

# TAP interface within Aladin Desktop: the Gaia use case



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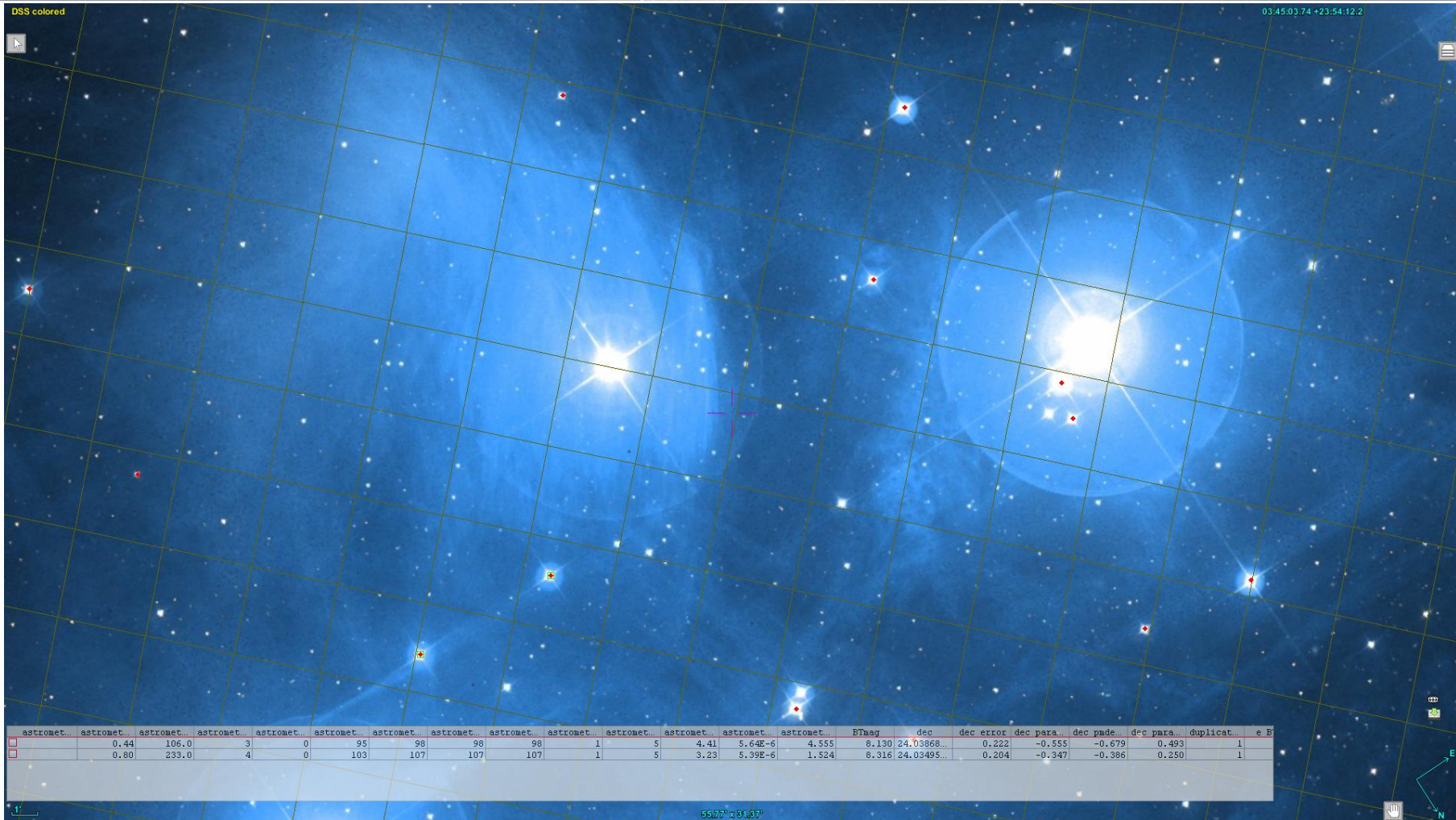
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# □ Aladin TAP interface project

- TAP interface was missing in Aladin
- First attempt with a Plugin 2 years ago
  - Lesson learnt : poor integration of full Aladin functionalities
- Strong motivations:
  - CDS participation to Gaia DR1 distribution
  - Rise of ObsTap services with images and cubes
- → TAP interface integration in Aladin main code
  - Generic and customized interfaces

