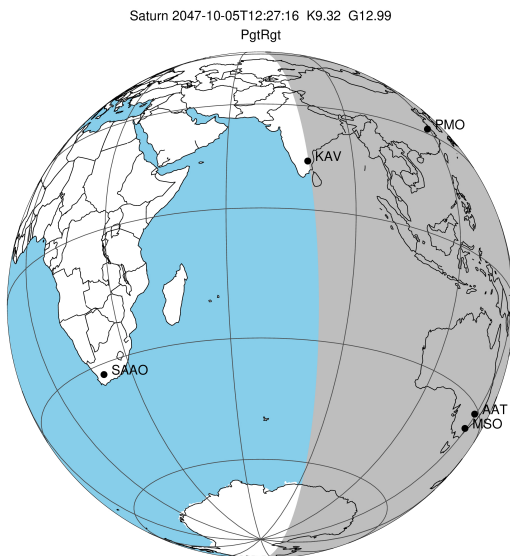


target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-10-05T12:27:16.080  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4070223550253062144  
 2Mass ID (if available) : 17522080-2236048

Saturn 2047-10-05T12:27:16 K9.32 G12.99 PgtRgt

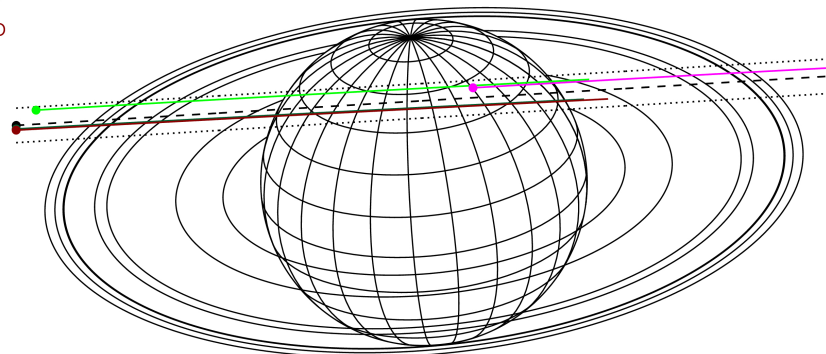
ICRS Star Coord at Epoch: 17h 52m 20.79761s -22:36:04.93944s

RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.321  
 G magnitude : 12.988  
 RP magnitude : 11.971  
 BP magnitude : 14.059  
 DUPflag : 0  
 Distance (au) : 10.228  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 16.43  
 Sun-Target sep (deg) : 76.70  
 Sun-Moon sep (deg) : 120.06  
 B (ring opening deg) : 26.90  
 PA of pole (deg) : 5.37



2047-10-05T12:27:16.0800 α: 17 52 20.7976 δ: -22 36 04.939 C/A 4.065° PA 183.46 deg v\_sky +16.43 km/s D 10.23 AU  
 Credit: Styled after SORA/Lucky Star

