

Forthcoming mutual events of planets and astrometric radio sources

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Computations are made at the Pulkovo Observatory making use of the EPOS software package (<http://www.gao.spb.ru/personal/neo/ENG/ESUPP/main.htm>).

If you use these data please include the following references:

Malkin Z. M., L'vov V. N., Tsekmejster S. D. (2009), Forthcoming Close Angular Approaches of Planets to Radio Sources and Possibilities to Use Them as GR Tests. *Solar System Research*, v. 43, No. 4, pp. 313-318.

L'vov V., Malkin Z., Tsekmeister S. (2010), Forthcoming Occultations of Astrometric Radio Sources by Planets. In: D. Behrend, K. D. Baver (Eds.), *IVS 2010 General Meeting Proceedings*, NASA/CP-2010-215864, pp. 320-324.

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Occultations of astrometric radio sources by planets
(*E* – elongation)

Planet	Date Y M D	Source	α, δ (J2000.0)		<i>E</i>	Region of visibility
			h m s	° ' "		
Venus	2012 12 24.4	1631–208	16 34 30	–20 58 26	23W	S. America, Antarctic, Africa
Mercury	2014 07 30.2	0750+218	07 53 53	+21 46 02	11W	Europe
Venus	2015 08 06.8	0947+064	09 50 03	+06 15 04	15E	America
Jupiter	2016 04 10.4	1101+077	11 04 24	+07 30 53	144E	N. America, Australia, SE Asia
Venus	2020 01 16.7	2220–119	22 22 56	–11 44 26	38E	S. America, Africa , Europe
Venus	2020 07 17.7	0446+178	04 49 13	+17 54 32	42W	America
Mercury	2022 11 14.7	1529–195	15 32 08	–19 41 44	4E	S. America, Antarctic
Jupiter	2025 09 18.6	0725+219	07 28 21	+21 53 06	65W	America
Mercury	2027 03 21.7	2220–119	22 22 56	–11 44 26	27W	N. America
Saturn	2028 10 24.8	0223+113	02 25 42	+11 34 25	173W	by ring: Asia, Europe, N. Africa
Mercury	2029 01 14.3	1958–179	20 00 57	–17 48 58	5E	Australia , Antarctic, S. Africa
Venus	2029 02 28.2	2221–116	22 24 08	–11 26 21	6W	Africa , Australia, SE Asia
Mercury	2029 04 16.1	0243+181	02 46 12	+18 23 30	19E	Asia, N. America
Mercury	2029 12 27.9	1858–212	19 01 04	–21 12 01	8E	S. America, Australia
Mercury	2030 02 27.6	2208–137	22 11 24	–13 28 10	9W	S. America, Antarctic, S. Africa
Jupiter	2033 02 04.2	2104–173	21 07 27	–17 08 10	1W	Antarctic, Australia
Mercury	2033 05 13.6	0346+209	03 49 45	+21 04 46	7E	S. America, Africa
Venus	2034 09 15.2	1346–168	13 48 59	–17 04 06	40E	Australia
Mercury	2035 03 23.2	2321–065	23 23 39	–06 17 59	13W	Asia
Venus	2035 07 03.3	0558+234	06 01 47	+23 24 53	10W	Europe, Asia
Mercury	2035 10 17.8	1228–008	12 30 55	–01 08 50	16W	S. America
Venus	2037 01 03.8	1734–228	17 37 02	–22 51 55	19W	Australia , Antarctic, S. America
Mercury	2037 10 15.1	1346–109	13 49 03	–11 10 01	8E	Asia, Australia
Mercury	2038 10 30.5	1545–226	15 48 50	–22 51 03	24E	Europe
Venus	2039 03 05.2	0058+058	01 01 15	+06 05 45	33E	Asia
Mars	2039 06 21.9	0156+105	01 59 34	+10 47 06	58W	Asia, N. America
Mercury	2039 11 04.7	1456–179	14 59 29	–18 10 45	6E	S. America, Australia
Venus	2040 11 04.6	1721–251	17 24 31	–25 12 18	40E	S. America, Europe, Africa
Mercury	2042 03 08.4	2208–137	22 11 24	–13 28 10	18W	Europe
Jupiter	2043 02 01.1	1734–228	17 37 02	–22 51 55	47W	Antarctic, Asia, Australia
Venus	2043 02 09.1	1825–214	18 28 19	–21 23 39	43W	Asia
Venus	2043 02 15.6	1858–212	19 01 04	–21 12 01	42W	America
Venus	2043 02 17.7	1908–211	19 11 54	–21 02 44	42W	America, Australia
Mercury	2044 11 08.7	1623–243	16 27 00	–24 26 40	23E	S. America, Antarctic
Venus	2045 02 07.4	2042–191	20 45 24	–18 58 54	10W	Antarctic
Jupiter	2045 09 24.4	2221–116	22 24 08	–11 26 21	152E	America, Australia , Asia
Mercury	2047 06 04.4	0558+234	06 01 47	+23 24 53	17E	Asia, Australia
Mercury	2047 08 09.3	0923+171	09 25 50	+16 58 12	3E	Asia, Australia
Venus	2048 10 31.6	1701–246	17 05 01	–24 45 10	39E	S. America, Antarctic, Africa
Venus	2049 01 13.5	2243–081	22 45 49	–07 55 19	47E	Europe, Asia
Mercury	2049 08 15.0	1115+028	11 17 48	+02 31 53	27E	N. America
Venus	2049 11 02.2	1333–082	13 36 08	–08 29 52	14W	Africa , Antarctic
Mercury	2049 12 22.8	1842–220	18 45 40	–22 00 37	10E	Antarctic, S. America

