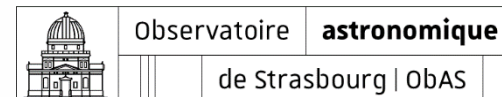# Does Aladin require DM?

Interop meeting – 13-17 May 2019
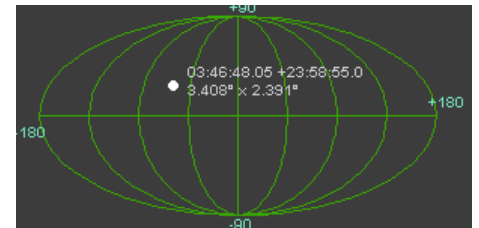
Pierre Fernique

☐ The key data in catalogs for Aladin
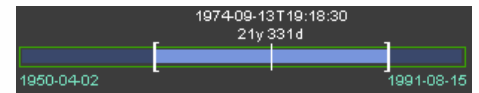
1. Aladin is Space oriented => it requires **RA,DEC**
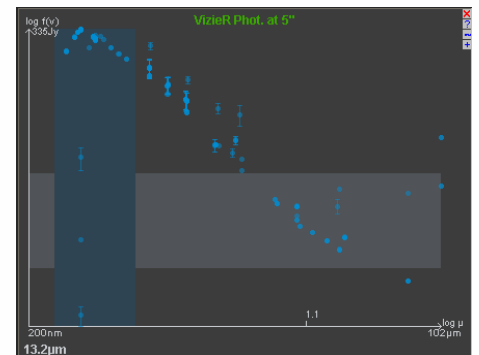

2. It also manipulates Time => it required **JD**

3. It may display SED => it requires **Flux** & **frequence**

☐ Other key data

- Aladin must also recognize:
  - **Links** associated to a row or to a column value
  - **FoV** associated to a row

RA   **DE**   **JD**   **Link**   Link   **Fov**   Link   Link

RAJ2000	DEJ2000	OBSERVATIO...	id	access	FoV	DATASET	PREVIEW	INSTRUME	OPT_ELE	DETECT0
217.27611	-62.72529	2000-05-08...	u67fb204r_drz	Display	FoV	Full metainfo	Preview	WFPC2	F450W	WFC
217.27611	-62.72529	2000-05-08...	u67fb205r_drz	Display	FoV	Full metainfo	Preview	WFPC2	F450W	WFC
217.27611	-62.72529	2000-05-08...	u67fb206r_drz	Display	FoV	Full metainfo	Preview	WFPC2	F450W	WFC
217.27394	-62.72373	2000-05-09...	u67fb304r_drz	Display	FoV	Full metainfo	Preview	WFPC2	F450W	WFC
217.27394	-62.72373	2000-05-09...	u67fb305r_drz	Display	FoV	Full metainfo	Preview	WFPC2	F450W	WFC
217.27394	-62.72373	2000-05-09...	u67fb306r_drz	Display	FoV	Full metainfo	Preview	WFPC2	F450W	WFC

Position & Time

Aladin uses **COOSYS** and now **TIMESYS** to find associated columns

Catalog information

```
http://vizier.u-strasbg.fr/viz-bin/votable?-source=I%2F259%2Ftyc2&-c=03+46+58.9

V0Table format
.Table I/259/tyc2
  -assuming Time column 17 (proba=90.0%)
  -assuming RADEC in degrees column 1 for RA and 2 for DEC
  -Proper motion fields found column 11 for PMRA and 12 for PMDEC
    [RA=0 (proba=100.0%) DE=1 (proba=100.0%) PMRA=10 (proba=90.0%) PMDEC=11 (
  -Coordinate system references found:
    ID="J2000" => eq_FK5 Eq=J2000
    => RA/DEC coordinate conversion not required: ref="J2000" => FK5(J2000.0)
  -No time system reference found... TCB/BARYCENTER
  -found CSV DATA (field sep=Tab record sep=\n)
  -Found 3 lines CVS header with dash separator
  -Ref time system: format=YEARS unit=yr timescale=TCB refposition=BARYCENTER
```

