

Exercise

- Star: HD209458 with transiting planet
- Ephemeris (mid-transit):
HJD(TT) 2453344.768245 + 3.52474859 E
- Telescope: William Herschel Telescope (WHT) on La Palma
 - Note: not the Herschel space telescope
- Which night in 2014 is transit best observed?
- What is precise UTC of mid-transit?



SIMBAD query result

other query modes : [Identifier query](#) [Coordinate query](#) [Criteria query](#) [Reference query](#) [Basic query](#) [Script submission](#) [Output options](#) [Help](#)

Object query : HD209458

Available data : [Basic data](#) • [Identifiers](#) • [Plot & images](#) • [Bibliography](#) • [Measurements](#) • [External archives](#) • [Notes](#) • [Annotations](#)

Basic data :

V* V376 Peg -- Star showing eclipses by its planet

Other object types: EP* () , * (AG,AGKR,BD,GSC,HD,HIC,HIP,PPM,SAO,SKY#,SPOCS,TYC,uvby98,YZ) , V* (V*) , IR (2MASS)

ICRS coord. (ep=J2000) : 22 03 10.77207 +18 53 03.5430 (Optical) [7.21 6.77 89] A [2007A&A...474..653V](#)

FK5 coord. (ep=J2000 eq=2000) : 22 03 10.772 +18 53 03.54 (Optical) [7.21 6.77 89] A [2007A&A...474..653V](#)

FK4 coord. (ep=B1950 eq=1950) : 22 00 48.07 +18 38 32.2 (Optical) [41.63 39.09 90] A [2007A&A...474..653V](#)

Gal coord. (ep=J2000) : 076.7533 -28.5269 (Optical) [7.21 6.77 89] A [2007A&A...474..653V](#)

Proper motions *mas/yr* [error ellipse]: 28.55 -18.81 [0.77 0.82 0] A [2007A&A...474..653V](#)

Radial velocity / Redshift / cz : V(km/s) -14.69 [0.09] / z(-) -0.000049 [0.000000] / cz -14.69 [0.09] (-) A [2002ApJS..141..503N](#)

Parallaxes *mas*: 20.15 [0.80] A [2007A&A...474..653V](#)

Spectral type: G0V C [2001MNRAS.328...45M](#)

Fluxes (5) :
 B 8.21 [0.02] D [2000A&A...355L..27H](#)
 V 7.63 [0.01] D [2000A&A...355L..27H](#)
 J 6.591 [0.020] C [2003yCat.2246....0C](#)
 H 6.37 [0.04] C [2003yCat.2246....0C](#)
 K 6.308 [0.026] C [2003yCat.2246....0C](#)

essential notes: • Substellar companion [HD 209458b](#) detected, see in the [Extrasolar Planets Encyclopaedia](#).