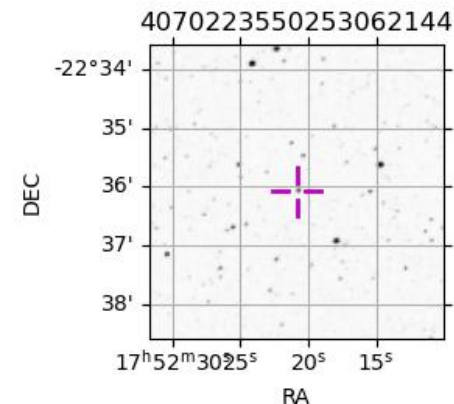
Earth  
 PMO  
 KAV  
 AAT  
 MSO



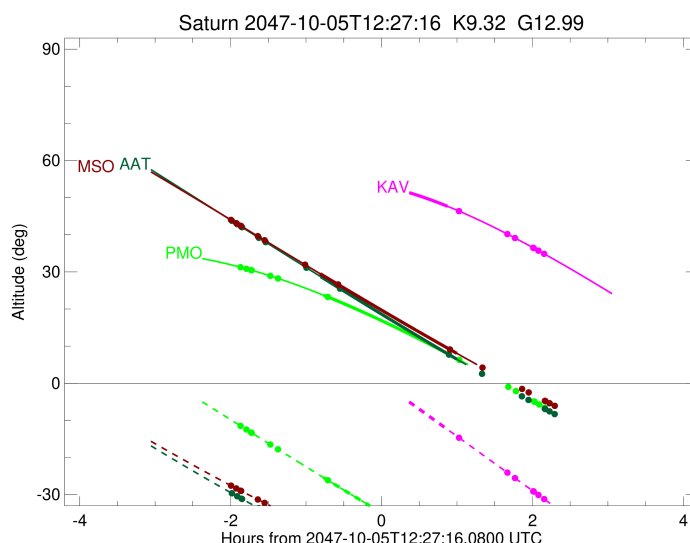
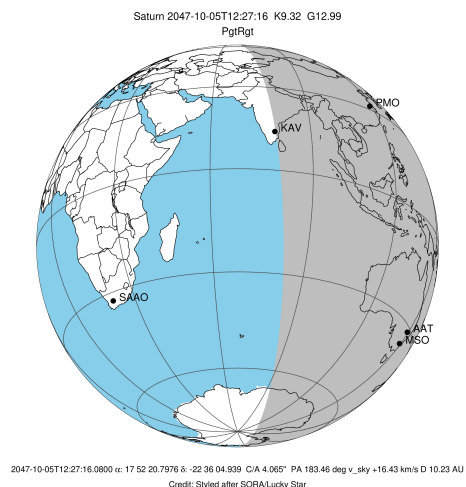
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (20	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8	+ + + + +	+ +	+	OCT 05 10:35 - OCT 05 13:29	PieRie
KPNO	Kitt Peak Natl	32.0	248.4					PnnRnn
MCD	McDonald Obs.	30.7	256.0					PnnRnn
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observ	12.6	78.8		+	+ + + + + + +	OCT 05 13:19 - OCT 05 14:36	PneRne
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European South	-29.3	289.3					PnnRnn
AAT	Siding Spring	-31.3	149.1	+ + + + + + +	+ +		OCT 05 10:28 - OCT 05 13:27	PieRin
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0	+ + + + + + +	+ +		OCT 05 10:27 - OCT 05 13:27	PieRin



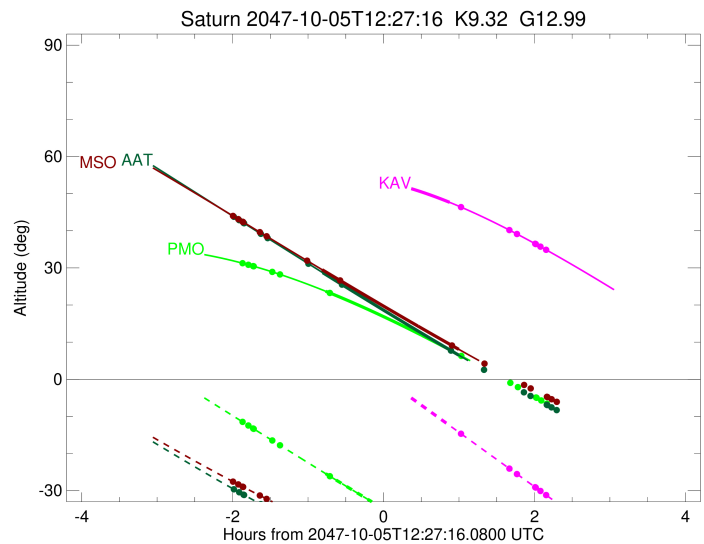
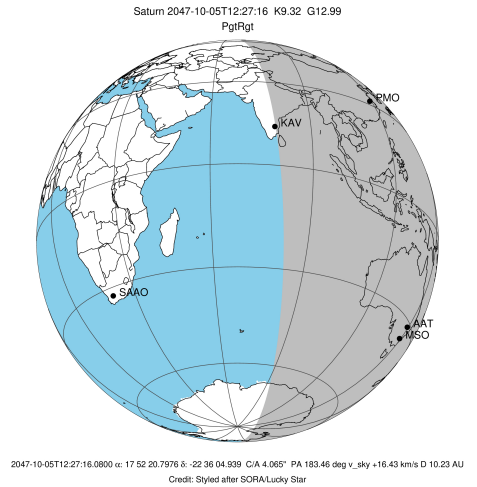
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-10-05T12:31:34.360  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 4070223550253062144  
 2Mass ID (if available) : 17522080-2236048  
 ICRS Star Coord at Epoch: 17h 52m 20.79761s -22:36:04.93944s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.321  
 G magnitude : 12.988  
 RP magnitude : 11.971  
 BP magnitude : 14.059  
 DUPflag : 0  
 Distance (au) : 10.228  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 16.43  
 Sun-Target sep (deg) : 76.70  
 Sun-Moon sep (deg) : 120.62  
 B (ring opening deg) : 26.90  
 PA of pole (deg) : 5.37  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 4.687  
 C/A sky separation (km) : 34768.1  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 Saturn\_ring\_plane.tf  
 sat378.bsp  
 sat286.bsp  
 vgr1.sat286.bsp  
 vgr2.sat286.bsp  
 HST1081HSPephemUTC.bsp  
 pfb10000r.bsp  
 cassini.bsp  
 earthstns\_itrf93\_040916.bsp  
 earth\_200101\_990628\_predict.bpc  
 earth\_720101\_070426.bpc  
 cpck28Mar2008.tpc  
 pck.sat440.tpc  
 IAU\_SATURN\_for\_RINGFIT.tpc  
 naif0012.tls  
 earth\_flat\_IAU.spk



