

News Feature: The 10 parsec sample in the Gaia era

John I Davies

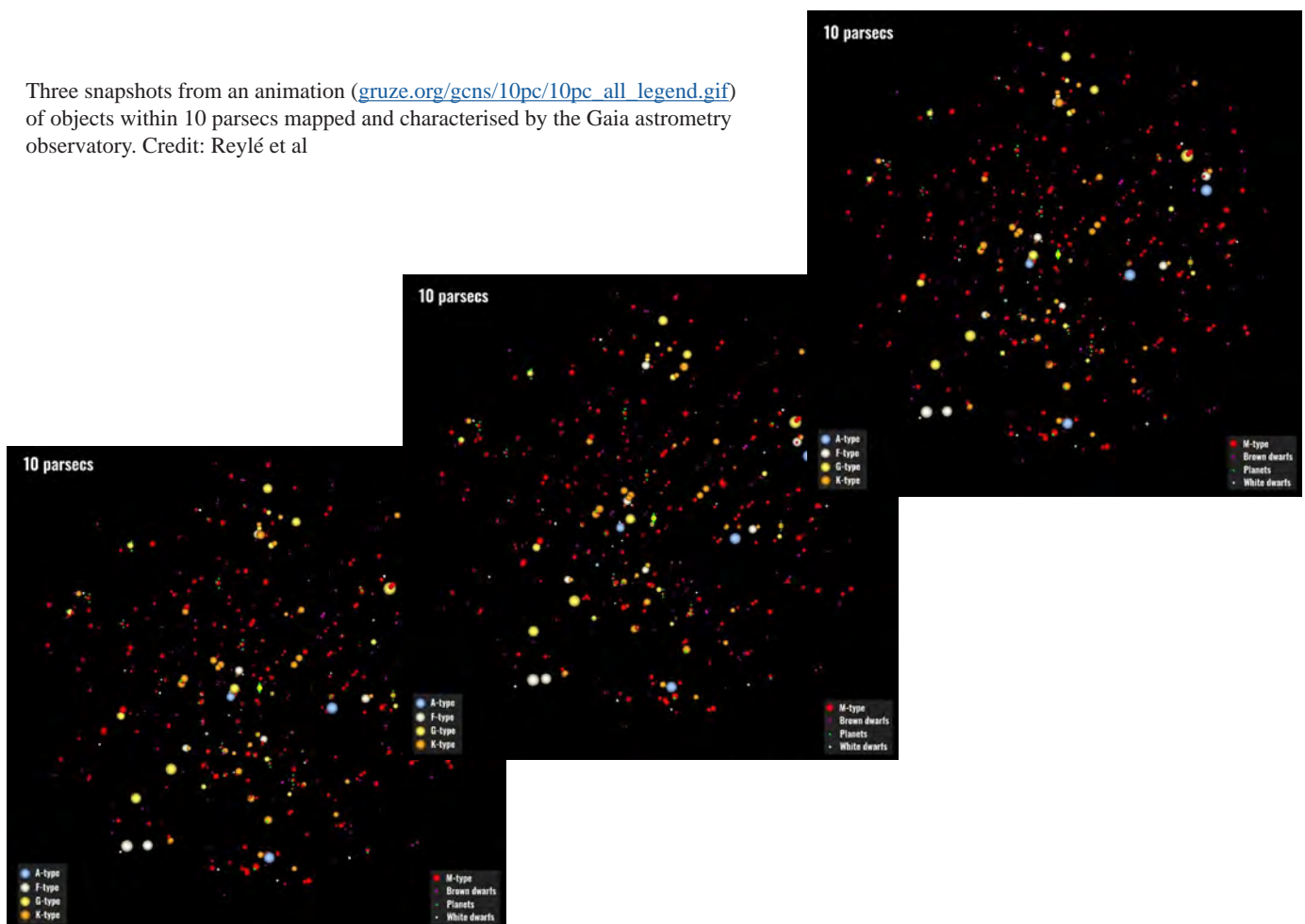
The Gaia astrometry observatory is a dual-telescope vehicle orbiting the Earth-Sun Lagrange 2 position (L2) which it will soon (we hope!) share with the James Webb Space Telescope. L2 is a favourite spot for astronomical missions and Gaia has mapped our interstellar neighbourhood to unprecedented accuracy. Here we introduce a recently organised set of results and a paper analysing them.

A recent paper, Reylé et al, *The 10 parsec sample in the Gaia era* [1] describes a nearer subset of the objects Gaia has found. A team including the lead author of the paper, Celine Reylé, has produced a corresponding online database of this subset [2]. This data is likely to prove a treasure trove for a significant proportion of Principium readers - astronomers both professional and amateur. A team including Marshall Eubanks and his colleagues are seeking collaborators to further refine this data. If you have time and expertise then contact John.Davies@i4is.org who can put you in touch.