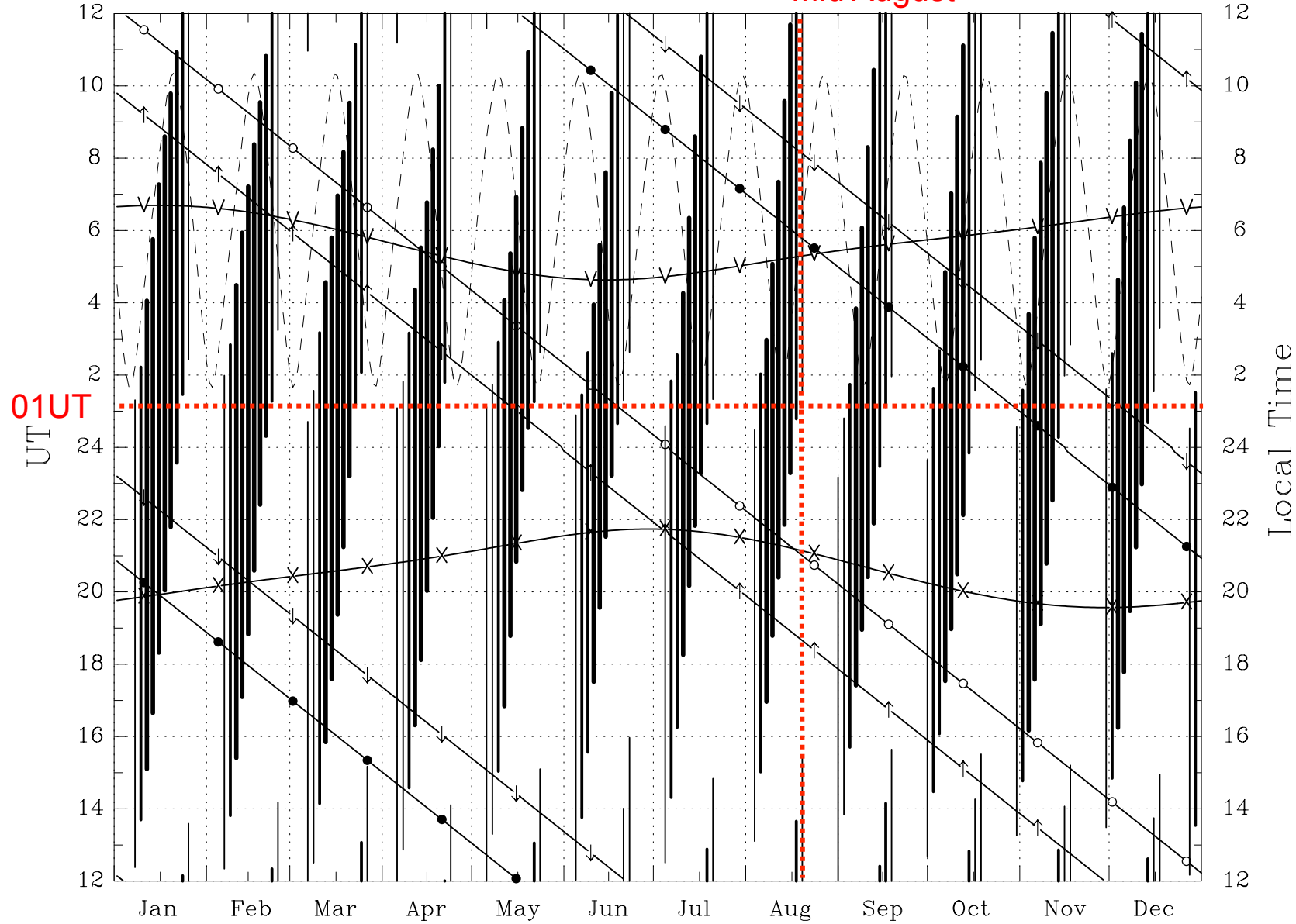
Visibility of HD209458

Year 2014

RA: 22h 3m10.8 DEC: +18d53m 4.0

William Herschel 4.2m Telescope observe

Mid August



\\(2262) star rise(2264) star set(0901) star gets above \\(08500)180)ar gets below 30\\(07


-x- twilight ends -v- twilight begins - - g.c. moon-star dist. (hrs)

moon above horizon: thin line - moon 25%-50% illuminated

medium line - moon 50%-75% illuminated

thick line - moon 75%-100% illuminated

- 2014 Aug 1 12:00 UT = JD 2456871.0
- 2014 Aug 31 12:00 UT = JD 2456901.0

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Calendar date to Julian date

Year: CE BCE

Month: Day:

Hour: Minute: Second: [Universal Time \(UT1\)](#)

Julian date to Calendar date

Julian Date:

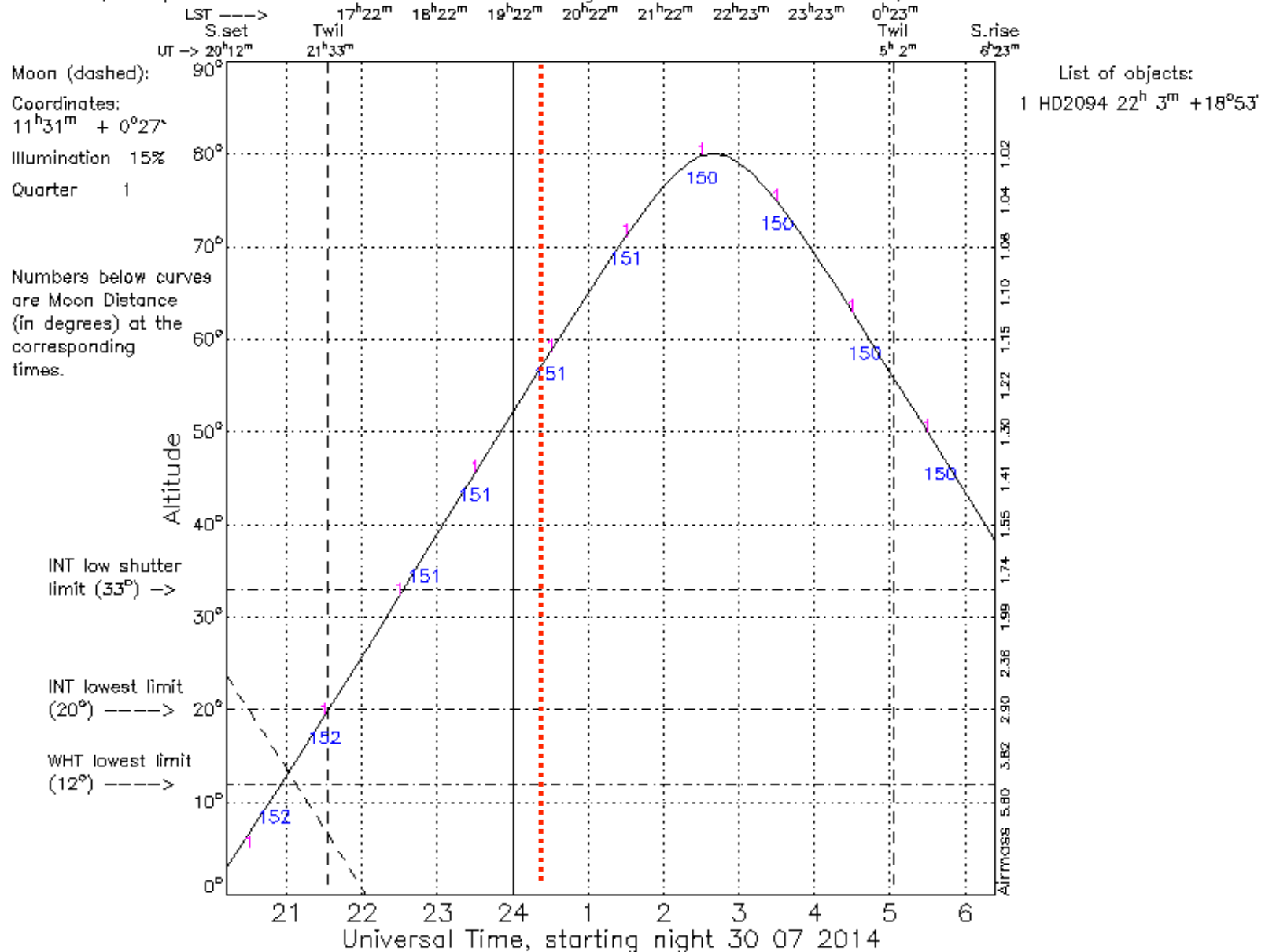
Notes

Julian dates (abbreviated JD) are simply a continuous count of days and fractions since noon Universal Time on January 1, 4713 BCE (on the Julian calendar). Almost 2.5 million days have transpired since this date. Julian dates are widely used as time

- 2014 Aug 1 12:00 UT = JD 2456871.0
- 2014 Aug 31 12:00 UT = JD 2456901.0
- Mid-transits
 - HJD(TT) 2453344.768245 + 3.52474859 E
 - HJD(UTC) 2453344.768245-0.000766 + 3.52474859 E
 - HJD(UTC) 2453344.7674790 + 3.52474859 E
 - E=1000: HJD(UTC) 2456869.5160690 = 2014 July 31 00:23:08.4 UTC
 - E=1001: HJD(UTC) 2456873.0408176
 - E=1002: HJD(UTC) 2456876.5655662 = 2014 August 07 01:34:25.2 UTC
 - E=1003: HJD(UTC) 2456880.0903148
 - E=1004: HJD(UTC) 2456883.6150634 = 2014 August 14 02:45:41.2 UTC
 - E=1005: HJD(UTC) 2456887.1398120
 - E=1006: HJD(UTC) 2456890.6645605 = 2014 August 21 03:56:58.0 UTC
 - E=1007: HJD(UTC) 2456894.1893091
 - E=1008: HJD(UTC) 2456897.7140577 = 2014 August 28 05:08:14.8 UTC
 - E=1009: HJD(UTC) 2456901.2388063

