

# SIMBAD : the bibliographic database

A meta-compilation of astronomical objects of interest that have been studied in the literature

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**CDS Council  
December 2019**



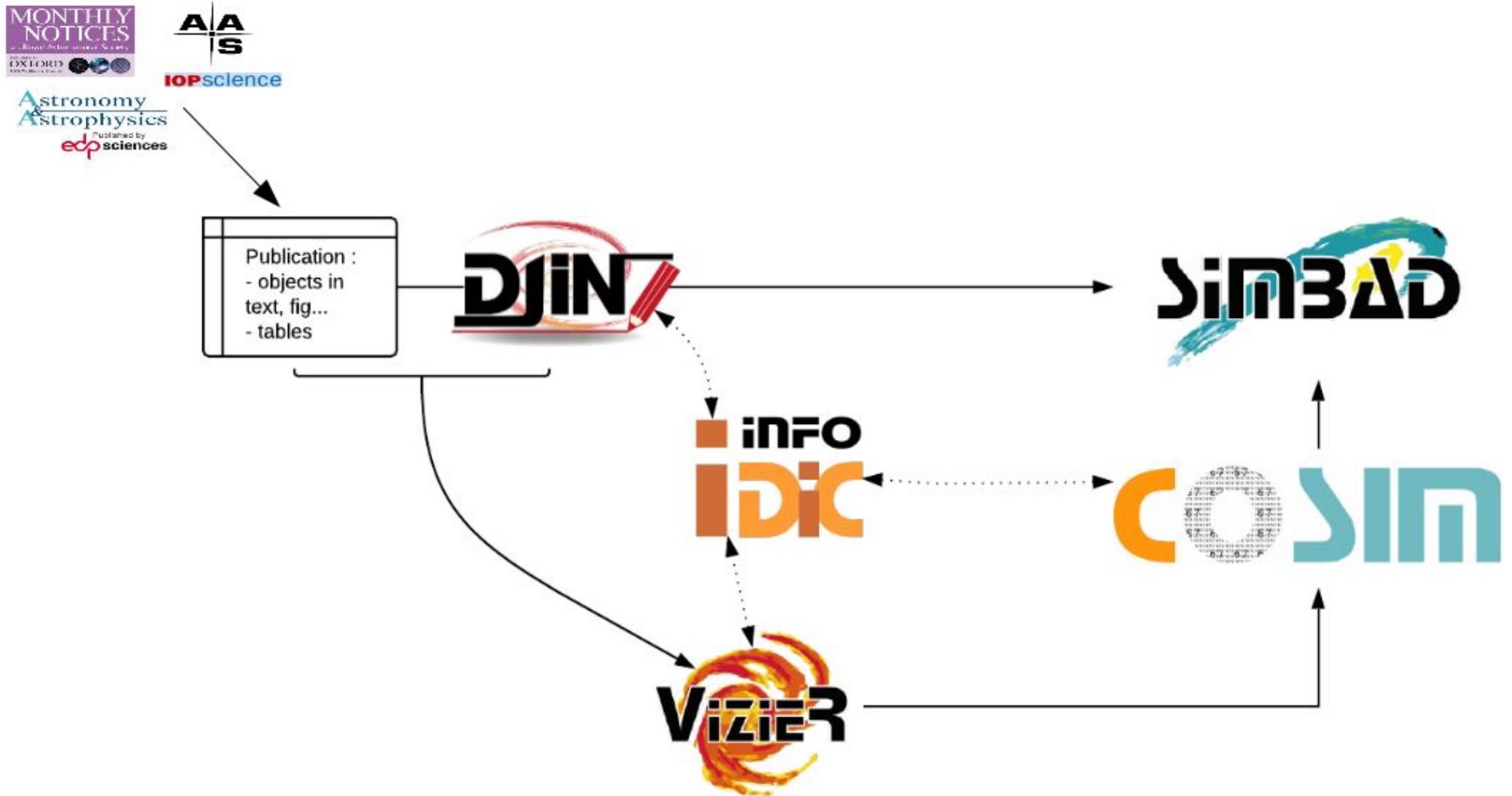
S. Lesteven,  
C. Loup,  
A. Oberto  
B. Vollmer



# The Team

- Bibliography & human resources : Lesteven Soizick
- Scientific content : Loup Cécile
- Database & softwares : Oberto Anais
- Nomenclature : Vollmer Bernd
  
- Documentalists
  - Nomenclature (1.5) : Brouty Marianne, Marquis Fabienne
  - Ingestion of references via DJIN (3.5) : Eisele Aline, Neuville Magali, Son Evelyne, Vonflie Philippe
  - Ingestion of lists of objects via COSIM (2.5) : Brunet Catherine, (Buga Mihaela), Collas Esther, Marquis Fabienne, Perret Emmanuelle, van der Woerd Katia
- Astronomers involved in scientific content : Bot Caroline, Cambresy Laurent, Derrière Sébastien, Genova Françoise, Monari Giacomo, Nebot Ada, Ocvirk Pierre, Siebert Arnaud, Vollmer Bernd