Apparent close approaches of Jupiter to astrometric radio sources
(d – angular distance between planet and radio source, r – planet radius, E – elongation)

Date Y M D	Source	α, δ (J2000)		d "	r "	E °
		h m s	° ' "			
2011 07 03.6	0210+119	02 13 05	+12 13 11	341	19	66W
2011 08 16.8	0229+131	02 31 46	+13 22 55	488	21	104W
2011 09 13.1	0229+131	02 31 46	+13 22 55	149	23	130W
2011 11 27.2	0156+105	01 59 34	+10 47 06	285	24	147E
2012 02 04.0	0201+113	02 03 47	+11 34 45	490	19	78E
2012 02 20.3	0210+119	02 13 05	+12 13 11	342	18	64E
2012 04 22.5	0300+162	03 03 15	+16 26 19	115	17	16E
2013 02 28.1	0420+210	04 23 02	+21 08 02	216	20	88E
2013 03 29.5	0435+217	04 38 56	+21 53 10	563	20	63E
2013 10 23.0	0723+219	07 26 14	+21 53 20	123	20	100W
2013 11 07.2	0725+219	07 28 21	+21 53 06	388	21	114W
2013 11 22.1	0723+219	07 26 14	+21 53 20	351	22	130W
2014 07 26.1	0814+201	08 17 05	+19 58 43	488	16	1W
2014 08 22.8	0839+187	08 42 05	+18 35 41	360	16	21W
2014 09 09.3	0854+178	08 56 57	+17 39 48	310	16	35W
2016 10 19.2	1229–021	12 32 00	–02 24 05	506	15	18W
2017 10 13.7	1352–104	13 54 47	–10 41 03	69	15	10E
2019 10 20.5	1717–229	17 20 44	–22 58 25	222	17	55E
2019 10 28.4	1723–229	17 26 59	–22 58 02	184	17	48E
2020 01 30.3	1853–226	18 56 36	–22 36 17	542	16	27W
2020 02 15.0	1907–224	19 10 58	–22 23 29	91	17	39W
2020 08 02.0	1922–224	19 25 40	–22 19 35	78	24	160E
2020 10 24.2	1922–224	19 25 40	–22 19 35	355	19	79E
2021 02 19.9	2104–173	21 07 27	–17 08 10	149	16	17W
2021 03 16.0	2126–158	21 29 12	–15 38 41	528	17	36W
2021 11 29.8	2147–144	21 50 16	–14 10 50	79	19	77E
2022 02 14.2	2245–091	22 47 52	–08 50 22	491	17	15E
2022 11 13.8	2354–021	23 57 25	–01 52 16	159	23	128E
2022 12 04.1	2354–021	23 57 25	–01 52 16	177	22	107E
2023 06 11.1	0210+119	02 13 05	+12 13 11	28	17	44W
2023 11 05.4	0229+131	02 31 46	+13 22 55	199	25	177E
2024 01 02.1	0210+119	02 13 05	+12 13 11	396	22	114E
2024 04 05.7	0300+162	03 03 15	+16 26 19	46	17	32E
2025 09 15.4	0723+219	07 26 14	+21 53 20	215	18	63W
2025 06 13.2	0558+234	06 01 47	+23 24 53	495	16	8E
2025 10 25.0	0741+214	07 44 47	+21 20 00	30	20	97W
2025 11 29.1	0741+214	07 44 47	+21 20 00	274	22	132W
2026 08 07.4	0839+187	08 42 05	+18 35 41	511	16	7W
2026 08 24.1	0854+178	08 56 57	+17 39 48	435	16	19W
2028 10 04.3	1229–021	12 32 00	–02 24 05	483	15	3W
2029 01 08.8	1333–082	13 36 08	–08 29 52	433	18	83W
2029 03 15.3	1333–082	13 36 08	–08 29 52	432	22	149W
2029 09 28.5	1352–104	13 54 47	–10 41 03	47	16	25E
2031 02 23.2	1734–228	17 37 02	–22 51 55	261	18	69W
2031 06 07.1	1734–228	17 37 02	–22 51 55	55	23	171W
2031 09 24.2	1717–229	17 20 44	–22 58 25	129	19	80E
2031 10 05.6	1723–229	17 26 59	–22 58 02	312	18	71E

