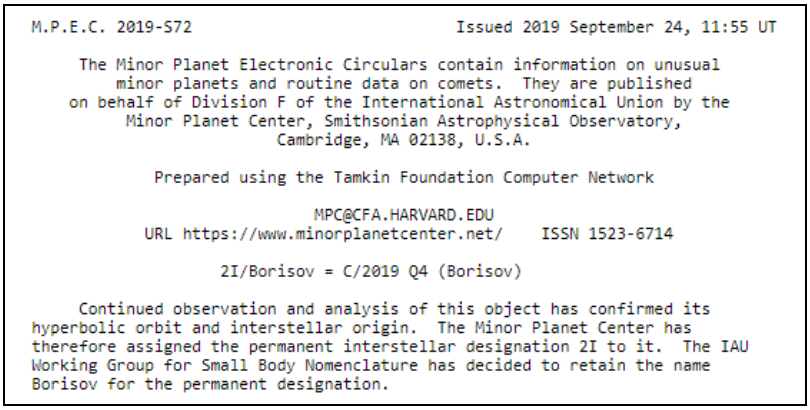
* NOVA *

N. 1604 - 25 SETTEMBRE 2019

ASSOCIAZIONE ASTROFILI SEGUSINI

2I/BORISOV = C/2019 Q4 (BORISOV)

Da ieri la cometa C/2019 Q4 (Borisov), scoperta il 30 agosto (v. *Nova* 1597 e 1598 rispettivamente del 13 e 14 settembre 2019), è ufficialmente il secondo oggetto interstellare dopo 1I/'Oumuamua, avvistato per la prima volta nell'ottobre 2017.
Già dopo una settimana di osservazioni da parte di astronomi dilettanti e professionisti, il Minor Planet Center dell'IAU (International Astronomical Union) era stato in grado di calcolare un'orbita preliminare per la cometa C/2019 Q4 (Borisov) che suggeriva che questo oggetto era interstellare.
L'orbita è ora sufficientemente nota e l'oggetto ha origine inequivocabilmente interstellare: ieri la circolare M.P.E.C. 2019-S72 (2019 September 24, 11:55 UT) lo ha ufficialmente designato come secondo oggetto interstellare, chiamandolo 2I/Borisov.



M.P.E.C. 2019-S72 Issued 2019 September 24, 11:55 UT

The Minor Planet Electronic Circulars contain information on unusual minor planets and routine data on comets. They are published on behalf of Division F of the International Astronomical Union by the Minor Planet Center, Smithsonian Astrophysical Observatory, Cambridge, MA 02138, U.S.A.

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URL https://www.minorplanetcenter.net/ ISSN 1523-6714

2I/Borisov = C/2019 Q4 (Borisov)

Continued observation and analysis of this object has confirmed its hyperbolic orbit and interstellar origin. The Minor Planet Center has therefore assigned the permanent interstellar designation 2I to it. The IAU Working Group for Small Body Nomenclature has decided to retain the name Borisov for the permanent designation.

La Circolare del Minor Planet Center del 24 settembre 2019 che annuncia 2I/Borisov.
https://www.minorplanetcenter.net/mpec/K19/K19S72.html

Delle migliaia di comete scoperte finora, nessuna ha un'orbita iperbolica come quella di 2I/Borisov. A soli due anni dalla scoperta del primo oggetto interstellare 1I/'Oumuamua, questa nuova scoperta suggerisce che tali oggetti potrebbero essere sufficientemente numerosi da fornire un nuovo modo di investigare i processi nei sistemi planetari oltre il nostro.
2I/Borisov raggiungerà il suo perielio il 7 dicembre 2019, quando sarà a 2 unità astronomiche (UA) dal Sole e anche a 2 UA dalla Terra. Entro dicembre e gennaio si prevede che raggiungerà la massima luminosità (anche se sarà invisibile ad occhio nudo) nel cielo meridionale. Inizierà quindi il suo viaggio di ritorno, lasciando infine il Sistema Solare per sempre.
Questo oggetto sarà continuamente osservabile per molti mesi, un periodo più lungo di quello del suo predecessore, 1I/'Oumuamua. Gli astronomi sono ottimisti sulle possibilità di studiare questo raro ospite in modo molto dettagliato.