# Workflow



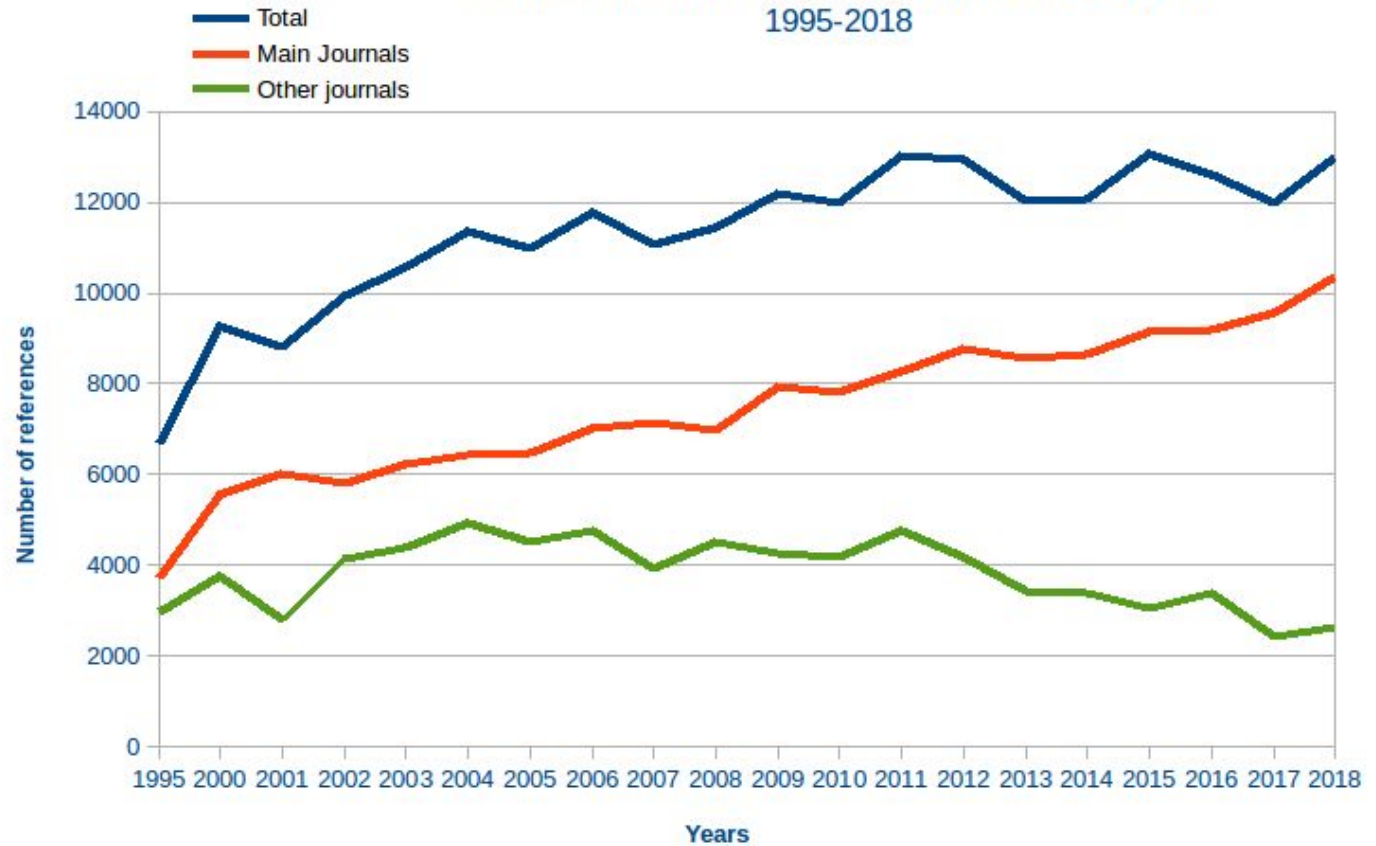




# Bibliography

- 13,000 references processed in SIMBAD in 2018
- The quantity of articles in the main journals are still growing (MNRAS).
- All efforts are done to keep the quality of the process (see documentalist's work)
- Priority 1 journals : A&A, AJ, ApJ, ApJS, Natur, MNRAS, PASJ, PASP, Sci
- Priority 2 journals : Aca, Raa, ARep, AstL, BaltA, AN, NewA, NewAR, ATel, CBET, IAUC, IBVS, RMxAA

Number of references processed by SIMBAD by year 1995-2018





# Nomenclature

## The Keystone of SIMBAD

- Fundamental principle : **unicity**, a name corresponds to a unique object
- Building an identifier : **acronym** + **format**
  - e.g. **HD** 247377 or **2MASS** J05465186+3136536 or **Gaia** DR2 3445087280664517504
- Acronyms and formats are **encoded** in the database, and **controlled**
- An object type is linked automatically to the acronym
- Nomenclature follows the acceptance of an acronym by the community
- Dictionary of nomenclature contains more entries than SIMBAD
- Total number of acronyms in SIMBAD = 14,500

Challenge at the era of big data : minimize the number of new acronyms

- Encourage astronomers to follow IAU recommendations
- Avoid to rename sub-samples of objects that already have names.
- The nature of an object lies in its object type(s) and measurements, not in its name.



