ExoplAn3T

The SSDC tool for exoplanetary science

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ARIEL-It Science Meeting
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Outline

Present day exoplanetary science

- More than 4000 exoplanets discovered so far (… and counting)
- 3000 exoplanetary systems
  - At least 1 out of 5 of them has multiplicity M > 1

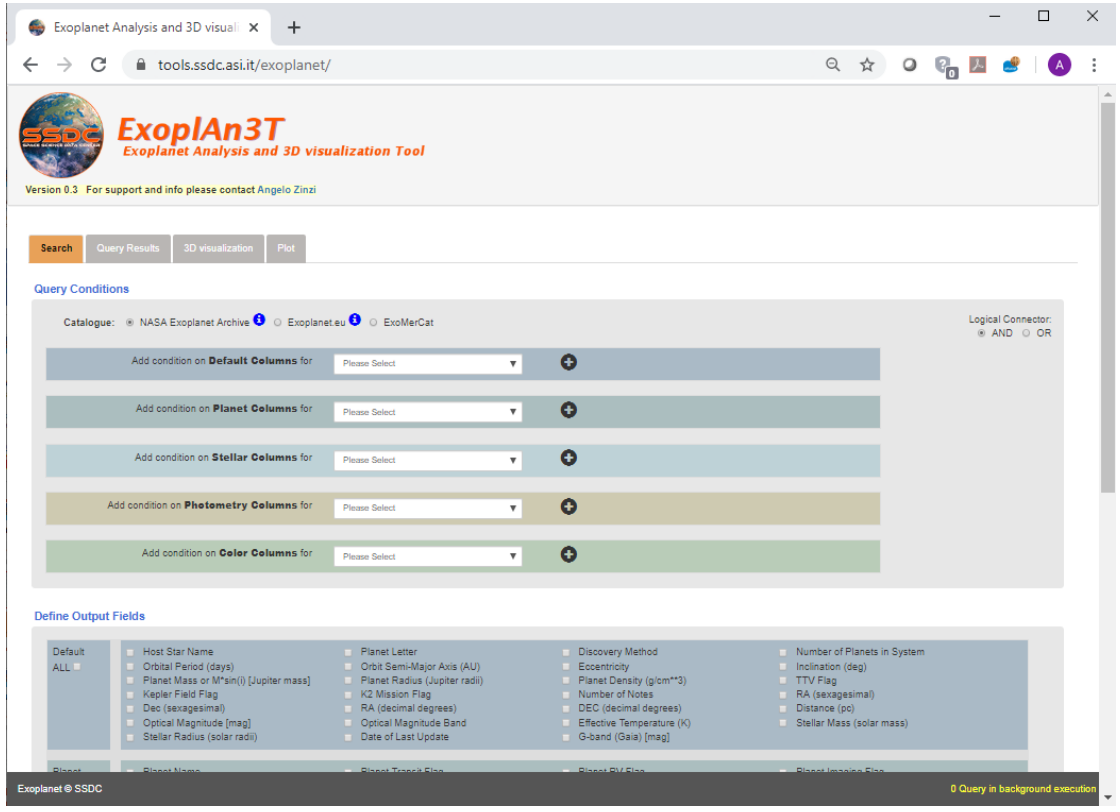
A detailed statistical study of these archives cannot be performed without dedicated tools!