https://www.space.com/interstellar-comet-borisov-officially-from-beyond-solar-system.html
https://www.sciencedaily.com/releases/2019/09/190924125025.htm
https://www.virtualtelescope.eu/2019/09/25/2i-borisov-c-2019q4-the-first-interstellar-comet-is-now-official-a-new-image-24-sept-2019/
https://s22380.pcdn.co/wp-content/uploads/Borisov_Finder_BW_V4.pdf

Nelle pagine seguenti riportiamo le effemeridi della cometa 2I/Borisov dal 26 settembre al 30 novembre c.a. calcolate, per le ore 06 CEST, dal JPL per il nostro Grange Observatory.

```
*******************************************************************************
Ephemeris / WWW_USER Thu Sep 26 07:46:30 2019 Pasadena, USA      / Horizons
*******************************************************************************
Target body name: Borisov (C/2019 Q4)             {source: JPL#10}
Center body name: Earth (399)                     {source: DE431}
Center-site name: Grange Observatory, Bussoleno
*******************************************************************************
Start time      : A.D. 2019-Sep-26 04:00:00.0000 UT
Stop  time      : A.D. 2019-Nov-30 04:00:00.0000 UT
Step-size       : 1440 minutes
*******************************************************************************
*******************************************************************************************************
 Date__(UT)__HR:MN     R.A._(ICRF/J2000.0)_DEC Azi_(a-appr)_Elev  T-mag  N-mag    S-O-T /r
*******************************************************************************************************
 2019-Sep-26 04:00 Am  09 17 24.62 +25 02 41.9  86.2494  32.7254  17.57  18.35  49.0379 /L
 2019-Sep-27 04:00 Am  09 19 16.32 +24 39 51.1  86.9564  32.8514  17.54  18.32  49.4537 /L
 2019-Sep-28 04:00 A   09 21 07.94 +24 16 42.1  87.6708  32.9739  17.50  18.30  49.8689 /L
 2019-Sep-29 04:00 A   09 22 59.48 +23 53 14.8  88.3927  33.0927  17.47  18.28  50.2834 /L
 2019-Sep-30 04:00 A   09 24 50.94 +23 29 28.9  89.1221  33.2075  17.44  18.26  50.6972 /L
 2019-Oct-01 04:00 A   09 26 42.30 +23 05 24.2  89.8591  33.3183  17.40  18.24  51.1103 /L
 2019-Oct-02 04:00 A   09 28 33.56 +22 41 00.5  90.6037  33.4250  17.37  18.22  51.5226 /L
 2019-Oct-03 04:00 A   09 30 24.73 +22 16 17.6  91.3559  33.5272  17.34  18.20  51.9341 /L
 2019-Oct-04 04:00 A   09 32 15.80 +21 51 15.3  92.1158  33.6249  17.30  18.18  52.3447 /L
 2019-Oct-05 04:00 A   09 34 06.77 +21 25 53.2  92.8833  33.7179  17.27  18.16  52.7543 /L
 2019-Oct-06 04:00 A   09 35 57.63 +21 00 11.3  93.6586  33.8060  17.24  18.14  53.1631 /L
 2019-Oct-07 04:00 A   09 37 48.40 +20 34 09.3  94.4416  33.8890  17.20  18.12  53.5709 /L
 2019-Oct-08 04:00 A   09 39 39.06 +20 07 47.0  95.2322  33.9667  17.17  18.10  53.9776 /L
 2019-Oct-09 04:00     09 41 29.61 +19 41 04.2  96.0306  34.0390  17.14  18.08  54.3834 /L
 2019-Oct-10 04:00     09 43 20.06 +19 14 00.6  96.8366  34.1056  17.10  18.06  54.7881 /L
 2019-Oct-11 04:00     09 45 10.40 +18 46 36.2  97.6502  34.1663  17.07  18.04  55.1918 /L
 2019-Oct-12 04:00     09 47 00.64 +18 18 50.6  98.4715  34.2210  17.04  18.02  55.5944 /L