# Appraisal of lists of objects

## Selection of objects of interests : complementarity SIMBAD - VizieR

Two meetings per week involving astronomers and documentalists : 990 in 2018

→ Comments on each reference to optimize scientific content and processing

### Criteria for priority 1 : 70%

- Nature of the objects well characterized; rare objects
- Spectroscopy
- Known distance
- Membership
- Careful cross-identifications provided

### Criteria for low priority :

- Photometrically selected candidates
- Surveys without characterisation or/and cross-identifications
- No or poor coordinates





# Cross-identifications

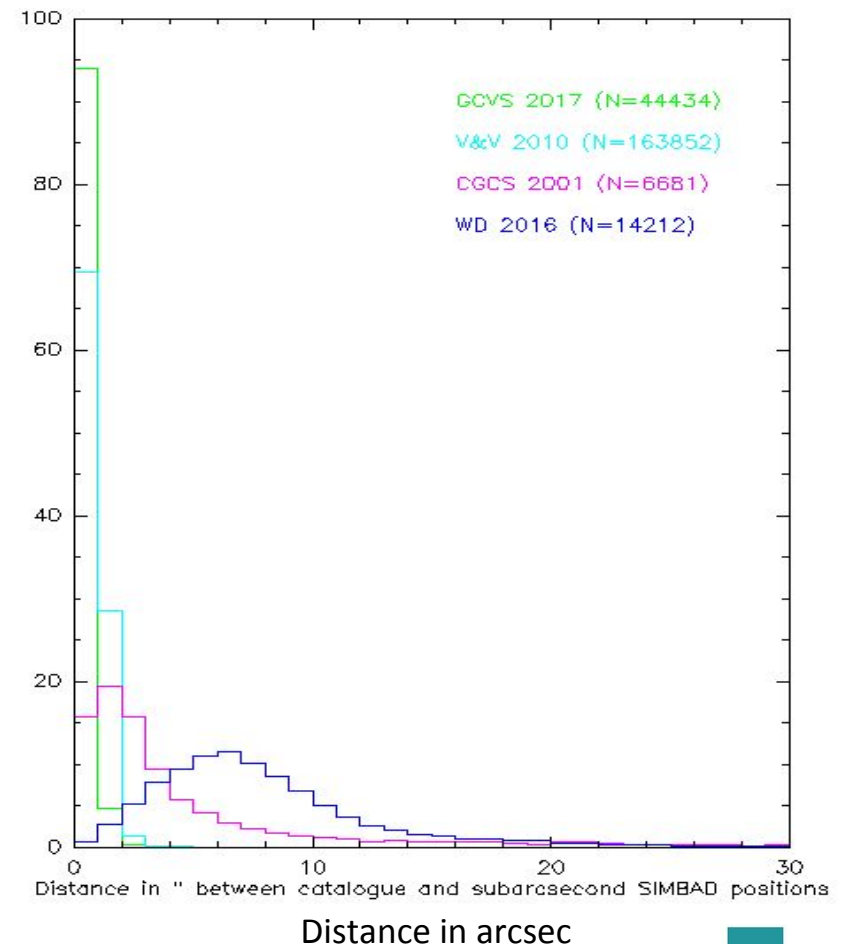
## One the highest added-value of SIMBAD

**Cross-identifications with COSIM** : → talk of the documentalists

- Multi-parameter software :  
coords, mags, HRV/z, PM, plx, size

**Special operations** :

- astronomers, engineers, or/and documentalists
- Xid SIMBAD - Gaia DR2, June 2018 : → 4,500,000  
(no neighbour within 3'', astrometry < 1'')
- More in 2018-2019 : → 700,000  
(HPM stars, crowded regions, astrometry ~ 1-3'')
- Historical objects with poor astrometry



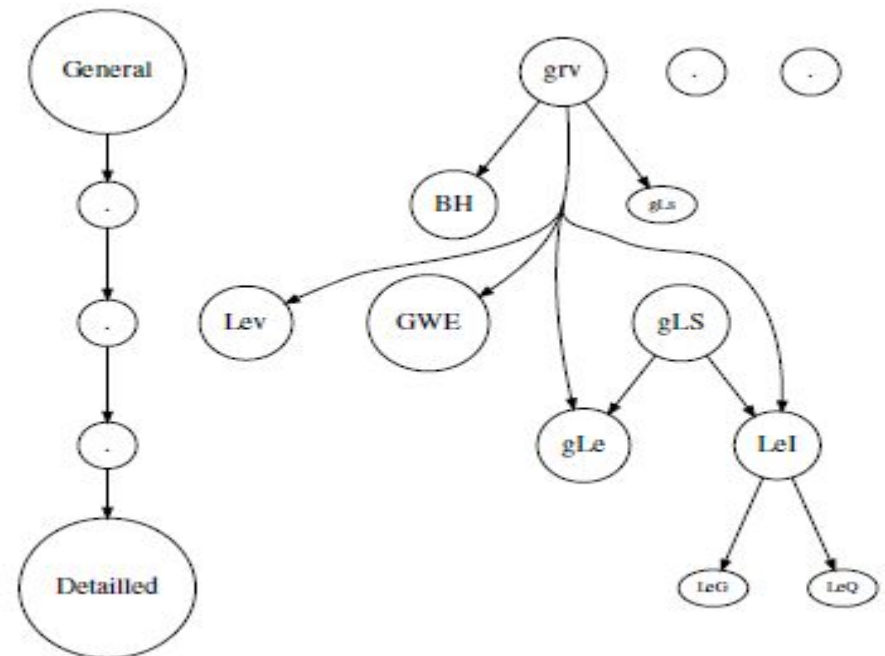
# Objects Types

## Reorganisation of the 230 objects types of SIMBAD

- Involved all the CDS astronomers
- Based on physical criteria, especially evolutionary stage for stars
- Full revision of the hierarchy, priority as main object type, and compatibilities

- Software implementation in progress :  
will improve the efficiency of COSIM.

