Mutual Events of Binary Asteroid (22) Kalliope in 2016 and 2017

Version 2
Updated data presented in red colour

2017-01-13

ESOP XXXV, Guildford, 2016  Oliver Klös, IOTA-ES
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Some facts about (22) Kalliope:

Discovered by J.R. Hind, London, 1852

Main-Belt Type M Diameter: ~ 166 km
Orbital period: 4.97 y Synodic rotation period: 4.1483 h

2001: Satellite discovered
(Margot, J.L., Brown, M.E., 2001. IAU Circ. 7703)
2003: Satellite named "Linus"

Orbital period: 3.59 d Synodic rotation period: ?
Diameter ~ 28 km Semi-major axis ~ 1100 km
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Occultations by (22) Kalliope for Europe

2016

- Sep 05
- (Sep 22)
- Nov 03
- Nov 08
- Dec 16
- Dec 24

2017 (Jan - Jun)

- Mar 14

Predictions at: http://asteroidoccultation.com/
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The Path of (22) Kalliope

2016 Sep 01 - Dec 31

O. Klös
Guide 9.1
**Mutual Events of Binary Asteroid (22) Kalliope in 2016 and 2017**

Conditions for mutual events:
- Asteroidal system at annual equinox
- The orbital plane of Linus is close to the Sun’s line of sight.
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Conditions for mutual events:
- Asteroidal system at annual equinox
- The orbital plane of Linus is close to the Sun’s line of sight.

What can be observed:
- Eclipses and occultations by the two bodies itself
Mutual Events of Binary Asteroid (22) Kalliope in 2016 and 2017

• Mutual Events of Binary Asteroids 2016 - 2018

Frédéric Vachier, IMCCE
Mutual Events of Binary Asteroid (22) Kalliope in 2016 and 2017

Some data about the mutual events of (22) Kalliope

NEW CALCULATIONS BY PASCAL DESCAMPS

- Observable from Jan to Feb 2017
- Duration: 95 min up to 200 min
- Mag drop: 0.005 up to 0.074 mag
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Top 7 mutual events for Europe
(calculated by P. Descamps, IMCCE)

(sorted by mag drop)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time (UT)</th>
<th>Dur</th>
<th>Event</th>
<th>Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017-02-05</td>
<td>17:15 - 20:10</td>
<td>02:55</td>
<td>S1 ecl K</td>
<td>0.0619</td>
</tr>
<tr>
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<td>21:55 - 00:50</td>
<td>02:55</td>
<td>K ecl S1</td>
<td>0.0617</td>
</tr>
<tr>
<td>2017-01-27</td>
<td>17:25 - 20:35</td>
<td>03:10</td>
<td>K ecl S1</td>
<td>0.0549</td>
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<tr>
<td>2017-02-11</td>
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<td>02:55</td>
<td>K ecl S1</td>
<td>0.0551</td>
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<tr>
<td>2017-02-12</td>
<td>- 00:30</td>
<td>02:55</td>
<td>S1 ecl K</td>
<td>0.0480</td>
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<td>03:20 - 05:50</td>
<td>02:30</td>
<td>K ecl S1</td>
<td>0.0411</td>
</tr>
</tbody>
</table>

Opposition of (22) Kalliope: 2016 Dec 28
Mutual Events of Binary Asteroid (22) Kalliope in 2016 and 2017

- Hints for observation:

- The mutual events are slow:
  - Start recording at least 90 min before predicted start of event
  - Long running observation, use 1 frame per second or less
  - Digital cameras are preferred to analogue cameras (8 bit)
  - Use a high bit rate with digital cameras (10 - 16 bit)
  - Don’t forget darks and flats
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  – These are events for observers with high patience!!
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Many thanks to
Frédéric Vachier, IMCCE
and
Pascal Descamps, IMCCE
for calculating the mutual events and answering my questions.

Link to F. Vachier’s web page with predictions of stellar occultations by binary asteroids, mutual events and more:

http://fredvachier.free.fr/

List for Kalliope mutual events 2017 worldwide:
http://fredvachier.free.fr/binaries/phemu/phenomenes_kalliope2017.txt