 2019-Oct-13 04:00  m  09 48 50.77 +17 50 43.6  99.3002  34.2693  17.01  18.00  55.9960 /L
 2019-Oct-14 04:00  m  09 50 40.79 +17 22 15.2 100.1365  34.3112  16.97  17.98  56.3964 /L
 2019-Oct-15 04:00  m  09 52 30.69 +16 53 25.0 100.9801  34.3464  16.94  17.96  56.7957 /L
 2019-Oct-16 04:00  m  09 54 20.49 +16 24 13.0 101.8310  34.3747  16.91  17.94  57.1940 /L
 2019-Oct-17 04:00  m  09 56 10.17 +15 54 38.9 102.6891  34.3958  16.88  17.92  57.5911 /L
 2019-Oct-18 04:00  m  09 57 59.74 +15 24 42.6 103.5544  34.4096  16.84  17.90  57.9871 /L
 2019-Oct-19 04:00  m  09 59 49.20 +14 54 24.0 104.4266  34.4158  16.81  17.88  58.3819 /L
 2019-Oct-20 04:00  m  10 01 38.53 +14 23 42.8 105.3056  34.4142  16.78  17.86  58.7756 /L
 2019-Oct-21 04:00  m  10 03 27.74 +13 52 38.9 106.1913  34.4047  16.75  17.84  59.1682 /L
 2019-Oct-22 04:00  m  10 05 16.83 +13 21 12.2 107.0835  34.3870  16.72  17.82  59.5596 /L
 2019-Oct-23 04:00  m  10 07 05.79 +12 49 22.6 107.9821  34.3608  16.69  17.80  59.9499 /L
 2019-Oct-24 04:00  m  10 08 54.62 +12 17 10.0 108.8868  34.3261  16.66  17.78  60.3390 /L
 2019-Oct-25 04:00  m  10 10 43.31 +11 44 34.3 109.7975  34.2825  16.63  17.76  60.7269 /L
 2019-Oct-26 04:00  m  10 12 31.86 +11 11 35.4 110.7140  34.2300  16.60  17.74  61.1136 /L
 2019-Oct-27 05:00 Nm  10 14 24.76 +10 36 49.4 126.4767  43.4113  16.57  17.73  61.5153 /L
 2019-Oct-28 05:00 N   10 16 13.01 +10 03 02.9 127.5135  43.2509  16.54  17.71  61.8995 /L
 2019-Oct-29 05:00 A   10 18 01.12 +09 28 53.1 128.5519  43.0779  16.51  17.69  62.2823 /L
 2019-Oct-30 05:00 A   10 19 49.07 +08 54 19.9 129.5912  42.8921  16.48  17.67  62.6638 /L
 2019-Oct-31 05:00 A   10 21 36.87 +08 19 23.3 130.6309  42.6933  16.45  17.65  63.0440 /L
 2019-Nov-01 05:00 A   10 23 24.52 +07 44 03.3 131.6705  42.4815  16.42  17.63  63.4228 /L
 2019-Nov-02 05:00 A   10 25 12.00 +07 08 19.9 132.7095  42.2565  16.39  17.62  63.8001 /L
 2019-Nov-03 05:00 A   10 26 59.33 +06 32 13.3 133.7473  42.0182  16.37  17.60  64.1761 /L
 2019-Nov-04 05:00 A   10 28 46.50 +05 55 43.3 134.7834  41.7665  16.34  17.58  64.5505 /L
 2019-Nov-05 05:00 A   10 30 33.51 +05 18 50.2 135.8173  41.5013  16.31  17.56  64.9235 /L
 2019-Nov-06 05:00 A   10 32 20.37 +04 41 33.9 136.8484  41.2225  16.28  17.55  65.2949 /L
 2019-Nov-07 05:00 A   10 34 07.06 +04 03 54.7 137.8762  40.9301  16.26  17.53  65.6649 /L
 2019-Nov-08 05:00 A   10 35 53.59 +03 25 52.6 138.9002  40.6241  16.23  17.51  66.0333 /L
 2019-Nov-09 05:00 A   10 37 39.96 +02 47 27.9 139.9199  40.3044  16.21  17.50  66.4001 /L
 2019-Nov-10 05:00 A   10 39 26.17 +02 08 40.6 140.9347  39.9709  16.18  17.48  66.7654 /L
 2019-Nov-11 05:00 A   10 41 12.22 +01 29 31.1 141.9443  39.6238  16.16  17.47  67.1292 /L
 2019-Nov-12 05:00 Am  10 42 58.10 +00 49 59.5 142.9480  39.2630  16.13  17.45  67.4914 /L
 2019-Nov-13 05:00 Am  10 44 43.82 +00 10 06.2 143.9456  38.8887  16.11  17.44  67.8520 /L
 2019-Nov-14 05:00 Am  10 46 29.37 -00 30 08.6 144.9364  38.5007  16.09  17.42  68.2111 /L
 2019-Nov-15 05:00 Am  10 48 14.75 -01 10 44.6 145.9202  38.0992  16.07  17.41  68.5686 /L
 2019-Nov-16 05:00 Am  10 49 59.96 -01 51 41.4 146.8964  37.6844  16.04  17.39  68.9245 /L