- Example for Gravitation :



GRAVITATION-



# □ Statistics on the content

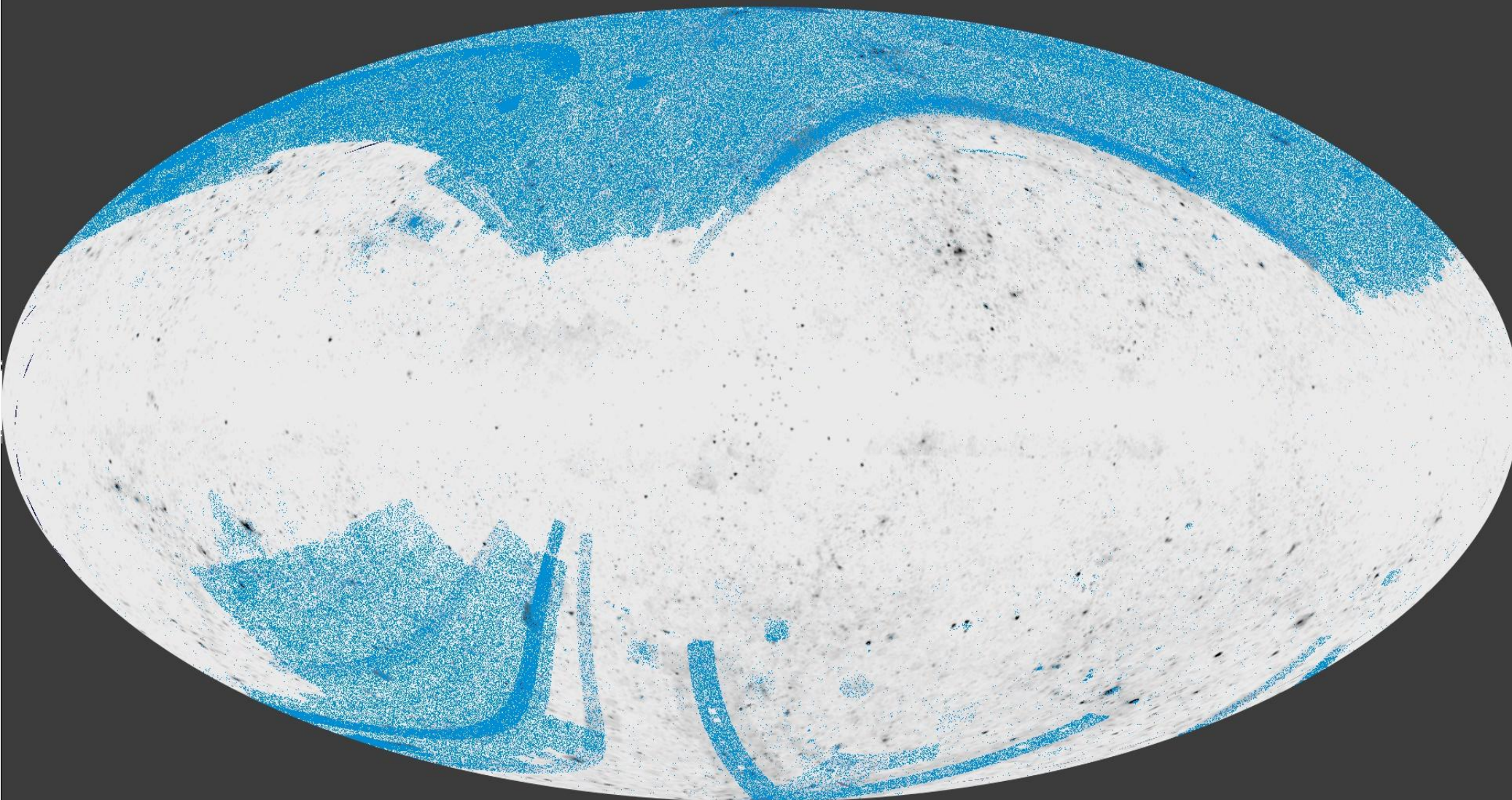
	Total	2018
Objects	10,979,000	+833,000
Identifiers	35,548,000	+7,200,000
References	364,900	+13,000
Acronyms	15,000	+560
All stars	5,580,000	
YSOs	57,400	
Eclipsing Binaries	539,000	
White dwarfs	39,000	
All galaxies	3,880,000	
QSOs	419,000	
AGNs	102,000	