CDS/I/259/tyc2

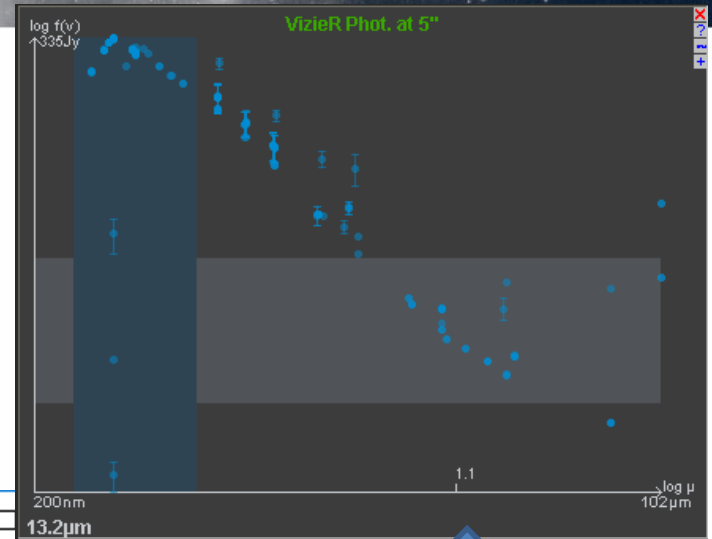|	Visible	Coo	Name	Description			
1	☐	RA	_RAJ2000	Right ascension (FK5,			
2	☐	DE	_DEJ2000	Declination (FK5, Equin			
3	☑		_r	Distance from center (			
4	☑		recno	Record number assigne			
5	☑		TYC1	[19537] += TYC1 from			
6	☑		TYC2	1,12121] TYC2 from TYC or GSC (1)		short	meta.id.part;meta....
7	☑		TYC3	[1,3] TYC3 from TYC (1)		unsignedByte	meta.id.part;meta....
8	☑		pflag	[PX] mean position flag (2)		char	meta.code
9	☑		RAmdeg	[]? Mean Right Asc, ICRS, epoch=J...	deg	double	pos.eq.ra
10	☑		DEmdeg	[]? Mean Decl, ICRS, at epoch=J20...	deg	double	pos.eq.dec
11	☑	PMRA	pmRA	[-4418.0,6544.2]? prop. mot. in RA...	mas/yr	float	pos.pm;pos.eq.ra
12	☑	PMDE	pmDE	[-5774.3,10277.3]? prop. mot. in Dec	mas/yr	float	pos.pm;pos.eq.dec
13	☑		e_RAmdeg	[3,183]? s.e. RA*cos(dec),at mean ...	mas	short	stat.error
14	☑		e_DEmdeg	[1,184]? s.e. of Dec at mean epoch ...	mas	short	stat.error
15	☑		e_pmRA	[0.2,11.5]? s.e. prop mot in RA*cos...	mas/yr	float	stat.error
16	☑		e_pmDE	[0.2,10.3]? s.e. of proper motion in ...	mas/yr	float	stat.error
17	☑	YEARS	EpRAm	[1915.95,1992.53]? mean epoch of ...	yr	float	time.epoch
18	☑		EpDEm	[1911.94,1992.01]? mean epoch of ...	yr	float	time.epoch
19	☑		Num	[2,36]? Number of positions used IN...		short	meta.id

^ v Select all Unselect all - Parsing report Coord. columns Epoch: J2000.0 -

Otherwise, it uses **heuristic rules** based:
- Column name
- UCD
- Unit
- Utype
- Relative position of the column
- …