# Gaia DR1 in M45 (Pleiades) in Aladin: TGAS supplement with BT and VT magnitudes



# □ Gaia: classical interface

The screenshot shows the Aladin v9.0 web interface. The main window displays a star field with a grid overlay. A 'Server selector' dialog box is open in the foreground, showing the 'Gaia DR1 (Gaia Collaboration, 2018)' server selected. The dialog box contains the following fields:

- Target (ICRS, name): 03 47 00.00 +24 07 00.1
- Radius: 2.895°
- Table: I/337/tgasptyc - TGAS supplemented with BT and ...
- Plx [mas](ex: >50): >7
- Gmag (ex: 10.11):
- pmRA [mas/yr] (ex: <20):
- pmDE [mas/yr] (ex: >30):
- Output columns: \* - Default columns
- Output max: 999999

At the bottom of the main window, there is a table with the following columns: RAJ2000, DEJ2000, V, TYC, HIP, Source, RA ICRS, e RA, DE ICRS, e DE, Plx, pmRA, pmDE, Di.

RAJ2000	DEJ2000	V	TYC	HIP	Source	RA ICRS	e RA	DE ICRS	e DE	Plx	pmRA	pmDE	Di
56.837658	24.116266	VizieR 1800-2201-1			66715101399291392	56.837753769	0.383	24.1160800639	0.216	7.88	20.889	-44.684	0 4774
56.830613	24.139113	VizieR 1800-1607-1			66715273197982848	56.830694692	0.312	24.1389324034	0.164	7.64	17.879	-43.463	0 821

# □ Gaia customized TAP interface

Aladin v9.0 \*\*\* BETA VERSION (based on v9.039) \*\*\*

File Edit Image Catalog Overlay Coverage Tool View Interop Help

Location 03:47:29.48 +24:17:17.3

Frame ICRS

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

GaiaGluTap-7

Server selector

Others HIPS File allVO Watch FeV... Tools...

Image servers

Aladin images SkyView UKIDSS Sloan DSS... VLA... Archives... Others...

Catalog servers

All VizieR Surveys Missions SIMBAD NED MOC TAP

● Gaia via TAP VizieR (Gaia Collaboration, 2016) ? Change...

Target (ICRS, name) 03 46 32.06 +24 00 59.0 Grab coord

Radius 1.97°

Table "I/337/tgasptyc" - TGAS supplemented with BT and...

Plx [mas][ex: >50]

Gmag (ex: 10..11)

pm limit [mas/yr] 50

Max records - Default server limit

Write... Check... SYNC

SELECT \*  
FROM I/337/tgasptyc"  
WHERE 1=CONTAINS(POINT(ICRS; ra dec), CIRCLE(ICRS;  
56 85308333333333, 24 0443888888888893, 3 441 )) AND  
SQRT(POWER(pmRA,2)+POWER(pmDEC,2))>50

Generated SQL

Reset Clear SUBMIT Close ?

GaiaGluTap-7 - astrometric\_n\_good\_obs\_ac - Number of good observations

astromet...	astromet...	astromet...	astromet...	astromet...	astrometric_n_good_obs_ac	astromet...	astromet...	astromet...	astromet...	astromet...
0.31	144.0	2	2		92	95	95	95	1	3
0.56	229.0	3	0						5	5
12.06	0.84	377.0	3	0					5.51	1.39E-5
									8.16	1.45E-5

UCD: meta.number

# □ Gaia customized TAP interface

The screenshot displays the Gaia customized TAP interface. The main window shows a star field with a grid overlay. A 'Server selector' window is open, showing the 'Gaia via TAP Vizier (Gaia Collaboration, 2016)' server selected. The 'Complex constraint' box highlights the 'pm limit [mas/yr]' field, which is set to 50. Below the server selector, a SQL query is visible:

```
SELECT *
FROM 'I/337/tgasptyc"
WHERE 1=CONTAINS(POINT('ICRS', ra, dec), CIRCLE('ICRS',
56.85308333333333, 24.04438888888889, 3.441 )) AND
SQRT(POWER(pmRA,2)+POWER(pmdec,2))>50
```