# QSOs on the Sky

DM simbad-biblio otypes Galaxy

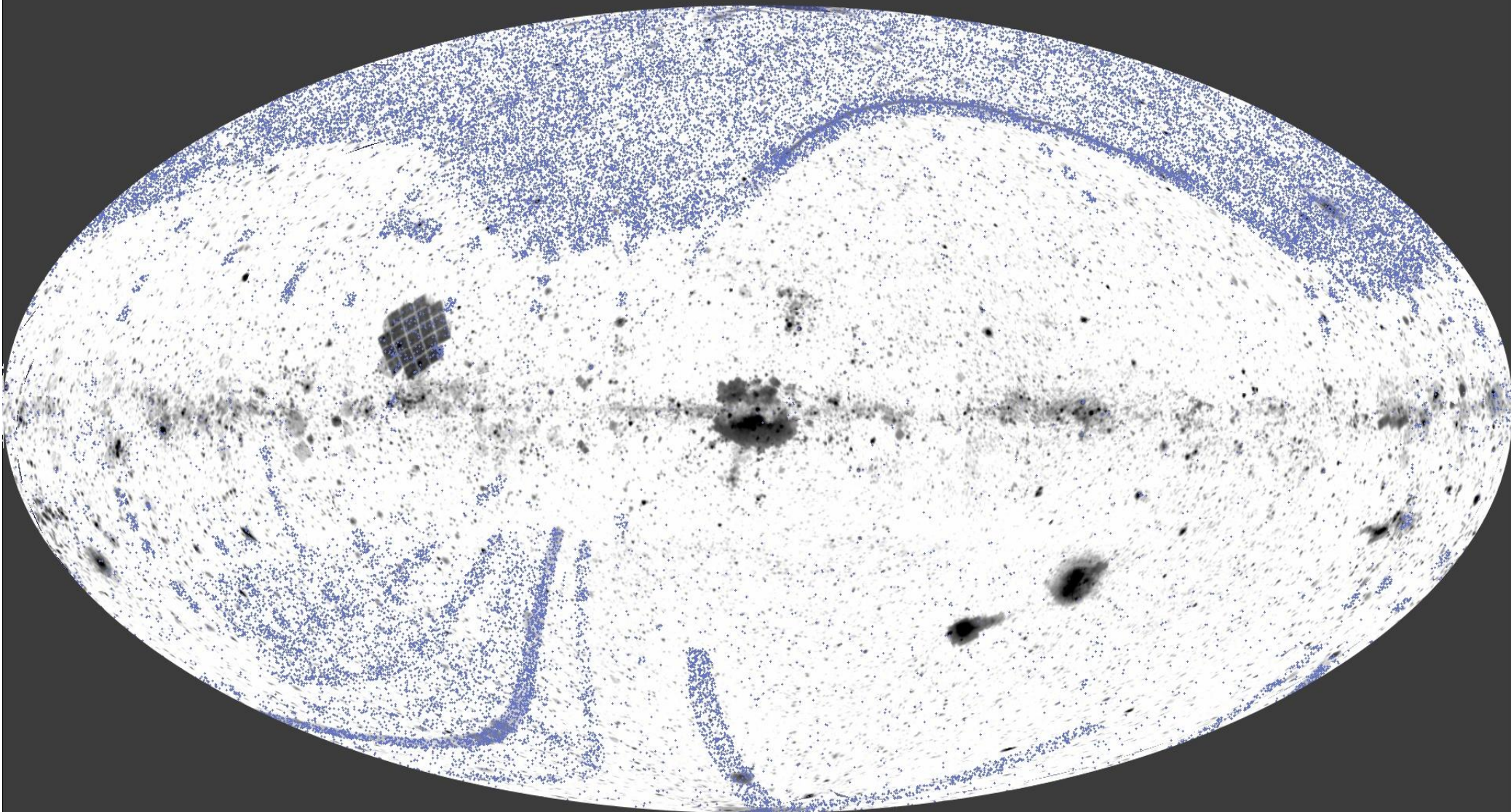






# White Dwarfs on the Sky

DM simbad-biblio otypes Star





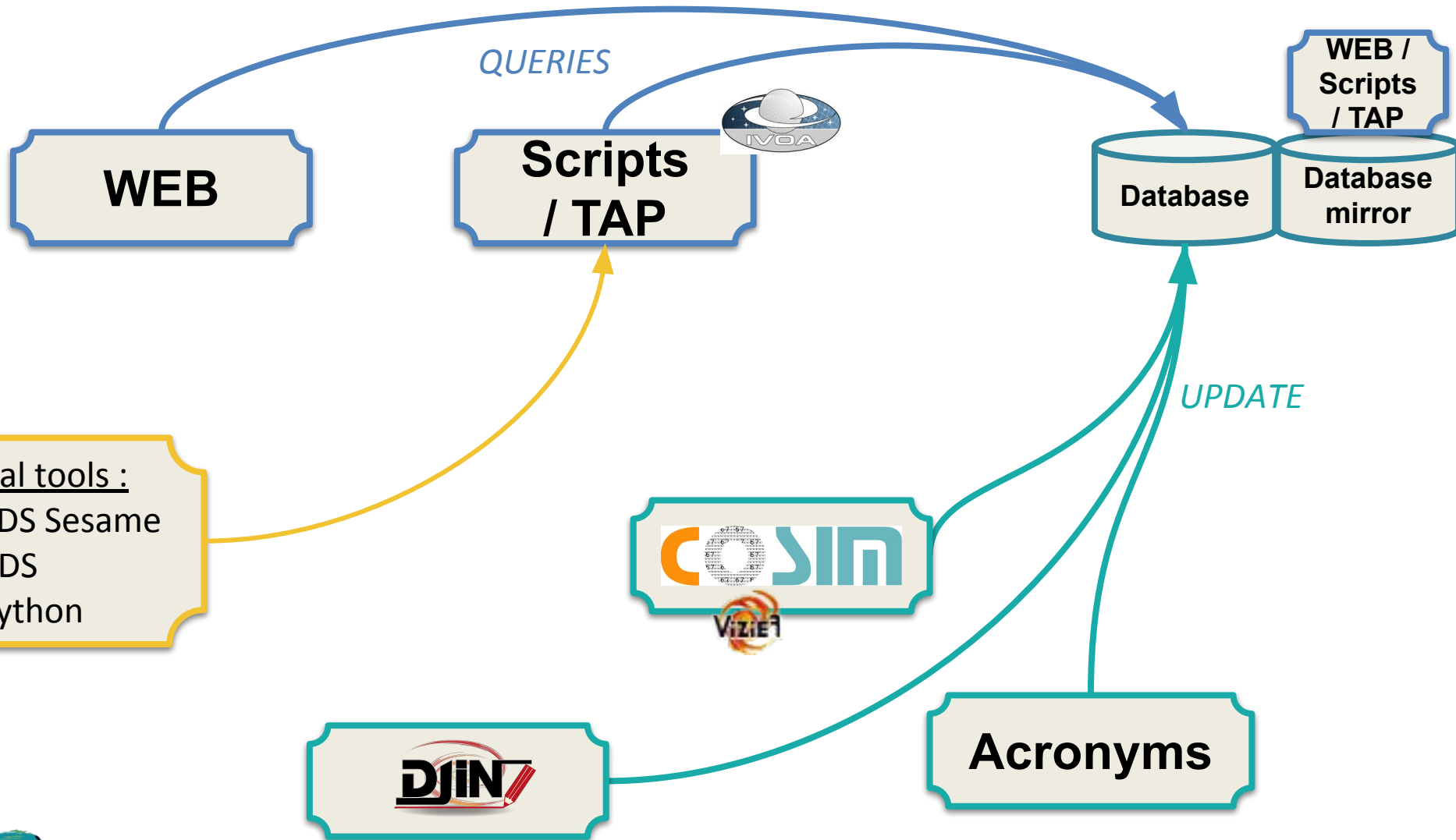


# Technical infrastructure

Anaïs Oberto, Gregory Mantelet





# Overview of SIMBAD tools



# Internal tools still in progress

2019ApJ...883...56R ApJ, volume 883, article 56, pages 1-6 published on the 20th of ... by The American Astronomical Society, doi:10.3847/1538-4357/ab3725

## The Next Generation Fornax Survey (NGFS). VI. The Alignment of Dwarf Galaxies in the Fornax Cluster

Rong Yu <sup>1</sup> , Puzia Thomas H. <sup>1</sup>, Eigenthaler Paul <sup>1</sup> , Ordenes-Briceño Yasna <sup>1,2</sup>, Taylor Matthew A. <sup>3</sup>, Muñoz Roberto P. <sup>1</sup>, Zhang Hongxin <sup>4,5</sup>, Galaz Gaspar <sup>1</sup>, Alamo-Martínez Karla <sup>1</sup>, Ribbeck Karen X. <sup>1</sup>, ... (9 more authors)

**Abstract**

Using the photometric data from the Next Generation Fornax Survey, we find a significant radial alignment among the Fornax dwarf galaxies. For the first time, we report that the radial alignment signal is stronger than that of non-nucleated ones at the  $2.4\sigma$  confidence level, and the dwarfs located in the region ( $R > R_{\text{vir}}/3$ ;  $R_{\text{vir}}$  is the Fornax virial radius) show a slightly stronger radial alignment signal than the region ( $R < R_{\text{vir}}/3$ ) at the  $1.5\sigma$  level. We also find that the significance of the radial alignment signal is independent of the luminosities or sizes of the dwarfs.