Space Science Data Center

The ExoplAn3T tool

Exoplanetary Analysis and 3D Tool

https://tools.ssdc.asi.it/exoplanet/



Space Science Data Center

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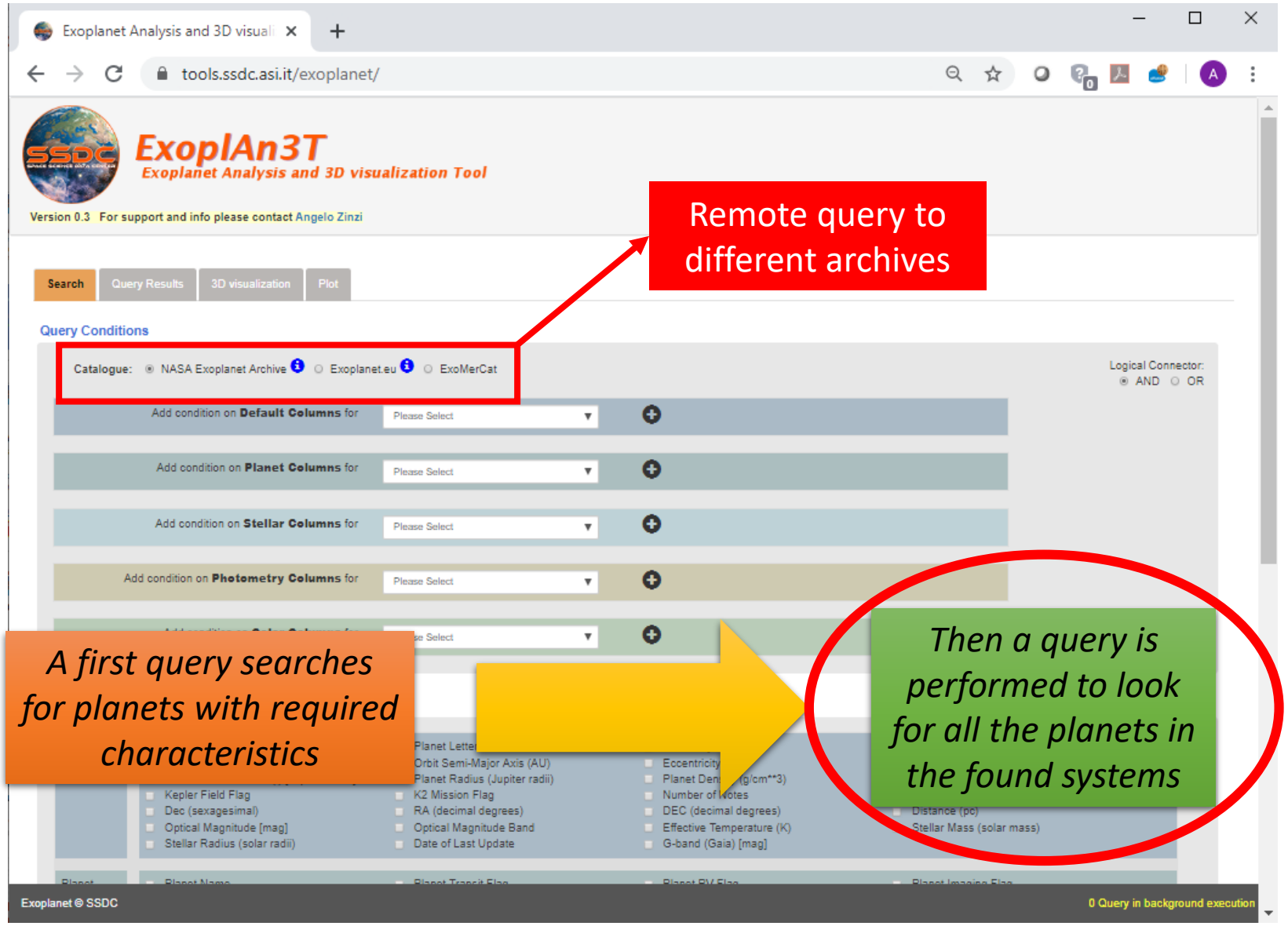


Remote query to different archives

A first query searches for planets with required characteristics

Then a query is performed to look for all the planets in the found systems

Output page

ExoplAn3T
Exoplanet Analysis and 3D visualization Tool

Version 1.1

angelo.zinzi (Logout)
Feedback

Search | Query Results | 3D visualization | Plot

1517386950304

Query: pl_pnum>=7

Show 10 entries Search:

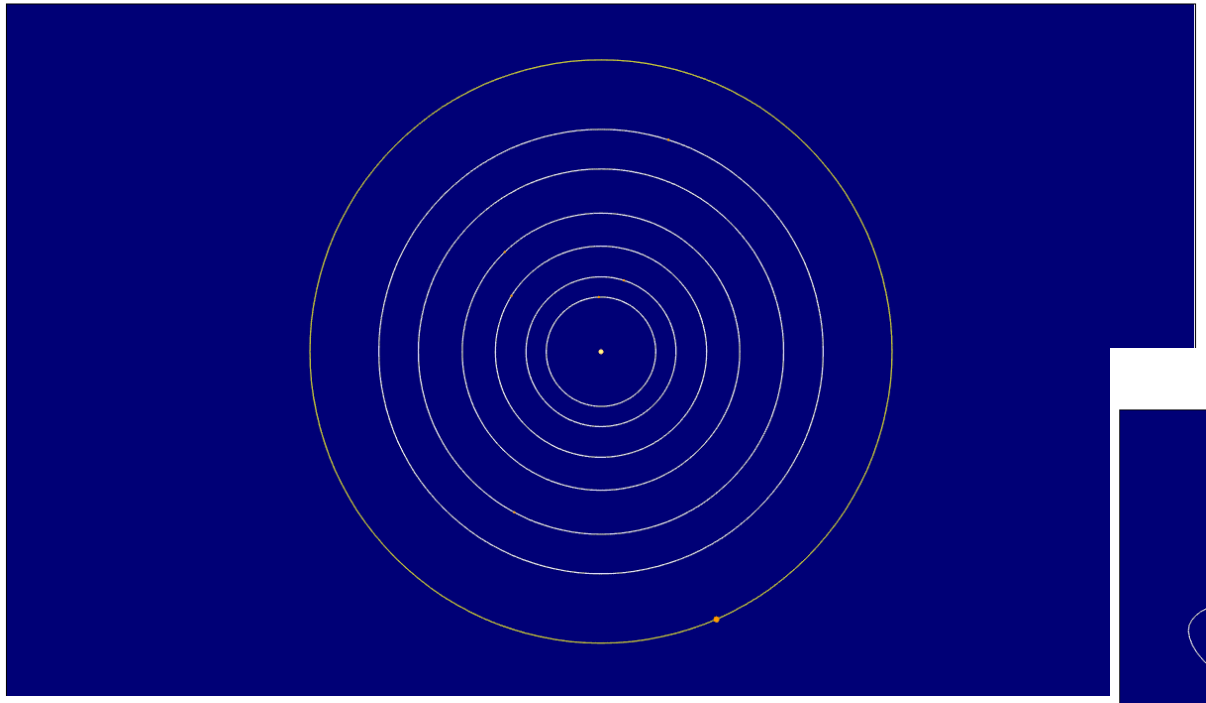
	Name	st_teff	pl_pnum
⊕	KOI-351	6080	8
⊖	TRAPPIST-1	2559	7

pl_name	pl_ratror	pl_ratdor	st_rad	pl_orbsmax	pl_orbeccen	pl_orbeccenerr1	pl_orbeccenerr2	pl_orbincl	pl_orbinclerr1	pl_orbinclerr2	pl_instrument
TRAPPIST-1 b		20.5	0.12	0.01111	0.081			89.65	0.22	-0.27	TRAPPISTCAM
TRAPPIST-1 c		28.08	0.12	0.01521	0.083			89.67	0.17	-0.17	TRAPPISTCAM
TRAPPIST-1 d		39.55	0.12	0.02144	0.07			89.75	0.16	-0.16	TRAPPISTCAM
TRAPPIST-1 e		51.97	0.12	0.02817	0.085			89.86	0.1	-0.12	Multiple Instruments
TRAPPIST-1 f		68.4	0.12	0.0371	0.063			89.68	0.034	-0.034	Multiple Instruments
TRAPPIST-1 g		83.2	0.12	0.0451	0.061			89.71	0.025	-0.025	Multiple Instruments
TRAPPIST-1 h	0.0588	109	0.12					89.76	0.05	-0.04	Multiple Instruments