And, of course, any initial exploration of nearby star systems is likely to be to the systems in this catalogue - see the log-log diagram later in this report.

Reylé et al, have also published data and some illustrative images of the results [3]. Here is a sample of them. We'll be reporting progress by Marshall and his colleagues in subsequent issues of Principium.

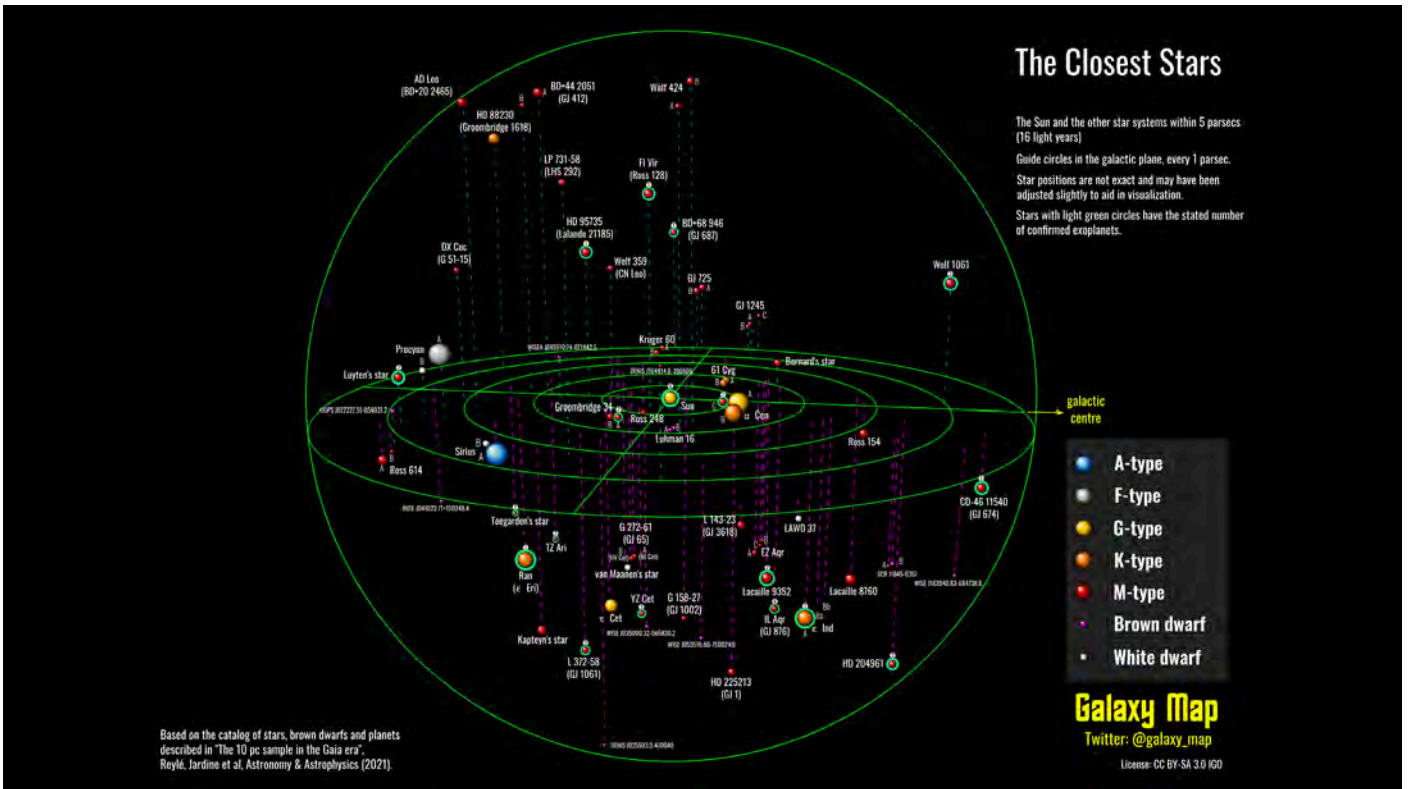
Three snapshots from an animation (gruze.org/gcns/10pc/10pc_all_legend.gif) of objects within 10 parsecs mapped and characterised by the Gaia astrometry observatory. Credit: Reylé et al



