
Supplementary information

Past, present and future stars that can see Earth as a transiting exoplanet

In the format provided by the
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Stars that can see Earth transit in the ± 5000 -year period. Table 1 lists all characteristics for stars that can see Earth transit in the ± 5000 -year period, sorted by distance from the Sun. We also cross-matched our full sample against literature estimates of mass, effective temperature, radii, bolometric luminosity, metallicity, and $\log g$ for Gaia sources. Respective catalog references for the parameter are noted in Table 1 and Table 2.

Exoplanet host stars that can see Earth transit in the ± 5000 -year period. Table 2 lists the characteristics of the seven known stars that can see Earth transit in the ± 5000 -year period, that are known exoplanet host stars, sorted by distance from the Sun.

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Authors: Lisa Kaltenegger & Jacqueline Faherty

Table: 1: Characteristics of Stars that can see Earth transit in the ± 5000 -year period.

Byte-by-byte Description of file: datafile.txt

Bytes	Format	Units	Label	Explanations
1- 22	I22	---	SOURCE-ID	Gaia EDR3 source ID
24- 36	F13.9	deg	RA	Right Ascension ep 2016.0
38- 48	F11.9	deg	E_RA	Uncertainty in Right Ascension ep 2016.0
50- 62	F13.9	deg	DEC	Declination ep 2016.0
64- 74	F11.9	deg	E_DEC	Uncertainty in Declination ep 2016.0
76- 87	F12.8	mas	PARALLAX	Parallax
89- 99	F11.9	mas	E_PARALLAX	Parallax Error
101-106	F6.3	pc	DISTANCE	1 over parallax distance
108-122	F15.9	mas/yr	PMRA	Proper Motion in Right Ascension
124-134	F11.9	mas/yr	E_PMRA	Proper Motion in Right Ascension Error
136-150	F15.9	mas/yr	PMDEC	Proper Motion in Declination
152-162	F11.9	mas/yr	E_PMDEC	Proper Motion in Declination Error
164-173	F10.7	mag	PHOT-G-MEAN-MAG	Gaia G Band magnitude
175-186	F12.6	---	PHOT-G-MEAN-FLUX-OVER-ERROR	Gaia G Band flux to flux error ratio
188-197	F10.7	mag	PHOT-BP-MEAN-MAG	Gaia BP Band magnitude
199-210	F12.7	---	PHOT-BP-MEAN-FLUX-OVER-ERROR	Gaia BP Band flux to flux error ratio
212-221	F10.7	mag	PHOT-RP-MEAN-MAG	Gaia RP Band magnitude
223-234	F12.7	---	PHOT-RP-MEAN-FLUX-OVER-ERROR	Gaia RP Band flux to flux error ratio
236-246	F11.8	---	RUWE	Renormalised Error
248-252	I5	yr	START-.264	Years from 2016 epoch when the star enters the ETZ
254-255	I2	yr	E_START-.264	Uncertainty on ETZ entrance
257-261	I5	yr	END-.264	Years from 2016 epoch when the star exits the ETZ
263-265	I3	yr	E_END-.264	Uncertainty on ETZ exit
267-271	I5	yr	TOTAL-.264	Total time a star spends in the ETZ
273-278	A6	---	When-.264	Note whether it is in the ETZ in the Past, Future or Both
280-282	A3	---	BOTH-ETZ?	Note of whether it is in both ETZ and rETZ
284-288	I5	yr	START-.162	Years from 2016 epoch when the star enters the rETZ
290-292	I3	yr	E_START-.162	Uncertainty on rETZ entrance
294-298	I5	yr	END-.162	Years from 2016 epoch when the star exits the rETZ
300-302	I3	yr	E_END-.162	Uncertainty on rETZ exit
304-308	I5	yr	TOTAL-.162	Total time a star spends in the rETZ
310-315	A6	---	When-.132	Note whether it is in the rETZ in the Past, Future or Both

317-324	F8.2	K	TEFF	Effective temperature
326-333	F8.2	K	E_TEFF	Effective temperature uncertainty
335-335	I1	---	TEFF-REF	Effective temperature reference
337-344	F8.6	solMass	MASS	Mass
346-351	F6.4	solMass	E_MASS	Mass uncertainty
353-353	I1	---	MASS-REF	Mass reference
355-360	F6.4	solRad	RADIUS	Radius
362-367	F6.4	solRad	E_RADIUS	Radius error
369-369	I1	---	RADIUS-REF	Radius reference
371-381	A11	solLum	LBOL	Bolometric luminosity
383-393	A11	solLum	E_LBOL	Bolometric luminosity uncertainty
395-395	I1	---	LBOL-REF	Bolometric luminosity reference
397-405	A9	---	METALLICITY	Metallicity
407-412	F6.4	---	E_METALLICITY	Metallicity uncertainty
414-414	I1	---	METALLICITY-REF	Metallicity reference
416-423	F8.6	cm/s^2	LOGG	Log g
425-432	A8	cm/s^2	E_LOGG	Log g uncertainty
434-434	I1	---	LOGG-REF	Log g reference
436-437	A2	---	SpT	SpT Estimate from Gaia CMD position

References:

- 1=Stassun, K. G., Oelkers, R. J., Paegert, M., et al. 2019, AJ,158, 138
2=Muirhead, P. S., Dressing, C. D., Mann, A. W., et al. 2018 AJ, 155, 180
3=Anders, F., Khalatyan, A., Chiappini, C., et al. 2019, A&A, 628, A94
4=Cifuentes, C., Caballero, J. A., Cortés-Contreras, M., et al. 2020, A&A, 642, A115
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Table: 2: Characteristics of Exoplanet Host Stars that can see Earth transit in the +/-5000-year period.