Apparent close approaches of Jupiter to astrometric radio sources
(d – angular distance between planet and radio source, r – planet radius, E – elongation)

Date Y M D	Source	α, δ (J2000)		<i>d</i> "	<i>r</i> "	<i>E</i> °
		h m s	° ' "			
2032 01 29.2	1907–224	19 10 58	–22 23 29	287	16	22W
2033 02 27.2	2126–158	21 29 12	–15 38 41	417	16	19W
2033 08 08.0	2223–114	22 25 44	–11 13 41	223	24	161W
2033 08 11.7	2221–116	22 24 08	–11 26 21	380	24	165W
2034 01 28.7	2245–091	22 47 52	–08 50 22	316	17	32E
2035 05 14.0	0201+113	02 03 47	+11 34 45	433	17	20W
2035 05 24.1	0210+119	02 13 05	+12 13 11	173	17	27W
2036 03 17.9	0300+162	03 03 15	+16 26 19	33	18	51E
2037 05 16.6	0547+234	05 50 47	+23 26 48	555	16	32E
2037 05 28.4	0558+234	06 01 47	+23 24 53	306	16	24E
2037 08 27.9	0725+219	07 28 21	+21 53 06	159	17	44W
2037 09 19.0	0741+214	07 44 47	+21 20 00	29	18	62W
2040 09 19.2	1229–021	12 32 00	–02 24 05	500	15	12E
2041 04 23.8	1333–082	13 36 08	–08 29 52	426	22	172E
2041 09 11.6	1352–104	13 54 47	–10 41 03	74	16	42E
2044 01 13.8	1907–224	19 10 58	–22 23 29	477	16	6W
2044 12 29.4	2044–188	20 47 38	–18 41 41	531	17	32E
2045 01 20.1	2104–173	21 07 27	–17 08 10	192	16	14E
2045 02 12.0	2126–158	21 29 12	–15 38 41	282	16	4W
2045 05 29.4	2245–091	22 47 52	–08 50 22	459	20	88W
2045 09 20.3	2223–114	22 25 44	–11 13 41	228	24	157E
2045 12 04.5	2223–114	22 25 44	–11 13 41	466	20	82E
2046 01 10.7	2245–091	22 47 52	–08 50 22	83	18	50E
2047 04 28.4	0201+113	02 03 47	+11 34 45	294	17	5W
2047 05 08.3	0210+119	02 13 05	+12 13 11	308	17	12W
2048 02 22.5	0300+162	03 03 15	+16 26 19	140	19	75E
2049 04 28.2	0547+234	05 50 47	+23 26 48	389	17	50E
2049 05 11.4	0558+234	06 01 47	+23 24 53	129	17	40E
2049 08 10.5	0725+219	07 28 21	+21 53 06	334	16	27W
2049 08 29.5	0741+214	07 44 47	+21 20 00	179	17	42W
2049 10 18.6	0814+201	08 17 05	+19 58 43	91	19	83W

Apparent close approaches of Saturn to astrometric radio sources
(d – angular distance between planet and radio source, r – planet radius, E – elongation)