 2019-Nov-17 05:00 Am  10 51 45.00 -02 32 58.7 147.8648  37.2563  16.02  17.38  69.2789 /L
 2019-Nov-18 05:00 Am  10 53 29.86 -03 14 36.0 148.8249  36.8150  16.00  17.36  69.6318 /L
 2019-Nov-19 05:00 Am  10 55 14.53 -03 56 32.8 149.7764  36.3608  15.98  17.35  69.9831 /L
 2019-Nov-20 05:00 Am  10 56 59.01 -04 38 48.8 150.7190  35.8937  15.96  17.34  70.3328 /L
 2019-Nov-21 05:00 Am  10 58 43.30 -05 21 23.4 151.6523  35.4139  15.94  17.33  70.6811 /L
 2019-Nov-22 05:00 Am  11 00 27.40 -06 04 16.0 152.5762  34.9217  15.93  17.31  71.0277 /L
 2019-Nov-23 05:00 Am  11 02 11.28 -06 47 26.2 153.4903  34.4172  15.91  17.30  71.3729 /L
 2019-Nov-24 05:00 Am  11 03 54.95 -07 30 53.2 154.3944  33.9007  15.89  17.29  71.7165 /L
 2019-Nov-25 05:00 Am  11 05 38.41 -08 14 36.4 155.2883  33.3724  15.87  17.28  72.0585 /L
 2019-Nov-26 05:00 A   11 07 21.64 -08 58 35.2 156.1718  32.8326  15.86  17.27  72.3989 /L
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*******************************************************************************************
 Date__(UT)__HR:MN     R.A._(ICRF/J2000.0)_DEC Azi_(a-appr)_Elev  T-mag  N-mag    S-O-T /r
*******************************************************************************************
 2019-Nov-27 05:00 A   11 09 04.64 -09 42 48.8 157.0447  32.2815  15.84  17.26  72.7378 /L
 2019-Nov-28 05:00     11 10 47.40 -10 27 16.5 157.9069  31.7194  15.83  17.25  73.0750 /L
 2019-Nov-29 05:00     11 12 29.93 -11 11 57.6 158.7581  31.1466  15.82  17.24  73.4106 /L
 2019-Nov-30 05:00     11 14 12.21 -11 56 51.3 159.5983  30.5634  15.80  17.23  73.7445 /L
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Column meaning:

TIME

Times PRIOR to 1962 are UT1, a mean-solar time closely related to the prior but now-deprecated GMT. Times AFTER 1962 are in UTC, the current civil or "wall-clock" time-scale. UTC is kept within 0.9 seconds of UT1 by introduction of integer leap-seconds for 1972 and later.

Conversion from the internal Barycentric Dynamical Time (TDB) to the non-uniform civil UT time-scale requested for output has not been determined for UTC times after the next July or January 1st. Therefore, the last known leap-second is used as a constant over future intervals.

Time tags refer to the UT time-scale conversion on Earth regardless of where the observer is located in the solar system. For example, if an observation from the surface of another body has an output time-tag of 12:31:00 UT, it refers to a time-scale conversion from TDB to UT valid at the center of the Earth at that instant, not the observer's location elsewhere in the solar system, where clock rates may differ slightly due to the local gravity field and there is no precisely defined or adopted "UT" analog.

Any 'b' symbol in the 1st-column denotes a B.C. date. First-column blank (" ") denotes an A.D. date. Calendar dates prior to 1582-Oct-15 are in the Julian calendar system. Later calendar dates are in the Gregorian system.

NOTE: "n.a." in output means quantity "not available" at the print-time.

SOLAR PRESENCE (OBSERVING SITE)