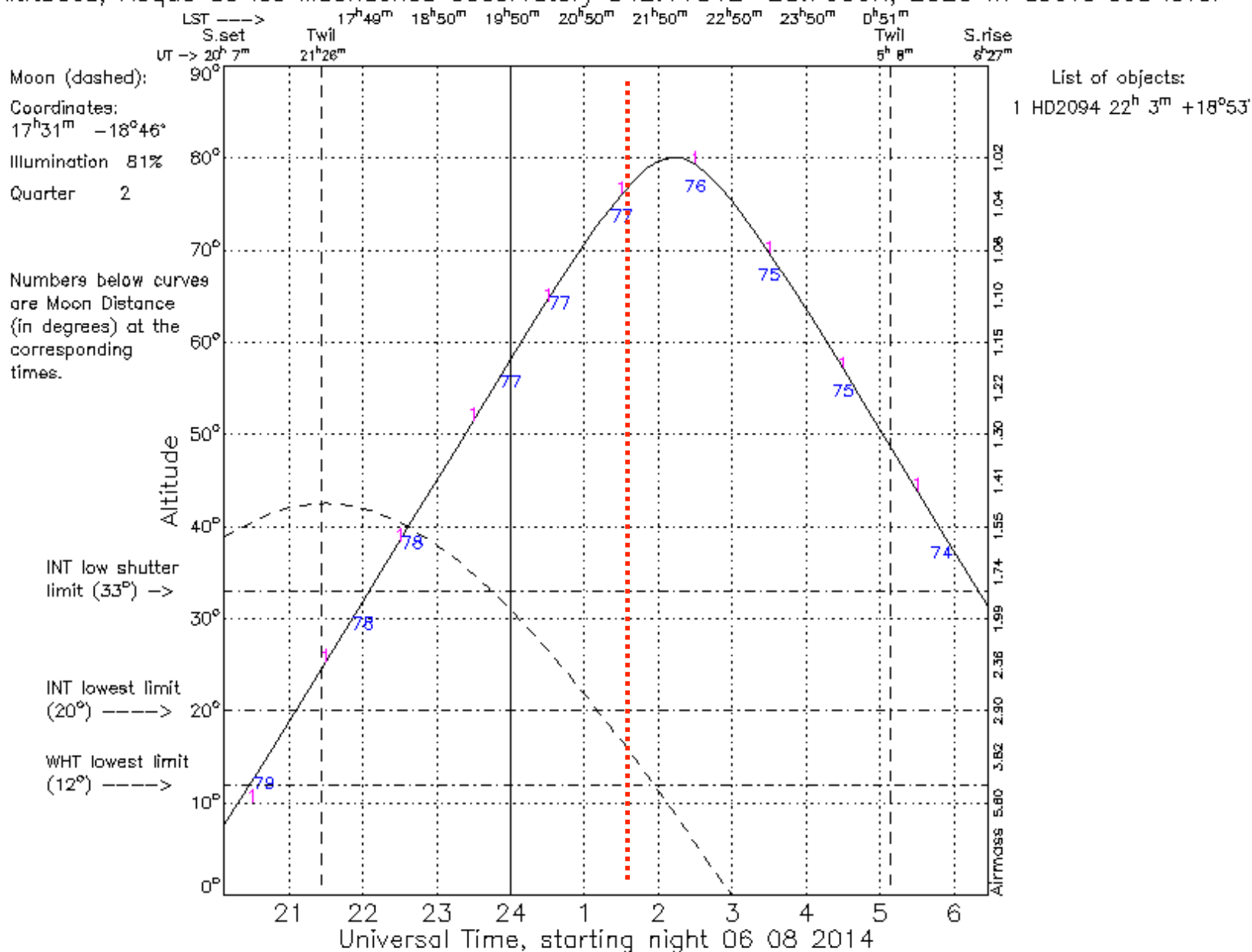
staralt – July 30/31

Altitudes, Roque de las Muchachas Observatory 342.1184E 28.7606N, 2326 m above sea level