Date Y M D	Source	α, δ (J2000)		d "	r "	E °
		h m s	° ' "			
2013 12 05.8	1459–149	15 02 25	–15 08 53	525	8	26W
2014 08 26.3	1459–149	15 02 25	–15 08 53	486	8	75E
2015 06 19.1	1548–177	15 51 15	–17 55 02	156	9	152E
2015 11 19.1	1614–195	16 17 27	–19 41 32	64	8	10E
2017 12 13.3	1752–225	17 55 26	–22 32 11	73	8	8E
2019 11 16.6	1907–224	19 10 58	–22 23 29	240	8	53E
2021 08 10.7	2044–188	20 47 38	–18 41 41	20	9	171E
2021 08 19.0	2042–191	20 45 24	–18 58 54	441	9	163E
2021 12 01.0	2042–191	20 45 24	–18 58 54	382	8	60E
2021 12 08.1	2044–188	20 47 38	–18 41 41	114	8	53E
2022 03 11.2	2126–158	21 29 12	–15 38 41	521	8	31W
2022 05 29.1	2147–144	21 50 16	–14 10 50	288	9	103W
2023 04 13.3	2221–116	22 24 08	–11 26 21	33	8	49W
2023 04 18.2	2223–114	22 25 44	–11 13 41	276	8	54W
2024 01 04.6	0220–119	22 22 56	–11 44 26	370	8	50E
2024 03 18.5	2252–090	22 55 04	–08 44 04	158	8	16W
2024 03 28.0	2256–084	22 59 01	–08 11 03	388	8	25W
2026 04 01.5	0019–001	00 22 25	+00 14 56	472	8	7W
2026 10 19.0	0037+011	00 40 14	+01 25 46	145	9	164E
2028 04 29.4	0158+096	02 01 15	+09 54 54	188	8	8W
2028 05 20.6	0208+106	02 11 13	+10 51 35	79	8	26W
2030 12 01.0	0409+188	04 12 46	+18 56 37	306	10	176E
2032 04 03.5	0503+216	05 06 34	+21 41 00	71	9	64E
2033 05 24.2	0620+227	06 23 18	+22 41 36	206	8	33E
2034 06 11.7	0723+219	07 26 14	+21 53 20	187	8	30E
2034 06 15.7	0725+219	07 28 21	+21 53 06	38	8	26E
2034 07 16.2	0741+214	07 44 47	+21 20 00	157	8	1E
2034 09 19.3	0814+201	08 17 05	+19 58 43	462	9	54W
2035 01 15.6	0814+201	08 17 05	+19 58 43	393	10	173W
2037 01 16.1	1013+127	10 15 44	+12 27 07	72	10	173W
2037 07 24.1	1013+127	10 15 44	+12 27 07	233	8	30E
2038 06 22.9	1047+097	10 50 26	+09 25 53	68	9	69E
2039 11 13.0	1228–008	12 30 55	–01 08 50	585	8	42W
2039 12 28.7	1241–020	12 43 52	–02 18 38	498	9	85W
2040 09 08.5	1241–020	12 43 52	–02 18 38	88	8	25E
2042 05 10.5	1358–090	14 01 05	–09 16 32	535	9	162E
2043 10 18.4	1459–149	15 02 25	–15 08 53	220	8	23E
2044 02 27.6	1548–177	15 51 15	–17 55 02	33	8	99W
2044 03 18.3	1548–177	15 51 15	–17 55 02	248	8	118W
2044 12 27.1	1614–195	16 17 27	–19 41 32	483	8	29W
2045 09 20.4	1614–195	16 17 27	–19 41 32	46	8	69E
2047 01 20.9	1752–225	17 55 26	–22 32 11	584	8	31W
2047 07 17.0	1752–225	17 55 26	–22 32 11	485	9	155E
2047 10 17.1	1752–225	17 55 26	–22 32 11	367	8	66E
2048 11 28.4	1853–226	18 56 36	–22 36 17	321	8	37E

Apparent close approaches of Uranus to astrometric radio sources

(d – angular distance between planet and radio source, r – planet radius, E – elongation)

Date Y M D	Source	α, δ (J2000)		<i>d</i> "	<i>r</i> "	<i>E</i> °
		h m s	° ' "			
2013 05 05.4	0036+030	00 39 19	+03 19 53	558	2	35W
2013 10 03.3	0036+030	00 39 19	+03 19 53	362	2	179W
2016 07 11.8	0127+084	01 30 28	+08 42 46	313	2	86W
2016 08 16.9	0127+084	01 30 28	+08 42 46	259	2	120W
2017 04 12.8	0127+084	01 30 28	+08 42 46	499	2	2E
2032 07 03.9	0547+234	05 50 47	+23 26 48	511	2	14W
2035 11 23.4	0658+232	07 01 29	+23 13 26	564	2	136W
2036 06 25.3	0658+232	07 01 29	+23 13 26	578	2	10E

Apparent close approaches of Neptune to astrometric radio sources

(d – angular distance between planet and radio source, r – planet radius, E – elongation)

Date Y M D	Source	α, δ (J2000)		<i>d</i> "	<i>r</i> "	<i>E</i> °
		h m s	° ' "			
2024 09 02.7	2354–021	23 57 25	–01 52 16	498	1	162W
2048 06 09.3	0316+162	03 18 58	+16 28 33	262	1	27W
2048 11 17.1	0316+162	03 18 58	+16 28 33	119	1	177E
2049 04 11.0	0316+162	03 18 58	+16 28 33	288	1	31E