Downloadable table to perform further analysis

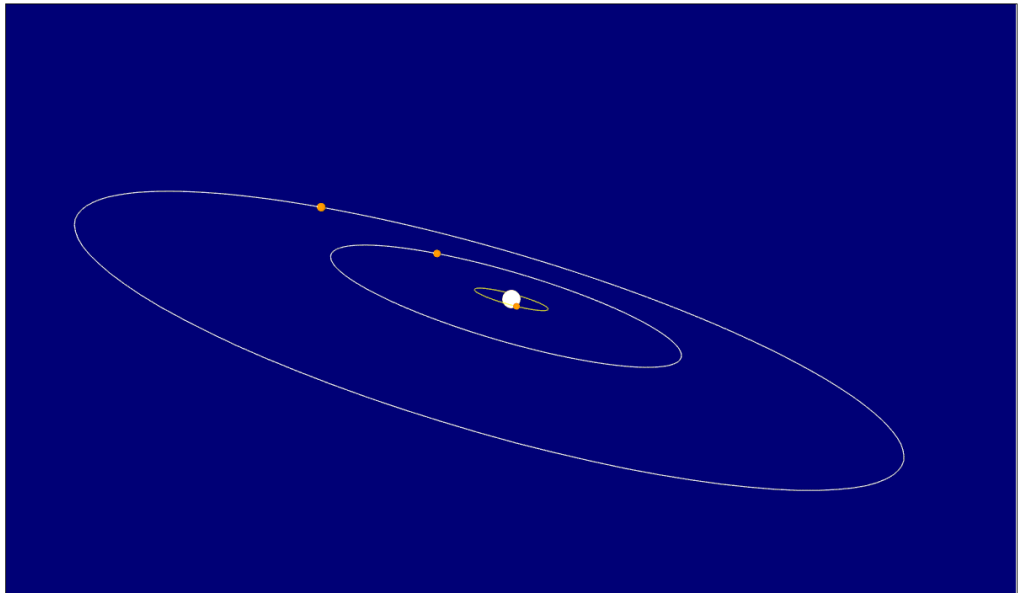
3D visualization

TRAPPIST-1



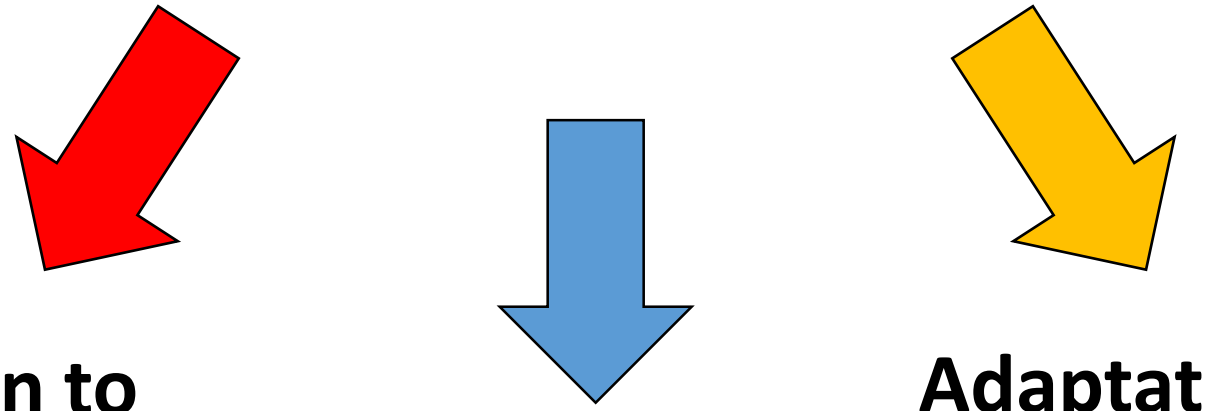
Visual analysis of the main features of the system

HD-3167



- Star color computed from temperature
- In scale star radius – planet orbits
- Planet radius magnified 20X
- Real orbital eccentricities and inclinations

Latest updates



Translation to Python 3

Also to speed up some queries, e.g. to ExoMerCat

Listed on EMAC / GSFC

Adaptation to new protocols

NASA Exoplanet Catalog recently changed its query protocol

Science with ExoplAn3T

Using the tool it is possible to perform statistical studies on multiple systems with desired architectures

A&A 605, L4 (2017)
DOI: 10.1051/0004-6361/201731595

Astronomy & Astrophysics

LETTER TO THE EDITOR

Anti-correlation between multiplicity and orbital properties in exoplanetary systems as a possible record of their dynamical histories

A. Zinzi[1,2] and D. Turrini[3,4]

A&A 636, A53 (2020)

Normalized angular momentum deficit: a tool for comparing the violence of the dynamical histories of planetary systems

D. Turrini[1], A. Zinzi[2] and J. A. Belinchon[3]

TASSEL project

An interdisciplinary pathway to the identification of solar-system analogs

PI Alessandro Sozzetti

Future works dedicated to Ariel

SSDC MAIN AIM

acquire, manage, process and distribute space mission data following FAIR principles (Findable, Accessible, Interoperable, Reusable).

SSDC uses international standards assuring both the long-term archive preservation and the interoperability with other data centers.

Space Science Data Center

Possibile contributions to Ariel through ExoplAn3t

- Big Data & Data Mining
  - Machine Learning
- Data Processing
  - Spectral retrieval
- Data Fusion (Multi-wavelength)
- Ingestion of other datasets
- Data Distribution (Virtual Observatory)
- Online analysis tools development
- Scientific community support
- Long-term data preservation
- Scientific missions mirroring and archive

A stronger collaboration inside the different WG we are involved in will be aimed at making valuable steps towards the best exploitation of ExoplAn3T for Ariel studies

Agenzia Spaziale Italiana

Thank you for the attention

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