Time tag is followed by a blank, then a solar-presence symbol:

- '*' Daylight (refracted solar upper-limb on or above apparent horizon)
- 'C' Civil twilight/dawn
- 'N' Nautical twilight/dawn
- 'A' Astronomical twilight/dawn
- ' ' Night OR geocentric ephemeris

LUNAR PRESENCE (OBSERVING SITE)

The solar-presence symbol is immediately followed by a lunar-presence symbol:

- 'm' Refracted upper-limb of Moon on or above apparent horizon
- ' ' Refracted upper-limb of Moon below apparent horizon OR geocentric ephemeris

R.A._(ICRF/J2000.0)_DEC =

Astrometric right ascension and declination of the TARGET CENTER with respect to the observing site in the coordinates of the ICRF/J2000 inertial reference frame. Compensated for down-leg light-time.

Units: RA in hours-minutes-seconds of time (HH MM SS.ff),
DEC in angular degrees-minutes-seconds (DD MM SS.f)

Azi_(a-appr)_Elev =

Airless apparent azimuth and elevation of target center. Adjusted for light-time, the gravitational deflection of light, stellar aberration, precession and nutation. Azimuth measured North(0) -> East(90) -> South(180) -> West(270) -> North (360). Elevation is with respect to plane perpendicular to local zenith direction. TOPOCENTRIC ONLY. Units: DEGREES

T-mag N-mag =

Comet's approximate apparent visual total magnitude ("T-mag") and nuclear magnitude ("N-mag") by following standard IAU definitions:

T-mag = M1 + 5*log10(delta) + k1*log10(r)
N-mag = M2 + 5*log10(delta) + k2*log10(r) + phcof*beta

Units: MAGNITUDES

S-O-T /r =

Sun-Observer-Target angle; target's apparent SOLAR ELONGATION seen from the observer location at print-time. Angular units: DEGREES

The '/r' column indicates the target's apparent position relative tothe Sun in the observer's sky, as described below:

For an observing location on the surface of a rotating body (considering its rotational sense):
/T indicates target TRAILS Sun (evening sky; rises and sets AFTER Sun)
/L indicates target LEADS Sun (morning sky; rises and sets BEFORE Sun)

For an observing point NOT on a rotating body (such as a spacecraft), the "leading" and "trailing" condition is defined by the observer's heliocentric orbital motion: if continuing in the observer's current direction of heliocentric motion would encounter the target's apparent longitude first, followed by the Sun's, the target LEADS the Sun as seen by the observer. If the Sun's apparent longitude would be encountered first, followed by the target's, the target TRAILS the Sun.

NOTE: The S-O-T solar elongation angle is numerically the minimum separation angle of the Sun and target in the sky in any direction. It does NOT indicate the amount of separation in the leading or trailing directions, which are defined in the equator of a spherical coordinatesystem.

Computations by Solar System Dynamics Group, Horizons On-Line Ephemeris System
4800 Oak Grove Drive, Jet Propulsion Laboratory - Pasadena, CA 91109 USA
Information: http://ssd.jpl.nasa.gov/
Connect: telnet://ssd.jpl.nasa.gov:6775 (via browser)- telnet ssd.jpl.nasa.gov 6775 (via command-line)
Author: Jon.D.Giorgini@jpl.nasa.gov

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