**Keywords:** galaxies: clusters: individual (Fornax), galaxies: dwarf, galaxies: elliptical and lenticular, galaxies: nuclei, galaxies: stellar content, surveys

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- 2. Alignments of the Fornax Dwarfs
  - 2.1. Photometry
  - 2.2. Radial Alignment Test
- 3. Discussion

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[Footnotes](#)

DJIN TEST - 2019ApJ...883...56R

File Name Identifier Search Configuration Help

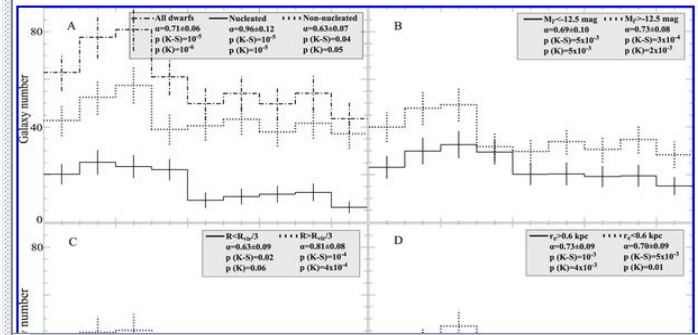
Journal: ApJ Volume: 883 Bibcode: 2019ApJ...883...56R

4 object names (8)  
Coma cluster (1)  
Fornax Cluster (5)  
Fornax dwarf galaxies (1)  
NGC 1399 (1)  
Text (1)

The two-dimensional surface brightness profile for each dwarf is studied with GALFIT (Peng et al. 2002), implementing a Sérsic profile by taking advantage of the iterative fitting method described in Eigenthaler et al. (2018); the best-fitting parameters, e.g., the magnitude, effective radius  $r_e$ , position (PA) and its error PA\_error, etc., are obtained. PAs in the  $g'$  and  $i'$  bands coincide with each other very well, yet the  $u'$ -band PAs of several dwarfs significantly deviate from their  $g'$ - and  $i'$ -band PAs. Since the  $g'$  and  $i'$  bands are more likely to indicate the stellar mass distribution while the  $u'$  band is probably affected by gas and current star formation, we prefer to use the  $i'$ -band PAs to test the alignments. The radial angles and PAs  $\theta$  of the dwarfs, used to quantitatively test the radial and primordial alignments, are then calculated from the  $i'$ -band PAs and locations of the dwarfs, as well as the PA of the BCG of Fornax, [Wiese & Keesen \(2010\)](#) (with axis ratio of  $b/a = 0.85$  and  $PA = 110^\circ$ ; Schubert et al. 2010).