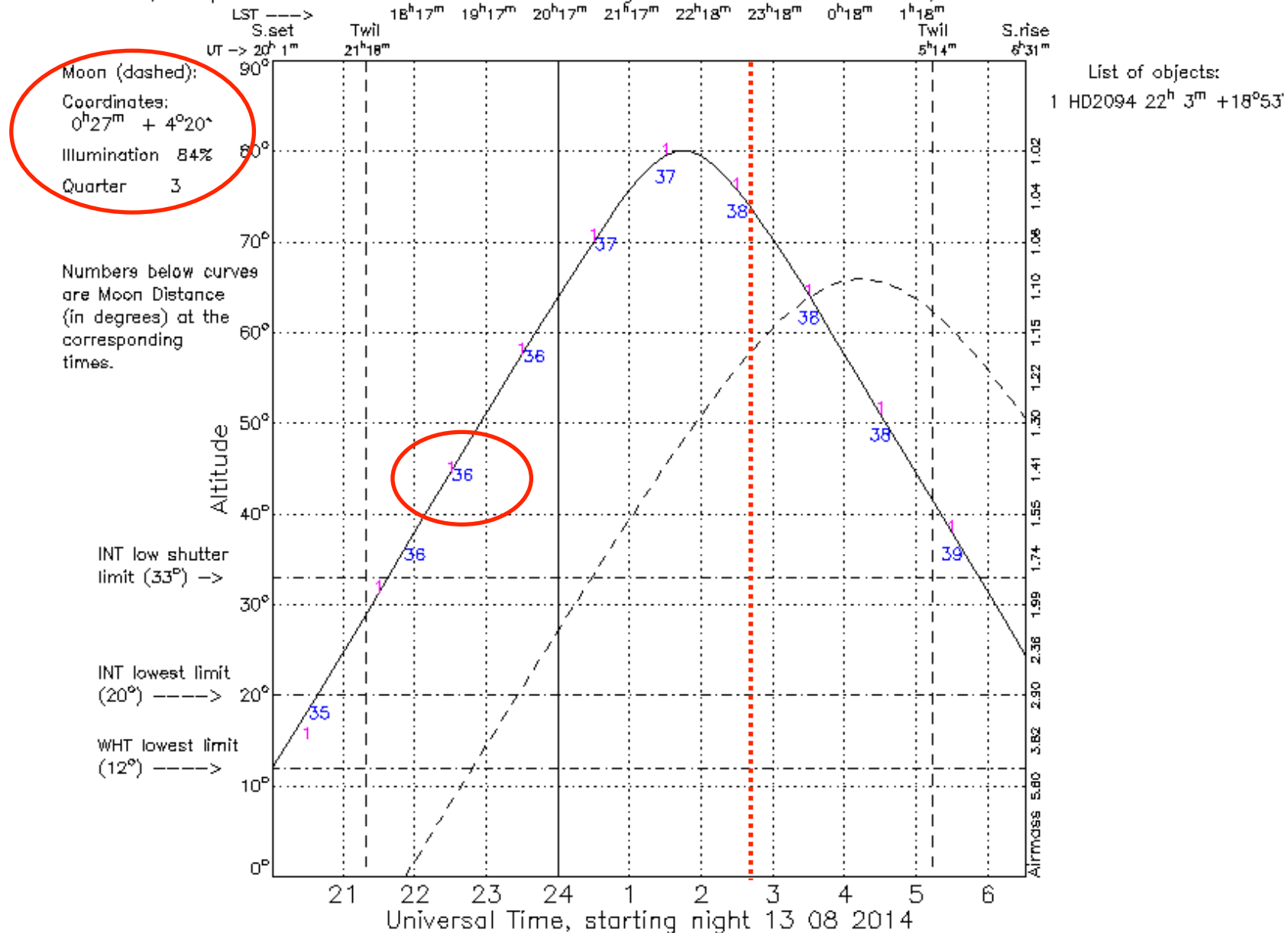
staralt – Aug 6/7

Altitudes, Roque de los Muchachos Observatory 342.1184E 28.7606N, 2326 m above sea level



staralt – Aug 13/14

Altitudes, Roque de los Muchachos Observatory 342.1184E 28.7606N, 2326 m above sea level



Answer

- 2014 August 07 01:34:25.2 UTC
- BUT, this is time at Sun centre (heliocentric)
- We really want time as observed

SLALIB -- Positional Astronomy Library

2.5-3

Programmer's Manual

Starlink User Note 67.70
P.T.Wallace
19 December 2005

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Contents

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SLA_ECOR - RV & Time Corrnns to Sun

ACTION:

Component of Earth orbit velocity and heliocentric light time in a given direction.

CALL:

CALL sla_ECOR (RM, DM, IY, ID, FD, RV, TL)

GIVEN:

RM,DM **R** mean $[\alpha, \delta]$ of date (radians)

IY **I** year

ID **I** day in year (1 = Jan 1st)

FD **R** fraction of day

RETURNED:

RV **R** component of Earth orbital velocity (km s^{-1})

TL **R** component of heliocentric light time (s)

Answer

- 2014 August 07 01:34:25.2 UTC
- BUT, this is time at Sun centre (heliocentric)
- We really want time as observed

- Heliocentric corrections is 396.3s
- So uncorrected time is:
 - 2014 August 07 01:27:48.7 UT (night of Aug 6)