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

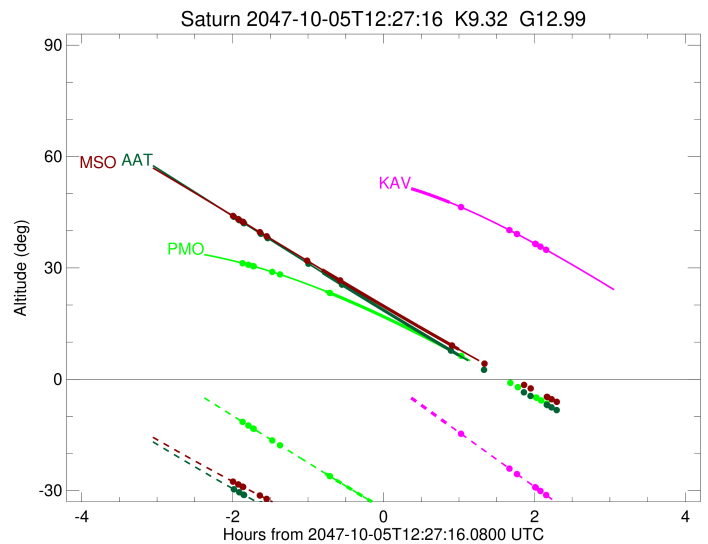
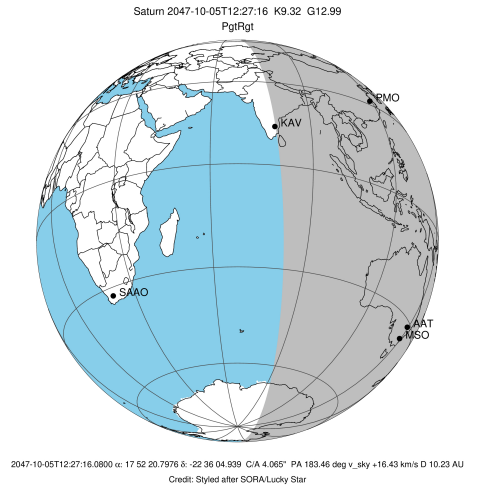
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-10-05T10:35:15.600		31.26	-11.49	140461.00	-13.42		
A (OER)	I	2047-10-05T10:39:51.844		30.84	-12.46	136774.40	-13.27		
Encke (OEG)	I	2047-10-05T10:43:41.336		30.47	-13.27	133744.89	-13.13		
Encke (IEG)	I	2047-10-05T10:44:05.838		30.44	-13.36	133423.31	-13.12		
A (IER)	I	2047-10-05T10:58:53.312		28.92	-16.50	122050.38	-12.48		
B (OER)	I	2047-10-05T11:04:56.598		28.25	-17.78	117571.16	-12.17		
B (IER)	I	2047-10-05T11:44:40.396	b	23.25	-26.13	91984.69	-8.88		
Saturn	I	2047-10-05T11:41:17.451		23.71	-25.42	59825.94		33.09	38.50
Saturn	E	2047-10-05T13:21:42.030		7.64	-45.46	59913.90		29.22	34.35
B (IER)	E	2047-10-05T13:29:14.310		6.28	-46.84	91984.69	9.01		
B (OER)	E	2047-10-05T14:08:17.065		-1.00x	-53.50	117571.16	12.43		
A (IER)	E	2047-10-05T14:14:12.436		-2.13x	-54.42	122050.38	12.77		
Encke (IEG)	E	2047-10-05T14:28:38.701		-4.92x	-56.52	133423.31	13.46		
Encke (OEG)	E	2047-10-05T14:29:02.580		-5.00x	-56.57	133744.89	13.48		
A (OER)	E	2047-10-05T14:32:46.141		-5.73x	-57.08	136774.40	13.63		
F ring	E	2047-10-05T14:37:15.014		-6.61x	-57.67	140461.00	13.79		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-10-05T12:28:18.840  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 4070223550253062144  
 2Mass ID (if available) : 17522080-2236048  
 ICRS Star Coord at Epoch: 17h 52m 20.79761s -22:36:04.93944s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.321  
 G magnitude : 12.988  
 RP magnitude : 11.971  
 BP magnitude : 14.059  
 DUPflag : 0  
 Distance (au) : 10.228  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 16.43  
 Sun-Target sep (deg) : 76.70  
 Sun-Moon sep (deg) : 120.79  
 B (ring opening deg) : 26.90  
 PA of pole (deg) : 5.37  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 4.561  
 C/A sky separation (km) : 33834.1  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 Saturn\_ring\_plane.tf  
 sat378.bsp  
 sat286.bsp  
 vgr1.sat286.bsp  
 vgr2.sat286.bsp  
 HST1081HSPephemUTC.bsp  
 pfb10000r.bsp  
 cassini.bsp  
 earthstns\_itrf93\_040916.bsp  
 earth\_200101\_990628\_predict.bpc  
 earth\_720101\_070426.bpc  
 cpck28Mar2008.tpc  
 pck.sat440.tpc  