4

Flux & Frequence

- Aladin recognizes SED VOTable by GROUP and utype
  => based on **IVOA note 2011** – « *Providing Photometric Data measurements Description in VOTables* »


```
VOTable format
.Table allVizieR
   -SED system found:
      .frequence col #41
      .flux col    #51
      .fluxError col #61
      .SEDid col   #71
   -assuming RADEC in degrees column 1 for RA and 2 for DEC
      [RA=0 (proba=90.0%) DE=1 (proba=90.1%) PMRA=-1 (proba=0.0%) PMDEC=-1 (...)]
   -Coordinate system refer
      ID="J2000" => eq_FK5
      ID="B1900" => eq_FK4
      => RA/DEC coordinate
```
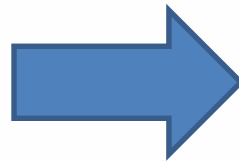
_RAJ2000	_DEJ2000	_tabname	_ID	_sed_freq	_sed_f...Δ	_sed_e...	_sed_filter
56.871154	24.105136	I/270/cp...	recno=5863	2940.6	7.27		IRAS:100
56.871054	24.104888	II/338/c...	recno=29644	2940.6	7.27		IRAS:100
56.871152	24.105136	J/AZh/88...	recno=20	59601	10.5		Johnson:M
56.871153	24.105136	II/346/j...	recno=51016	59601	13.7		Johnson:M
56.87088	24.105289	I/342/f3	recno=8523277	674900	14.4	3.9	Johnson:B
56.871	24.1054	V/114/ms	recno=9798	68918	16.1	1.5	MSX:B2

The good and the bad

- **It works !**
- For Pos & Time, it does the job even with **FITS, CSV, IPAC, ASCII sextractor**, ... tables
- **Unit** is required, and **UCD** helps a lot
- It may have ambiguities :
  - Multiple instances without MAIN UCD
  - PMRA is already multiplied or not by cos(d) ?
- Limitations:
  - **Ref** COOSYS, TIMESYS mechanism should be **multiple**
  - Requires **xxxSYS** (ex: do we need ENERGYSYS ?)
  - **Links** and **FoV** are badly supported (no IVOA consensus, standard inconsistencies)
    => except in OBSxxx or EPNxxx (thanks to utypes and/or name convention)
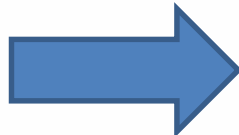
Concretely Aladin requires...
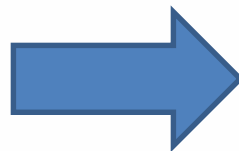
Dedicated GROUP/flagging method

→

```
<xxxSYS ID=n attribute=... />
<FIELD ref=n ...>
<FIELD ref=n ...>
```

Alternate GROUP/flagging method
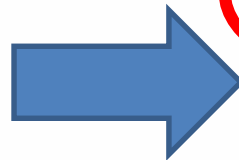
→

```
<GROUP *type>
        <FIELDref ref=n1>
        <FIELDref ref=n2>
</GROUP>
<FIELD ID=n1>
<FIELD ID=n2>
```
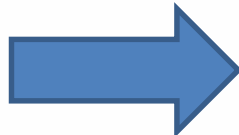
Basic flagging method

→

```
<FIELD *type...>
```
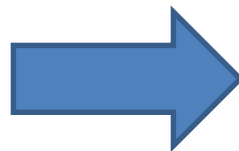
Where is the DM ?

Dedicated GROUP/flagging method
→ <xxxSYS ID=**n** attribut=... />
<FIELD ref=n ...>
<FIELD ref=n ...>

Alternate GROUP/flagging method
→ <GROUP *type>
   <FIELDref ref=n1>
   <FIELDref ref=n2>
</GROUP>
<FIELD ID=n1>
<FIELD ID=n2>

Basic flagging method
→ <FIELD *type...>

Does Aladin require DM?

What does it mean ?

– **DMs serialized** in the data: **no.**

– **DMs as reference documents** describing some data meaning and logic : **yes**, obviously

– A way to recognize and possibly to group some columns based on the knowledge in the DMs documents: **yes definitively** !

□ VOTable ok ! And FITS ?

- TOPcat solution is perfect
  (dedicated HDU for the VOTable header)
- Already supported by Aladin beta

  => should be standardized by IVOA ?
  => Just described in VOTable 1.5 ?