At the bottom of the interface, a table of data is visible:

astromet...	astrometric n good obs	astromet...	astromet...	astromet...	astromet...	astromet...	astromet...
2	2	1	5	3.14	2.5E-5		
3	0	1	5	5.51	1.39E-5		
3	0	92	95	95	95	1	3
						8.16	1.45E-5

# Customized interface : how does it work ?

```
#GLU record for Gaia DR1 from ARI
#Catalog Identifier : Gaia-DR1.cat
%A GaiaGluTAPARI
%D Gaia DR1 (Gaia Collaboration, 2016)
%O CDS'aladin
%Z ALADIN
%Aladin.Protocol TAPv1
%N 1475571165 2016/10/04 10:52:35
%U http://gaia.ari.uni-heidelberg.de/tap
```

```
%P.D $1=Target
%P.K $1=Target(RAd,gaiadr1.gaia_source,gaiadr1.tgas_source)
%P.D $2=Declination
%P.K $2=Target(DEd,gaiadr1.gaia_source,gaiadr1.tgas_source)
%P.D $3=Radius
%P.K $3=Field(RADIUSd,gaiadr1.gaia_source,gaiadr1.tgas_source)
%ADQL.Where $1=1=CONTAINS(POINT('ICRS', ra, dec), CIRCLE('ICRS', $1, $2, $3 ))
%P.V 3:0.17
```

```
%P.D 4:Table
%P.K $4=Tables(gaiadr1.gaia_source,gaiadr1.tgas_source)
%P.V 4:gaiadr1.gaia_source - Gaia Source data
%P.V 4:gaiadr1.tgas_source - TGAS supplemented with BT and VT magnitudes
%ADQL.TAPTables gaiadr1.gaia source gaiadr1.tgas source
```

```
%P.D 6:Gmag (ex: 10..11)
%P.K 6=char(OP,gaiadr1.gaia_source,gaiadr1.tgas_source)
%ADQL.Where 6=phot_g_mean_mag $6
```

```
%P.D 7:pm limit [mas/yr]
%P.K 7=char(gaiadr1.gaia_source,gaiadr1.tgas_source)
%ADQL.Where 7= SQRT(POWER(pmRA,2)%2BPOWER(pmdec,2))>$7
```

```
%P.D $8=Max records
%P.V $8=TOP 10 - A few
%P.V $8=TOP 1000 - first 1000
%P.V $8=- Default server limit
%P.K $8=TOP(gaiadr1.gaia_source,gaiadr1.tgas_source)
%ADQL.Select $8=$8
```

```
%P.D 9:Output columns
%P.V 9:* - Default columns
%P.V 9:ra, dec, pmra, pmdec,
SQRT(POWER(pmRA,2)+POWER(pmdec,2)) as pm - Position and
proper motion
%P.V 9:source_id, phot_g_mean_mag+5*log10(parallax)-
de MG
```

```
error,duplicated_source,phot_g_mean
phot_g_mean_mag,phot_variable_flag,l,ra,ra_error,
source_id,ref_epoch,pmRa,ra_dec_corr
```

## GLU records (ascii menu definitions)

```
%ADQL.Where 5=parallax $5
```

# Customized interface : how does it work ?

```
#GLU record for Gaia DR1 from ARI
#Catalog Identifier : Gaia-DR1.cat
%A GaiaGluTAPARI
%D Gaia DR1 (Gaia Collaboration, 2016)
%O CDS'aladin
%Z ALADIN
%Aladin.Protocol TAPv1
%N 1475571165 2016/10/04 10:52:35
%U http://gaia.ari.uni-heidelberg.de/tap
```

```
%P.D      $1=Target
%P.K      $1=Target(RAd,gaiadr1.gaia_source,gaiadr1.tgas_source)
%P.D      $2=Declination
%P.K      $2=Target(DEd,gaiadr1.gaia_source,gaiadr1.tgas_source)
%P.D      $3=Radius
%P.K      $3=Field(RADIUSd,gaiadr1.gaia_source,gaiadr1.tgas_source)
%ADQL.Where $1=1=CONTAINS(POINT('ICRS', ra, dec), CIRCLE('ICRS', $1, $2, $3 ))
%P.V      3:0.17

%P.D      4:Table
%P.K      $4=Tables(gaiadr1.gaia_source,gaiadr1.tgas_source)
%P.V      4:gaiadr1.gaia_source - Gaia Source data
%P.V      4:gaiadr1.tgas_source - TGAS supplemented with BT and VT magnitudes
%ADQL.TAPTables      gaiadr1.gaia_source      gaiadr1.tgas_source
%ADQL.From      $4=$4
```

```
%P.D      6:Gmag (ex: 10..11)
%P.K      6=char(OP,gaiadr1.gaia_source,gaiadr1.tgas_source
)
%ADQL.Where 6=phot_g_mean_mag $6
```

```
%P.D      7:pm limit [mas/yr]
%P.K      7=char(gaiadr1.gaia_source,gaiadr1.tgas_source)
%ADQL.Where 7=
SQRT(POWER(pmRA,2)%2BPOWER(pmdec,
2))>$7
```

```
%P.D      $8=Max records
%P.V      $8=TOP 10 - A few
%P.V      $8=TOP 1000 - first 1000
%P.V      $8=- Default server limit
%P.K      $8=TOP(gaiadr1.gaia_source,gaiadr1.tgas_source)
```

```
%P.V      9:ra, dec, pmra, pmdec,
SQRT(POWER(pmRA,2)+POWER(pmdec,2)) as pm - Position and
proper motion
%P.V      9:source_id, phot_g_mean_mag+5*log10(parallax)-
10 as g_mag - Absolute magnitude MG
```