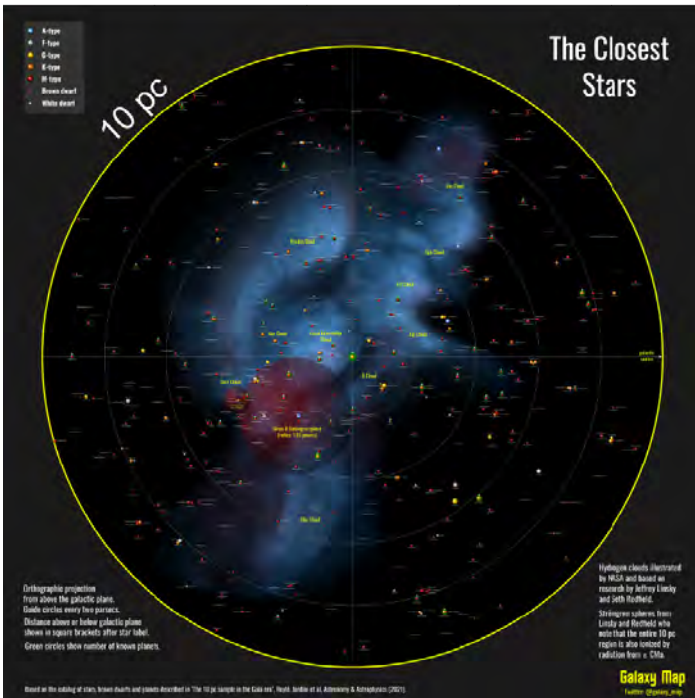
[1] *The 10 parsec sample in the Gaia era*, for epublication in Astronomy & Astrophysics, gu cds.inaf.it/GCNS/The10pcSample/The_10_parsec_sample_in_the_Gaia_era.pdf

[2] gu cds.inaf.it/GCNS/The10pcSample/

[3] gruze.org/gcns/10pc/resources

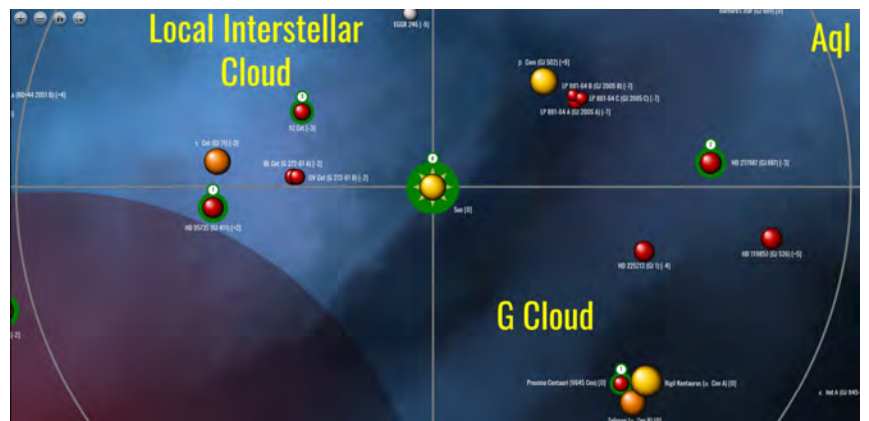


All star systems within 5 parsecs. Credit: Reylé et al gruze.org/gcns/10pc/resources



Two snapshots from a zoomable top down 10 parsecs map. Credit: Reylé et al gruze.org/galaxymap/10pc/

Ten parsecs is about 32 light years or 2 million AU.



