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History   Black Drop Effect

Black Drop Effect

The strange "black drop" effect was a conundrum that fouled the observations of dedicated observers. At the moment when Venus should nearly touch the edge of the sun, the circular planet appears to elongate.

*Note that some of the interpretations below on what causes the "black drop" effect are dated or subject to debate.*

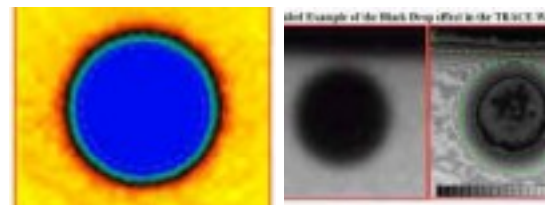
Links: Black Drop Effect

[http://www.phys.uu.nl/~vgent/venus/venus\\_text2.htm#black%20drop](http://www.phys.uu.nl/~vgent/venus/venus_text2.htm#black%20drop)

Bibliography: *The Black Drop and Related Phenomena*, from R.H. van Gent

<http://www.transitofvenus.org/faq/298-what-causes-the-black-drop-effect>

FAQ: *What causes the Black Drop Effect?* A simplified explanation of limb darkening and point-spread function, courtesy of Jay Pasachoff.



<http://nicmosis.as.arizona.edu:8000/POSTERS/TOM1999.jpg>

Poster on the 1999 transit of Mercury "definitively solves the problem of the black-drop effect that plagued past transits of Venus;" by Jay Pasachoff, Glenn Schneider and Leon Golub; from the American Astronomical Society's Division of Planetary Science meeting in 2001.



<http://arxiv.org/pdf/astro-ph/0310379>

Report by Schneider, Pasachoff, and Golub (see poster above) "separates the primary contributors to [the "Black Drop" Effect], solar limb darkening and broadening due to the instrumental point spread function...for the 1999 transit of Mercury, seen in high spatial resolution optical imaging with NASA's TRACE spacecraft."

<http://www.aas.org/publications/baas/v32n4/aas197785.htm>

Abstract describes physical cause of "black drop" effect; B. E. Schaefer (Univ. Texas Austin) at 2001 AAS meeting.



From footnote 28 of **Chapter 7** of *Sky and Ocean Joined: U.S. Naval Observatory, 1830-2000*, by Steven J. Dick, (Cambridge University Press, 2003):

“The physical cause of the black drop phenomenon has been the subject of considerable controversy. Bradley Schaefer reviews the controversy in “The Transit of Venus and the Notorious Black Drop,” *BAAS*, 32 (2000), 1383-1384. He concludes that the phenomenon is not caused by diffraction, illusion or atmospheric refraction, but by terrestrial atmospheric smearing that blurs the image.”

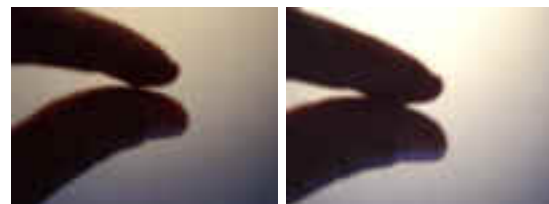
<http://www.bo.astro.it/~biblio/Horn/Blackdrop.htm>

Origin and Phases of the "Black Drop" Phenomenon, a paper on the understanding of the black drop effect as of 1922. Also available in Italian; from Guido Horn D'Arturo of Università di Bologna, Dipartimento di Astronomia, 1922.



[http://skyandtelescope.com/news/article\\_1277\\_1.asp](http://skyandtelescope.com/news/article_1277_1.asp)

Sky & Telescope magazine asks, "Where Was the Black Drop?" after the 2004 transit of Venus.



To simulate the appearance of the "black drop" effect, almost pinch your thumb and forefinger together against a bright background. Near contact the ligament between them appears.

[http://vestige.lmsal.com/TRACE/transits/venus\\_2004/](http://vestige.lmsal.com/TRACE/transits/venus_2004/)

Images and movies from the TRACE spacecraft are among many new perspectives of the 2004 transit of Venus.

At the critical moment when observers try to time when Venus touches the inside edge of the sun, strange phenomena such as the **black drop effect** suddenly emerge. This site guides observers in discerning at what instant internal contact occurs; from Steven van Roode.

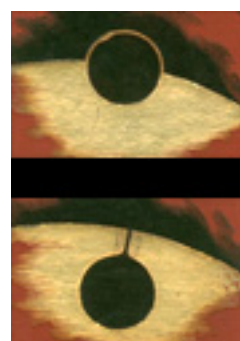


<http://star.arm.ac.uk/history/transit.html>

Drawings of the Transit of Venus by Captain James Cook and Charles Green; from the Armagh Observatory.

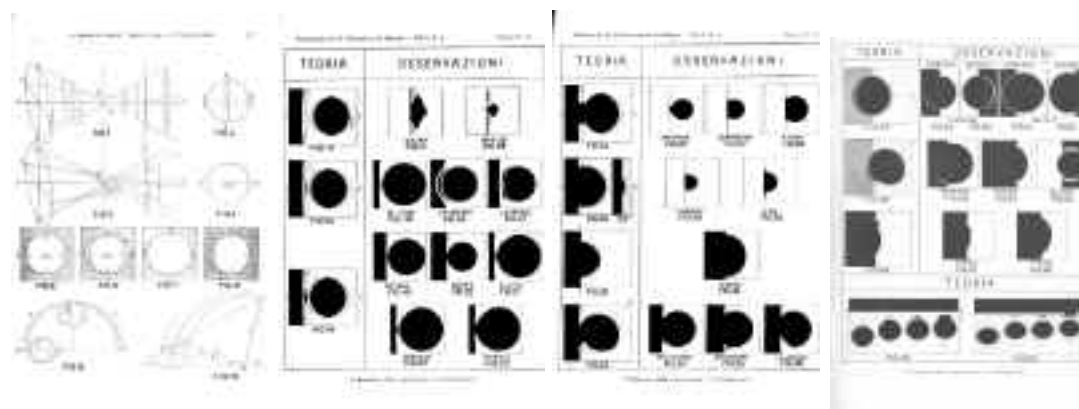
<http://www.metaresearch.org/home/Viewpoint/blackdrop.asp>

In noting "an irradiation effect – the apparent spreading of light from bright areas onto any adjacent dark areas," author Tom Van Flandern asserts that the well-understood black drop effect "provides a timing advantage rather than a disadvantage."



[http://www.bo.astro.it/~biblio/sma/page/venere\\_05\\_06\\_1761.html](http://www.bo.astro.it/~biblio/sma/page/venere_05_06_1761.html)

Bibliographical and archival records from the Department of Astronomy of the University of Bologna (Italy), featuring manuscripts of observations made in Bologna by Eustachio Zanotti; includes images and resources from transits in addition to the 1761 records. (Italian; a link with some English translation is at <http://www.bo.astro.it/~biblio/Archives/copertina.html>.)



<http://www.bo.astro.it/~biblio/Horn/Blackdrop.htm>

A detailed 1922 assessment of the black drop effect suggests "instrumental astigmatism should be considered the cause of some aspects of the *photographed* GUIDO HORN D'ARTURO The "black drop" phenomenon and astigmatism. Università di Bologna, Dipartimento di Astronomia, (Pubblicazioni dell'Osservatorio astronomico della R. Università di Bologna, vol. I, n.3, 1922). ligaments."

[Read more: Links: Black Drop Effect](#)