### 2.2. Radial Alignment Test

We investigate the possible radial alignment signal for the Fornax dwarfs, abandoning the 94 with  $b/a \geq 0.8$  or large PA\_error  $> 10^\circ$ . The distribution of the radial angles  $\phi$  (RAD) of the dwarfs is shown as the dashed dotted histogram in panel (A) of Figure 1. We use the  $p$  values returned from the Kolmogorov-Smirnov (denoted as  $p(K-S)$ ) and the Kuiper test (denoted as  $p(K)$ ) to detect the deviation of RAD from a uniform distribution; analogous to the work of Niederste-Ostholt et al. (2010), we also utilize the ratio  $\alpha = 14$  between the numbers of galaxies with  $\phi < 30^\circ$  and  $\phi > 30^\circ$  to quantitatively assess the significance of the alignment signal (a uniform distribution corresponding to  $\alpha = 0.5$ , while the radial alignment corresponds to  $\alpha \gg 0.5$ ). We find that, for the entire Fornax dwarf sample,  $p(K-S) \sim 10^{-5}$ ,  $p(K) \sim 10^{-6}$ , and  $\alpha = 0.71 \pm 0.06$ , suggesting a radial alignment of the Fornax dwarfs. We also test the alignment of the seven Fornax UDGs; the ratio  $\alpha = 0.75 \pm 0.57$  indicates no significant radial alignment among the Fornax UDGs due to the large uncertainty. This result is inconsistent with the findings of Venhola et al. (2017), but different from that of UDGs in the Coma cluster (Yagi et al. 2018), where the member UDGs are found to be tidally stretched toward the BCG.

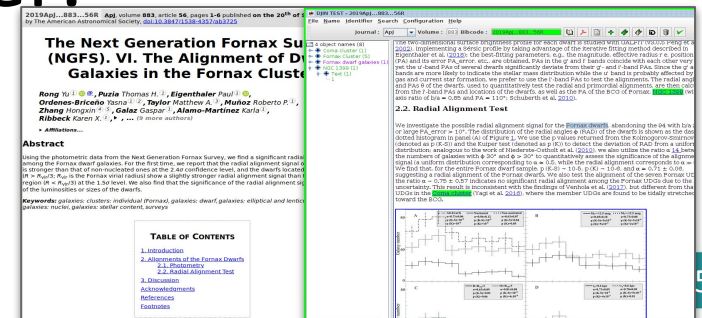


- DJIN evolution using publication in XML instead of PDF format



# Internal tools still in progress

- **DJIN** evolution using publication in **XML** instead of PDF format:
  - Easier, and more stable development
  - Conversion in our own format XCDS
  - Unique pipeline of input data with VizierR
  - Quite promising
  - Only IOP journals, ATel, ResearchNotes, A&A in study, MNRAS later.



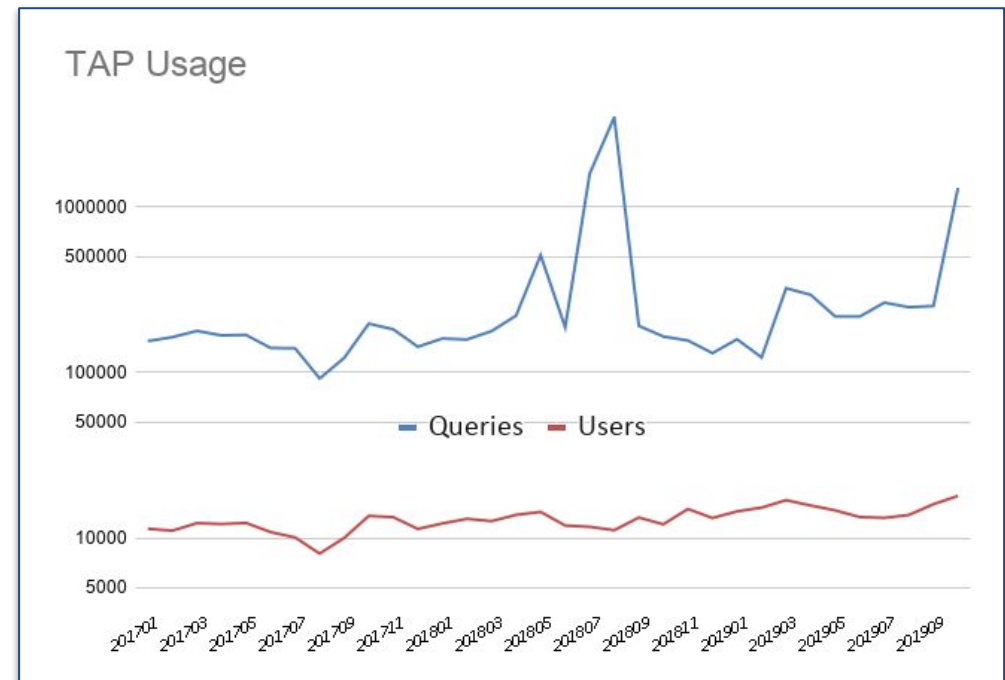
# ❑ Server still in progress

- **Object types** evolution using a more complex hierarchical structure:
  - Beginning of development
  - Add weight compatibility on object types for internal Xmatch.
- Hidden names to help users to find more easily objects with complex names (seen only internally).