 IAU\_SATURN\_for\_RINGFIT.tpc  
 naif0012.tls  
 earth\_flat\_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-10-05T10:28:29.273		50.36	29.01x	140461.00	-13.49		
A (OER)	I	2047-10-05T10:33:04.004		50.87	27.91x	136774.40	-13.34		
Encke (OEG)	I	2047-10-05T10:36:52.139		51.27	27.01x	133744.89	-13.21		
Encke (IEG)	I	2047-10-05T10:37:16.491		51.32	26.91x	133423.31	-13.20		
A (IER)	I	2047-10-05T10:51:57.430		52.69	23.40x	122050.38	-12.59		
B (OER)	I	2047-10-05T10:57:57.228		53.16	21.96x	117571.17	-12.30		
B (IER)	I	2047-10-05T11:36:48.241	b	54.86	12.59x	91984.69	-9.29		
Saturn	I	2047-10-05T11:36:45.242		54.86	12.60x	59854.92		31.84	37.17
Saturn	E	2047-10-05T13:19:51.151		47.66	-12.47	59928.60		28.54	33.61
B (IER)	E	2047-10-05T13:28:59.560		46.36	-14.70	91984.69	9.35		
B (OER)	E	2047-10-05T14:07:31.064		40.16	-24.10	117571.16	12.42		
A (IER)	E	2047-10-05T14:13:27.148		39.12	-25.55	122050.38	12.73		
Encke (IEG)	E	2047-10-05T14:27:58.155		36.48	-29.10	133423.31	13.36		
Encke (OEG)	E	2047-10-05T14:28:22.215		36.41	-29.19	133744.89	13.37		
A (OER)	E	2047-10-05T14:32:07.575		35.71	-30.11	136774.40	13.51		
F ring	E	2047-10-05T14:36:38.858		34.86	-31.21	140461.00	13.67		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-10-05T12:33:09.540  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 4070223550253062144  
 2Mass ID (if available) : 17522080-2236048  
 ICRS Star Coord at Epoch: 17h 52m 20.79761s -22:36:04.93944s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.321  
 G magnitude : 12.988  
 RP magnitude : 11.971  
 BP magnitude : 14.059  
 DUPflag : 0  
 Distance (au) : 10.229  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 16.43  
 Sun-Target sep (deg) : 76.70  
 Sun-Moon sep (deg) : 120.68  
 B (ring opening deg) : 26.90  
 PA of pole (deg) : 5.37  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 3.732  
 C/A sky separation (km) : 27682.7  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 Saturn\_ring\_plane.tf  
 sat378.bsp  
 sat286.bsp  
 vgr1.sat286.bsp  
 vgr2.sat286.bsp  
 HST1081HSPephemUTC.bsp  
 pfb10000r.bsp  
 cassini.bsp  
 earthstns\_itrf93\_040916.bsp  
 earth\_200101\_990628\_predict.bpc  
 earth\_720101\_070426.bpc  
 cpck28Mar2008.tpc  
 pck.sat440.tpc  
 IAU\_SATURN\_for\_RINGFIT.tpc  
 naif0012.tls  
 earth\_flat\_IAU.spk