Stars, brown dwarfs and exoplanets within 10 parsecs

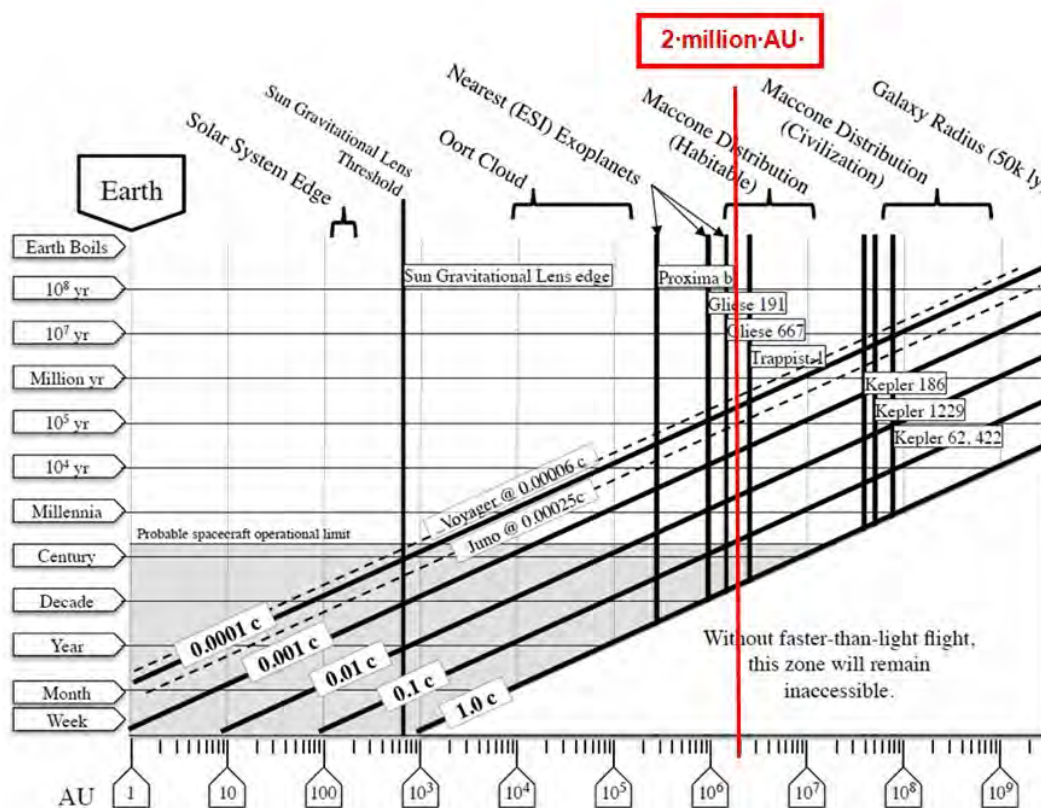
View the [The10pcSample.ReadMe.txt](#) file for more information on the data fields.
 Visit [the 10 pc resource page](#) for maps and other data visualisations.

NB_OBJ	NB_SYS	SYSTEM_NAME	OBJ_CAT	OBJ_NAME	RA	DEC	EPOCH	PARALLAX	PARALLAX_ERROR	PARALLAX_BIBCODE
1	1	alf Cen	LM	Proxima Cen	217.392321472009	-62.6760751167667	2016	768.066539187357	0.049872905	2020yCat.1350....0G
2	1	alf Cen	Planet	Proxima Cen b	217.392321472009	-62.6760751167667	2016	768.066539187357	0.049872905	FROM:ProximaCenC
3	1	alf Cen	*	alf Cen A	219.902058331708	-60.83399268831	2000	743	1.3	2016A&A...586A...90P
4	1	alf Cen	*	alf Cen B	219.896096289873	-60.8375275655841	2000	743	1.3	2016A&A...586A...90P
5	2	Barnard's Star	LM	Barnard's Star	269.448502525438	4.73942005111241	2016	546.975939730948	0.040116355	2020yCat.1350....0G
6	3	Luhman 16	BD	Luhman 16 A	162.308643668751	-53.3180447534979	2016	501.557	0.082	2018A&A...618A.111L
7	3	Luhman 16	BD	Luhman 16 B	162.308402229118	-53.3182778100269	2015.5	501.557	0.082	FROM:Luhman16A
8	4	WISEA J085510.74-071442.5	BD	WISEA J085510.74-071442.5	133.780984	-7.243932	2016.7	439	2.4	2021ApJS...253....7K
9	5	Wolf 359	LM	Wolf 359	164.10319030756	7.00272694098486	2016	415.179415678021	0.06837086	2020yCat.1350....0G
10	6	HD 95735	LM	HD 95735	165.830959675779	35.9486530326601	2016	392.752945438765	0.03206665	2020yCat.1350....0G
11	6	HD 95735	Planet	Lalande 21185 b	165.830959675779	35.9486530326601	2016	392.752945438765	0.03206665	FROM:HD95735
12	7	alf Cma	*	alf Cma A	101.287155333333	-16.7161158611111	2000	379.21	1.58	2007A&A...474...653V
13	7	alf Cma	WD	alf Cma B	101.286625520992	-16.7209325260232	2016	374.489588528761	0.2313347	2020yCat.1350....0G
14	8	G 272-61	LM	G 272-61 A	24.7715542934545	-17.9482998871293	2016	367.711896181477	0.74180114	2020yCat.1350....0G
15	8	G 272-61	LM	G 272-61 B	24.7716742082119	-17.9476828600085	2016	373.844312268399	0.50087124	2020yCat.1350....0G

snapshot of - Searchable and sortable data table downloadable in different formats <https://gruze.org/10pc/>

Accessibility of the 10 parsec sphere

The 10 parsec sphere = 2 million AU (about 206,000 AU per parsec)



How far can we reach in the 10 parsec sphere? To appreciate the distances and times involved we need to think in powers of ten.

This log-log diagram is adapted from the “Maccone Distribution” in C Maccone, *The Statistical Drake Equation*, 59th International Astronautical Congress, Glasgow, 2008.