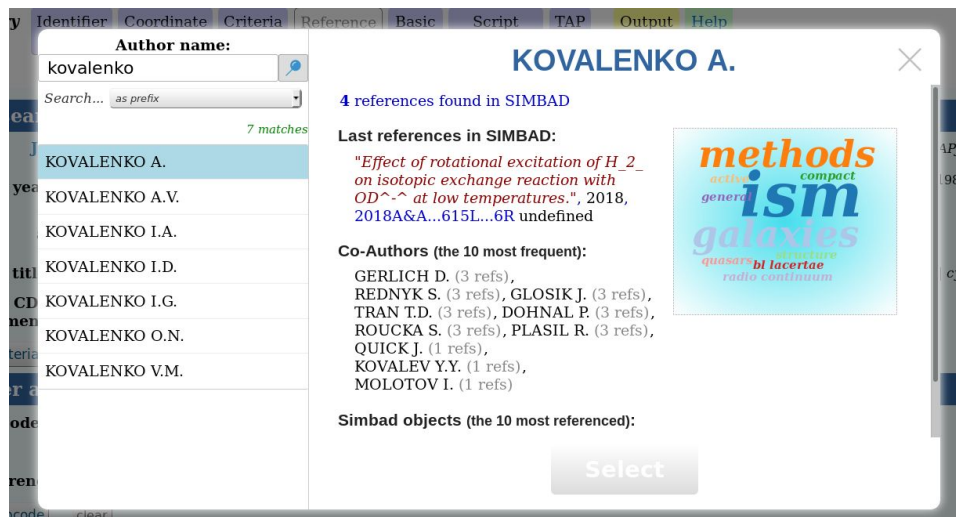
# □ Web interfaces still in progress

- **TAP** service need more user friendly interface to help people to use it:
  - VO Module in R&D
  - More integrated in SIMBAD web site

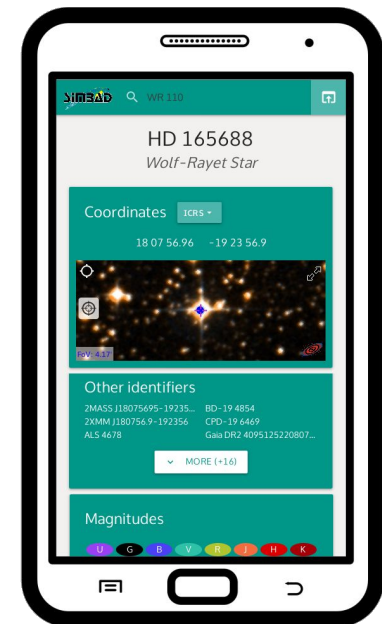


# □ Web interfaces still in progress

- Fast and flexible search authors interface to find linked objects.

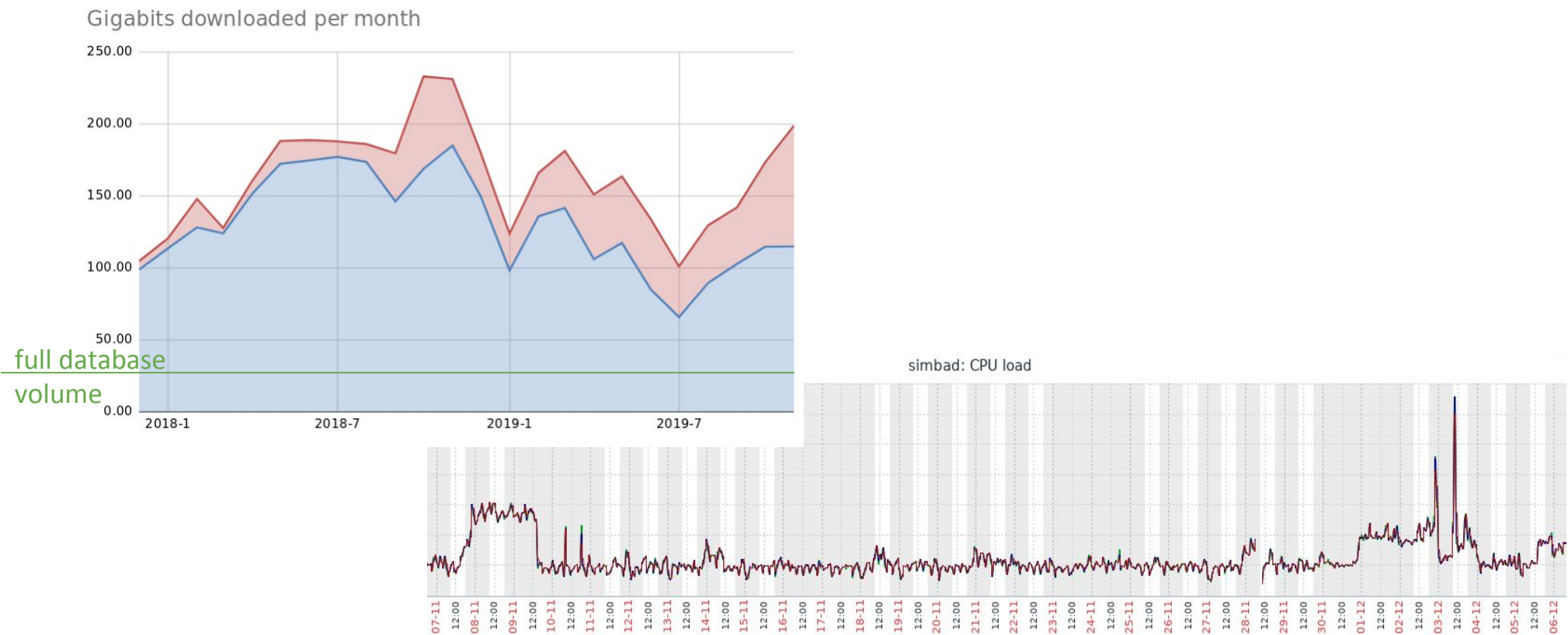


- SIMBAD Mobile in beta test (R&D).



# ☐ Infrastructure still in progress

- Duplication of SIMBAD service on a Virtual Machine to sustain instant high loading.





# □ Data mining visualisations

**The Universe as seen by the MNRAS in 2018:** objects linked by common publications.