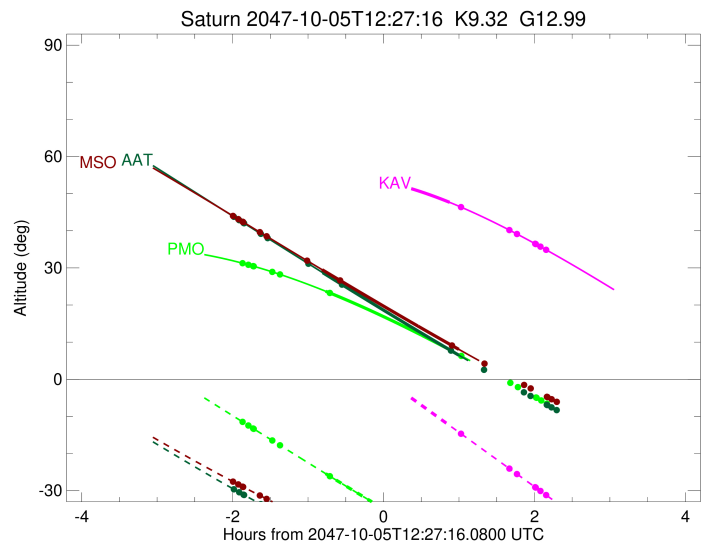
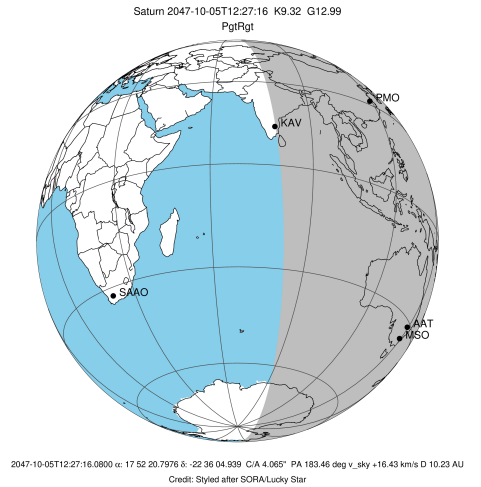