Byte-by-byte Description of file: datafile.txt

Bytes	Format	Units	Label	Explanations
1- 15	A15	---	EXOPLANET-NAME	Common Name of Exoplanet Host Star
17- 35	I19	---	SOURCE-ID	Gaia EDR3 source ID
37- 48	F12.8	deg	RA	Right Ascension ep 2016.0
50- 60	F11.9	deg	E_RA	Uncertainty in Right Ascension ep 2016.0
62- 74	F13.9	deg	DEC	Declination ep 2016.0
76- 86	F11.9	deg	E_DEC	Uncertainty in Declination ep 2016.0
88- 99	F12.8	mas/yr	PMRA	Proper Motion in Right Ascension
101-111	F11.9	mas/yr	E_PMRA	Proper Motion in Right Ascension Error
113-125	F13.8	mas/yr	PMDEC	Proper Motion in Declination
127-137	F11.9	mas/yr	E_PMDEC	Proper Motion in Declination Error
139-152	F14.8	mas	PARALLAX	Parallax
154-164	F11.9	mas	E_PARALLAX	Parallax Error
166-175	F10.7	pc	DISTANCE	1 over parallax distance
177-186	F10.5	yr	START-.264	Years from 2016 epoch when the star enters the ETZ

188-196	F9.6	yr	E_START-.264	Uncertainty on ETZ entrance
198-208	F11.6	yr	END-.264	Years from 2016 epoch when the star exits the ETZ
210-218	F9.6	yr	E_END-.264	Uncertainty on ETZ exit
220-229	F10.5	yr	TOTAL-.264	Total time a star spends in the ETZ
231-240	F10.8	---	BOTH-ETZ?	Note of whether it is in both ETZ and rETZ
242-246	I5	yr	START-.162	Years from 2016 epoch when the star enters the rETZ
248-248	I1	yr	E_START-.162	Uncertainty on rETZ entrance
250-253	I4	yr	END-.162	Years from 2016 epoch when the star exits the rETZ
255-255	I1	yr	E_END-.162	Uncertainty on rETZ exit
257-261	I5	yr	TOTAL-.162	Total time a star spends in the rETZ
263-265	A3	---	RUWE	Renormalised Error
267-271	I5	---	PHOT-G-MEAN-MAG	Gaia G Band magnitude
273-273	I1	mag	PHOT-G-MEAN-FLUX-OVER-ERROR	Gaia G Band flux to flux error ratio
275-279	I5	---	PHOT-BP-MEAN-MAG	Gaia BP Band magnitude
281-281	I1	mag	PHOT-BP-MEAN-FLUX-OVER-ERROR	Gaia BP Band flux to flux error ratio
283-286	I4	---	PHOT-RP-MEAN-MAG	Gaia RP Band magnitude
288-297	F10.8	mag	PHOT-RP-MEAN-FLUX-OVER-ERROR	Gaia RP Band flux to flux error ratio
299-302	I4	---	TEFF	Effective temperature
304-306	I3	K	E_TEFF	Effective temperature uncertainty
308-308	I1	K	TEFF-REF	Effective temperature reference
310-315	F6.4	solMass	MASS	Mass
317-322	F6.4	solMass	E_MASS	Mass uncertainty
324-324	I1	---	MASS-REF	Mass reference
326-331	F6.4	solRad	RADIUS	Radius
333-338	F6.4	solRad	E_RADIUS	Radius error
340-340	I1	---	RADIUS-REF	Radius reference
342-352	A11	solLum	LBOL	Bolometric luminosity
354-364	A11	solLum	E_LBOL	Bolometric luminosity uncertainty
366-366	I1	---	LBOL-REF	Bolometric luminosity reference
368-376	F9.6	---	METALLICITY	Metallicity
378-377	I0	---	E_METALLICITY	Metallicity uncertainty
379-379	I1	---	METALLICITY-REF	Metallicity reference
381-386	F6.4	cm/s^2	LOGG	Log g
388-393	F6.4	cm/s^2	E_LOGG	Log g uncertainty
395-395	I1	---	LOGG-REF	Log g reference

References:

- 1=Stassun, K. G., Oelkers, R. J., Paegert, M., et al. 2019, AJ,158, 138
- 2=Muirhead, P. S., Dressing, C. D., Mann, A. W., et al. 2018 AJ, 155, 180
- 3=Anders, F., Khalatyan, A., Chiappini, C., et al. 2019, A&A, 628, A94
- 4=Cifuentes, C., Caballero, J. A., Cortes-Contreras, M., et al. 2020, A&A, 642, A115