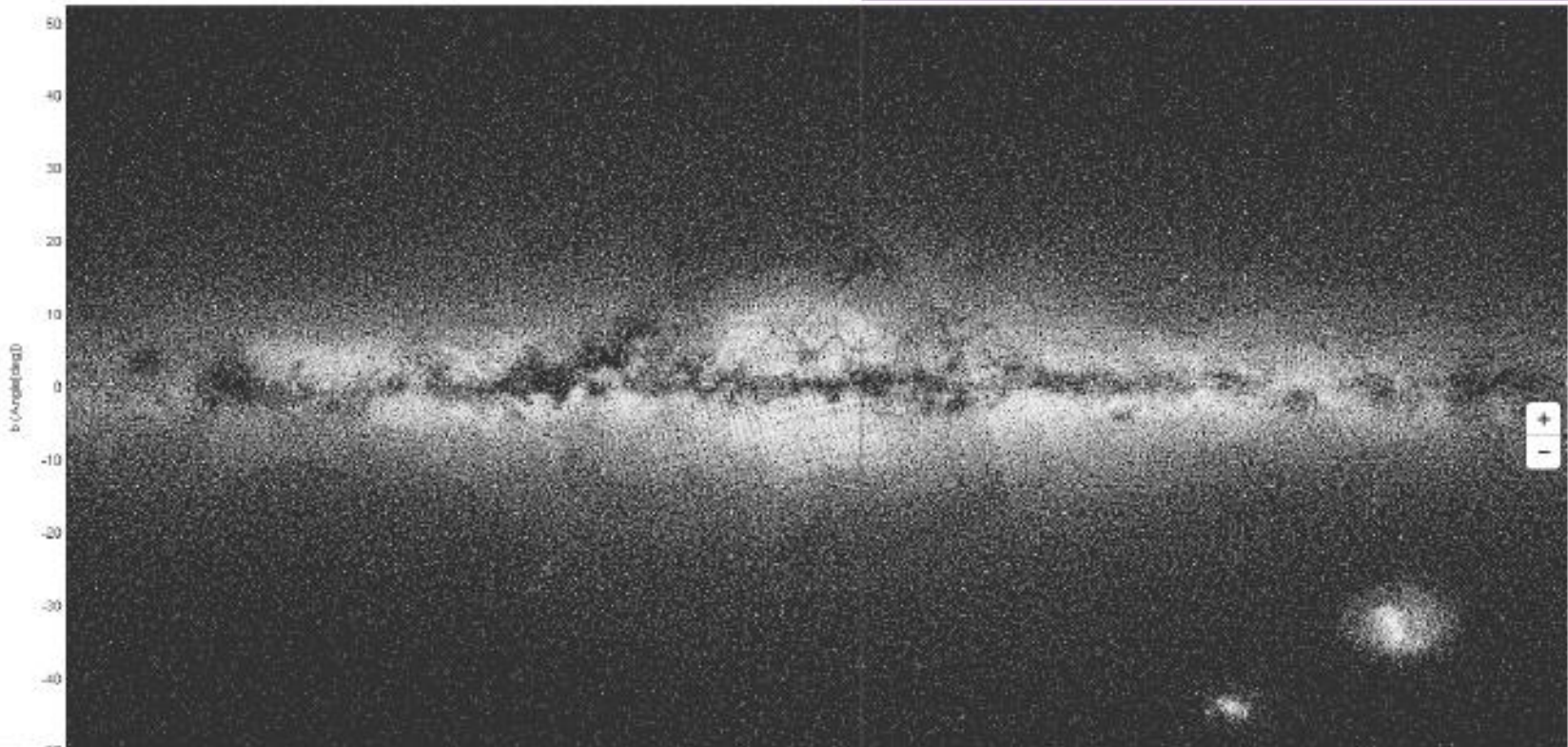
New window

Regions -

Q + x

Galactic Coordinate

Plenary, splinter: A. Moitinho





### Table Access Protocol (TAP) Query

Window TAP Registry Edit Interop Help

Select Service Use Service Resume Job Running jobs

Metadata

Find:

Name  Descrip Or

- gaiaedr1 (8)
  - gaiaedr1\_aux\_qso\_icrf2\_r
  - gaiaedr1\_cepheid
  - gaiaedr1\_gaia\_source
  - gaiaedr1\_phot\_variable\_t
  - gaiaedr1\_phot\_variable\_t
  - gaiaedr1\_rhydrae
  - gaiaedr1\_tgas\_source
  - gaiaedr1\_variable\_summ