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-10-05T10:28:20.453		43.76	-29.64	140461.00	-14.56		
A (OER)	I	2047-10-05T10:32:34.443		42.85	-30.45	136774.40	-14.47		
Encke (OEG)	I	2047-10-05T10:36:04.340		42.10	-31.11	133744.89	-14.39		
Encke (IEG)	I	2047-10-05T10:36:26.687		42.02	-31.18	133423.31	-14.39		
A (IER)	I	2047-10-05T10:49:46.618		39.17	-33.65	122050.38	-14.03		
B (OER)	I	2047-10-05T10:55:07.788		38.03	-34.62	117571.16	-13.86		
B (IER)	I	2047-10-05T11:27:37.366		31.11	-40.24	91984.69	-12.17		
C (IER)	I	2047-10-05T11:54:21.053	b	25.48	-44.41	74490.58	-9.33		
Saturn	I	2047-10-05T11:38:49.441		28.75	-42.05	59974.30		26.37	31.23
Saturn	E	2047-10-05T13:27:12.817		6.47	-53.57	60055.47		22.18	26.53
C (IER)	E	2047-10-05T13:20:57.458	b	7.71	-53.30	74490.58	9.46		
B (IER)	E	2047-10-05T13:47:15.268		2.53x	-54.03	91984.69	12.41		
B (OER)	E	2047-10-05T14:19:00.240		-3.53x	-53.47	117571.16	14.24		
A (IER)	E	2047-10-05T14:24:12.620		-4.50x	-53.23	122050.38	14.44		
Encke (IEG)	E	2047-10-05T14:37:08.916		-6.89x	-52.46	133423.31	14.85		
Encke (OEG)	E	2047-10-05T14:37:30.568		-6.96x	-52.43	133744.89	14.86		
A (OER)	E	2047-10-05T14:40:53.840		-7.57x	-52.19	136774.40	14.95		
F ring	E	2047-10-05T14:44:59.591		-8.31x	-51.88	140461.00	15.05		

```

target                : Saturn
target radius (km)   : 60268.00
C/A epoch             : 2047-10-05T12:32:54.910
Event type            : PgtRgt
: Saturn occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code         : MSO
Location               : Mt. Stromlo Observatory
Latitude (deg)        : -35.32000
E. Longitude (deg)    : 149.00833
Altitude (km)         : 0.770
Gaia source ID        : 4070223550253062144
2Mass ID (if available) : 17522080-2236048
ICRS Star Coord at Epoch: 17h 52m 20.79761s -22:36:04.93944s
RUWE (>1.4 is poor) : 1.03
K magnitude           : 9.321
G magnitude           : 12.988
RP magnitude          : 11.971
BP magnitude          : 14.059
DUPflag               : 0
Distance (au)         : 10.229
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : 16.43
Sun-Target sep (deg) : 76.70
Sun-Moon sep (deg)   : 120.67
B (ring opening deg) : 26.90
PA of pole (deg)     : 5.37
Pole direction: RA (deg): 40.60000
Dec (deg): 83.50000
C/A sky separation ("): 3.682
C/A sky separation (km): 27315.8
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl.spk
Saturn_ring_plane.tf
sat378.bsp
sat286.bsp
vgr1.sat286.bsp
vgr2.sat286.bsp
HST1081HSPephemUTC.bsp
pfb10000r.bsp
cassini.bsp
earthstns_itrf93_040916.bsp
earth_200101_990628_predict.bpc
earth_720101_070426.bpc
cpck28Mar2008.tpc
pck.sat440.tpc
IAU_SATURN_for_RINGFIT.tpc
naif0012.tls
earth_flat_IAU.spk
  
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-10-05T10:27:38.603		43.99	-27.58	140461.00	-14.61		
A (OER)	I	2047-10-05T10:31:51.634		43.13	-28.33	136774.40	-14.53		
Encke (OEG)	I	2047-10-05T10:35:20.701		42.41	-28.95	133744.89	-14.45		
Encke (IEG)	I	2047-10-05T10:35:42.958		42.34	-29.01	133423.31	-14.44		
A (IER)	I	2047-10-05T10:48:59.336		39.62	-31.31	122050.38	-14.10		
B (OER)	I	2047-10-05T10:54:18.874		38.53	-32.22	117571.16	-13.93		
B (IER)	I	2047-10-05T11:26:34.036		31.94	-37.40	91984.69	-12.30		
C (IER)	I	2047-10-05T11:52:51.273	b	26.61	-41.18	74490.58	-9.58		
Saturn	I	2047-10-05T11:38:23.453		29.53	-39.16	59981.73		26.01	30.83
Saturn	E	2047-10-05T13:27:10.099		8.05	-49.59	60061.33		21.85	26.16
C (IER)	E	2047-10-05T13:21:44.903	b	9.09	-49.39	74490.58	9.71		
B (IER)	E	2047-10-05T13:47:37.369		4.21x	-50.00	91984.69	12.53		
B (OER)	E	2047-10-05T14:19:09.694		-1.55x	-49.51	117571.17	14.30		
A (IER)	E	2047-10-05T14:24:20.788		-2.47x	-49.30	122050.38	14.49		
Encke (IEG)	E	2047-10-05T14:37:14.462		-4.74x	-48.63	133423.31	14.89		
Encke (OEG)	E	2047-10-05T14:37:36.050		-4.80x	-48.61	133744.89	14.90		
A (OER)	E	2047-10-05T14:40:58.753		-5.38x	-48.40	136774.40	14.99		
F ring	E	2047-10-05T14:45:03.869		-6.09x	-48.12	140461.00	15.09		