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# TAP Generic interface (Simbad tables – M45 again)

The screenshot displays the Aladin v9.0 software interface. A 'Server selector' dialog box is open, showing a 'SIMBAD\_TAP' server selected. The dialog includes a 'Table' dropdown menu with 'basic' selected, and a 'Query' field containing the following SQL query:

```
SELECT TOP 100 FROM basic WHERE CONTAINS(POINT(ICRS:ra, dec), CIRCLE(ICRS: 55 70729166666666, 0.2333333333333334)) = 1
```

A blue callout box labeled 'Cone search constraint' points to the 'CIRCLE' function in the query. The background shows a star field with a grid overlay. The bottom of the screen displays a table of search results.

astromet	astromet	astromet	astromet	astromet	astromet	astromet	astromet	astromet	astromet	astromet	astromet	astromet	astromet	astromet	ETaag	dec	dec error	dec para.	dec pade.	dec para.	duplicat.	e ETaag	ecl lat	ecl lon	e V
0.56	229.0	3	0	85	88	88	88	1	5	5.51	1.39E-5	3.020	8.765	23.99502...	0.190	0.142	-0.611	-0.103	1	0.022	3.964124	59.87585			
0.89	533.0	3	0	101	104	104	104	1	5	8.72	2.57E-5	1.219	6.302	24.11608	0.216	-0.600	-0.387	0.217	0	0.015	4.068282	59.96497			
0.62	482.0	3	3	120	120	123	123	1	5	6.07	1.7E-5	2.497	8.484	24.18993	0.164	-0.295	-0.612	0.273	0	0.019	4.091989	59.96366			

# TAP Generic interface (Simbad tables – M45 again)

The screenshot shows the Aladin v9.0 interface with the SIMBAD\_TAP server selector window open. The window contains the following elements:

- Table:** basic
- Constraints:** Add new, Max rows: 2000
- Target:** 03 47 05.71 +24 09 16.5
- Radius:** 2°
- Query:** Ra= 56.7737916666667 Dec= 24.1545833333333 Radius= 2.0
- Generated SQL:**

```
SELECT TOP 2000 * FROM basic WHERE CONTAINS(POINT('ICRS', ra, dec), CIRCLE('ICRS', 56.7737916666667, 24.1545833333333, 2.0)) = 1 AND plx_value > 8
```
- Parallax constraint:** A dropdown menu showing 'plx\_value' with a value of 8.

The background shows a star field with a grid overlay. The SIMBAD\_TAP window is highlighted with a blue border. A blue arrow points from the 'Generated SQL' box to the SQL query text. Another blue arrow points from the 'Parallax constraint' box to the 'plx\_value' dropdown menu.

# □ Demo

- TGAS has parallaxes and proper motions (Main Gaia catalogue generally doesn't have)
- Go to Pleiades (M45)
- Select TGAS sources with parallax  $> 7$  with classical interface
- Select TGAS sources with full proper motion constraints using customized TAP interface
- Select SIMBAD basic table with parallax constraints with generic TAP interface.
  - Compare. Simbad has Hipparcos parallaxes