Service	Schema	Table	Columns	FKeys	Hints
Name	DataType	Indexed	Unit		
source_id	BIGINT	<input checked="" type="checkbox"/>			Unique source id
ra	DOUBLE	<input checked="" type="checkbox"/>	deg		Right ascension
dec	DOUBLE	<input checked="" type="checkbox"/>	deg		Declination
l	DOUBLE	<input checked="" type="checkbox"/>	deg		Galactic longitude
b	DOUBLE	<input checked="" type="checkbox"/>	deg		Galactic latitude
ecl_lon	DOUBLE	<input checked="" type="checkbox"/>	deg		Ecliptic longitude
ecl_lat	DOUBLE	<input checked="" type="checkbox"/>	deg		Ecliptic latitude
parallax	DOUBLE	<input checked="" type="checkbox"/>	mas		Parallax
pmra	DOUBLE	<input checked="" type="checkbox"/>	mas/yr		Proper motion in RA
pmdec	DOUBLE	<input checked="" type="checkbox"/>	mas/yr		Proper motion in Dec

Service Capabilities

Query Language: ADQL-2.0 Max Rows: 100000 (default) Uploads: 1000krow/

ADQL Text

Mode: Synchronous

```

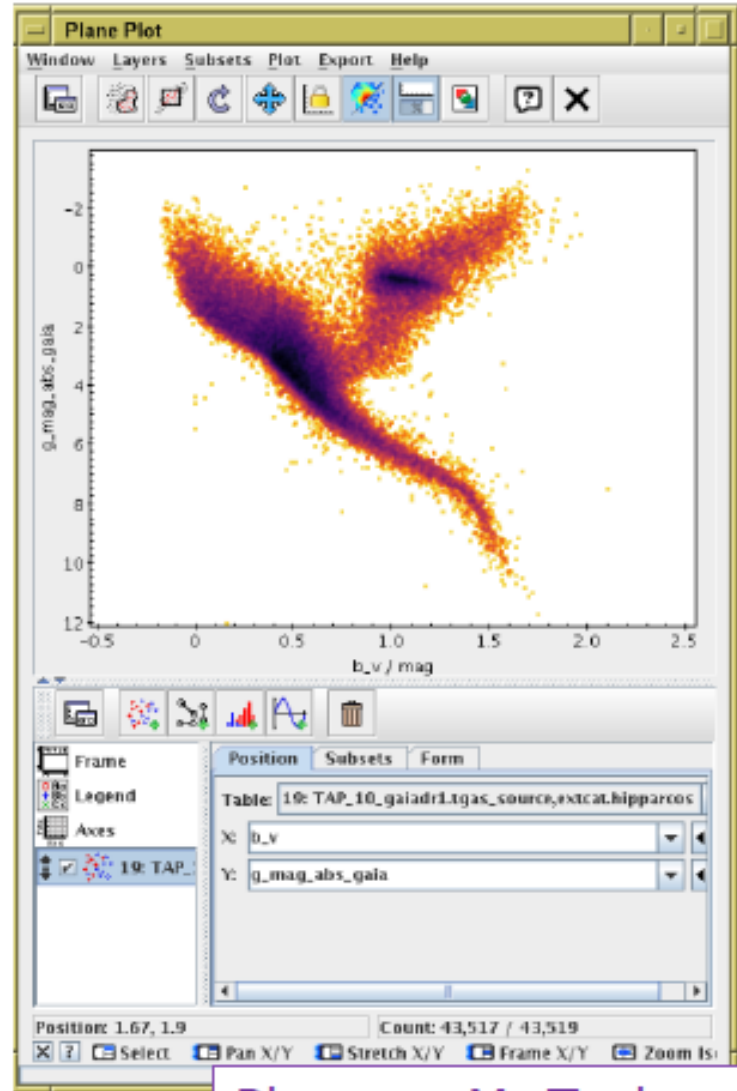
1
SELECT TOP 50000
  gaia.source_id,
  gaia.hip,
  gaia.phot,
  gaia.phot,
  hip.b_v
FROM gaiaedr1.tgas
INNER JOIN e

```

- Get the 5 astrometric parameters
- Cone Search with Galactic coordinates
- Getting Healpix Indices
- 3-D plot
- Gaia DR1 - Color and magnitude 1/2
- Gaia DR1 - Color and magnitude 2/2
- Gaia DR1 - Density by magnitude
- Gaia DR1 - Pleiades density by parallax

Basic Upload Service-Provided TAP\_SCHEMA ObsTAP

Run Query



# Archive documentation

- Gaia Archive. Includes help and tutorials
  - <https://archives.esac.esa.int/gaia>
- Gaia DR1 papers <http://www.cosmos.esa.int/web/gaia/dr1#A&A>
- Online documentation (361 pages)
  - <http://gaia.esac.esa.int/documentation/GDR1/index.html>
- Data model documentation
  - <https://gaia.esac.esa.int/documentation/GDR1/datamodel/>
- ADQL: GAVO short course, UK ROE cookbook
  - <http://docs.g-vo.org/adql-gaia/html/index.html>
  - <https://gaia.ac.uk/science/gaia-data-release-1/adql-cookbook>
- Gaia Helpdesk. <https://support.cosmos.esa.int/gaia/>



