u14_opmt_106cm_880nm_predicted_ring_event_times.txt produced Sun Apr 4 21:52:30 2021 using
rfrench@Achilles.fios-router.home:/Volumes/PromisePegasus28TB_backup/dione_raid2/Research/uranus/PDART2014/programs/pro_occinfo2geom_plots_pds4_v7
.pro

Bundle ID: uranus_occ_u14_opmt_106cm

```
Event:                                  u14
Planet:                                 Uranus
Reference:                              French et al. 1986 Icarus 67, 134-163
Title:                                  Structure of the Uranian rings II. Ring orbits and widths.
Computations from:                      1982-04-22T01:33:39.0898Z to 1982-04-22T01:43:37.0898Z
Observatory name:                       Observatoire du Pic du Midi et de Toulouse
Observatory code file directory:        /Volumes/dione_raid2/Research/kernels/
Observatory code file:                  ObsCodes_pck00010_20200709_Elon+ocobs_v9BJ.obs
Observatory code:                       PI1
Observatory abbreviation:               opmt
Entry from observatory code file:
    PI1 G +000 08 32.28  +42 56 11.6        2891 Pic du Midi for 1-m Pic du Midi
Telescope:                              106cm
Instrument:                             Generic GaAs High Speed Photometer
Mean wavelength (nm)                    880nm
Observatory latitude (deg):                42.936555556
Observatory E longitude (deg):              0.142300000
Observatory altitude (km):                  2.891000000
Ellipsoid source:                       /Volumes/dione_raid2/Research/kernels/pck00010.tpc
Observatory reference frame:            ITRF93
Earth equatorial radius (km):              6378.136600000
Earth 1/flattening:                         298.257006177
Topocentric position vector:               4678.859107812      11.620454869    4324.313415484
Leapsecond kernel file:                 /Volumes/dione_raid2/Research/kernels/naif0012.tls
Star catalog directory:                 /Volumes/dione_raid2/Research/RINGFIT/stars/data/
Star catalog file:                      ustarsALLd.v3.merged.sortedA.csv
Star catalog ID:                        79085
Star number:                               56
Star name:                              U14
Star source catalog:                    Hipparcos
Star RA (deg):                             242.149347400
Star Dec (deg):                            -20.807432480
Star epoch:                             1991-04-02T13:30:00.0000Z
Star parallax (mas):                        -6.000000000
Star pm RA (mas/yr):                        -1.160000000
Star pm Dec (mas/yr):                        0.450000000
Star catalog positions in frame:        J2000
Star frame for calculations:            J2000
Heliocentric frame for calculations:    J2000
Ringfit savefile directory:             /Volumes/dione_raid2/Research/RINGFIT/tests/Uranus/Ur017L/savefiles/
Ringfit savefile for star/time offsets: ringfit_v1.8.Ur017L-RF-V0204.sav
Ringfit output file directory:          /Volumes/dione_raid2/Research/RINGFIT/tests/Uranus/Ur017L/outfiles/
Ringfit output file:                    ringfit_v1.8.Ur017L-RF-V0204.out
Star offsets dRA,dDec (mas):                8.814505696     -21.854856960
Time offset for this obstr./event (sec):    0.733143353
Kernel directory:                       /Volumes/dione_raid2/Research/kernels/
   ../../../../kernels/ura111.bsp
   ../../../../kernels/vgr2.ura111.bsp
   ../../../../kernels/earthstns_itrf93_040916.bsp
   ../../../../kernels/earth_720101_031229.bpc
   ../../../../kernels/pg3f0000r.bsp
   ../../../../kernels/pg490000r.bsp
   ../../../../kernels/naif0012.tls
   /Volumes/dione_raid2/Research/RINGFIT/tests/Uranus/Ur017L/savefiles/../kernels/RAJobs_U111+rgf9.spk
   /Volumes/dione_raid2/Research/RINGFIT/tests/Uranus/Ur017L/savefiles/../kernels/URKALLv1.spk
   /Volumes/dione_raid2/Research/kernels/uranus_ringframes_rfrench20201201_v1.tf
   /Volumes/dione_raid2/Research/kernels/pck00010.tpc
```

Predicted Ring/Atmosphere Occultation Events

Ring	I/E	UTC(Earth)	UTC(@ring)	R(model)	R-dot	Anomaly	Sin B	Ulon	Alt(deg)	Sun(deg)
epsilon	I	1982-04-22T01:33:45.31Z	1982-04-21T23:03:55.94Z	51509.16	-16.350	152.619	-0.96376	34.016	25.821	-30.833
lambda	I	1982-04-22T01:35:16.45Z	1982-04-21T23:05:27.08Z	50026.01	-16.195	43.047	-0.96376	34.974	25.863	-30.703
delta	I	1982-04-22T01:37:03.67Z	1982-04-21T23:07:14.31Z	48300.21	-15.994	325.005	-0.96376	36.177	25.910	-30.549
gamma	I	1982-04-22T01:37:45.68Z	1982-04-21T23:07:56.33Z	47629.99	-15.909	228.900	-0.96376	36.672	25.928	-30.488
eta	I	1982-04-22T01:38:14.26Z	1982-04-21T23:08:24.91Z	47176.19	-15.849	283.163	-0.96377	37.017	25.940	-30.446
beta	I	1982-04-22T01:39:51.72Z	1982-04-21T23:10:02.38Z	45642.37	-15.632	339.549	-0.96375	38.242	25.979	-30.302
alpha	I	1982-04-22T01:40:52.17Z	1982-04-21T23:11:02.83Z	44699.82	-15.484	303.679	-0.96380	39.050	26.002	-30.211
four	I	1982-04-22T01:43:10.65Z	1982-04-21T23:13:21.31Z	42579.56	-15.111	100.558	-0.96388	41.026	26.051	-30.001
five	I	1982-04-22T01:43:34.40Z	1982-04-21T23:13:45.07Z	42219.97	-15.041	280.752	-0.96372	41.388	26.059	-29.965

```
Event geometry at 1982-04-22T01:43:37.0000Z
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    Ring opening angle B (deg):  -74.52839
Position angle of pole P (deg):   71.13346
 Observer-planet distance (km):    2695.148651 x 10^6
       Light travel time (sec):    8990.048213
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