

LETTERS TO THE EDITOR

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THE TRANSIT OF VENUS: JUNE 5/6, 2012

For most living humans June 5, 2012 will be their last chance to see Venus cross in front of the Sun, to share the fascination felt by astronomers in past centuries, and to appreciate their observations and measurements. It is also an occasion to organize public viewings and to participate in international projects to publicize, view, and measure the transit.

On June 5th/6th between 10:09 pm and 4:50 am Universal Time, the black, circular silhouette of Venus will slowly pass across the Sun's disc from east to west (see Fig. 1). Such a passage is called a *transit of Venus*.¹

The transit can be observed without any magnification using only a pair of Solar filters. You can also project the Sun with field glasses, you can view it through a telescope equipped with a solar filter, and, of course, you can photograph it. The last transit of Venus occurred in 2004, but after this June the world will have to wait until 2117 for the next one.

Transits of Venus are rare because Venus and Earth have different orbital

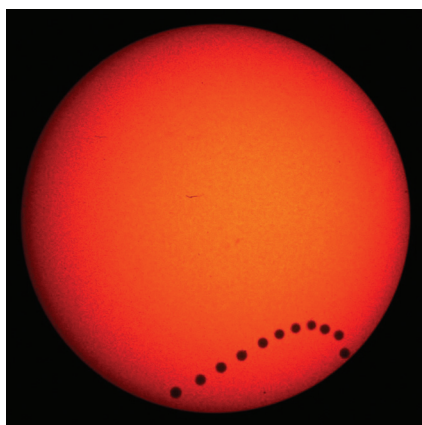


Fig. 1. Reconstruction of 2004 transit of Venus across the Sun as photographed from Essen, Germany.

periods and different inclinations of their orbital planes. The exact alignment of Venus, Earth, and the Sun required for a transit of Venus only occurs twice in (roughly) a century, as a pair of transits about 8 yr apart. For an observer on Earth, Venus will usually pass above or below the Sun and be invisible during its conjunction with the Sun.

When being observed from distant sites, the transit will appear slightly different:

- Different observers will see Venus enter onto the Sun's disc at times differing by up to 15 min, and they will measure similarly different exit times.
- The positions of Venus on the Sun's disc on photos taken at different places at exactly the same time will differ by up to half of the diameter of Venus' disc (see Fig. 2).

These parallax effects occur because Venus is not as far from Earth as the Sun. From measurements of the parallax, one can determine the distances of Venus and the Sun from Earth. This Earth-Sun distance, called the Astronomical Unit (AU), is the basic benchmark for determining the size of our solar system. In the 18th and 19th centuries, several countries organized expeditions to locations all over the world to view transits of Venus. At the time, this was the best way to determine the AU.^{2,3}

By organizing public viewing events, the upcoming transit offers an excellent

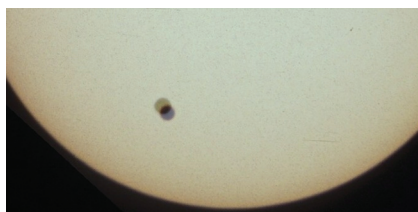


Fig. 2. Parallax of Venus during 2004 transit as it appears in the superposition of properly rescaled and rotated photos from Germany and Namibia.

opportunity to increase public awareness of astronomical phenomena and the history and nature of science. With international cooperation (including inter-American cooperation) it will be possible to combine your own measurements with those of distant observers. You have the chance to repeat historical measurements with modern equipment, make your own measurement of the AU, and experience the fascination of scientific discovery and the difficulties that had to be conquered in order to achieve a satisfactory accuracy.

The 2012 transit will begin in the afternoon on the North American continent but will end after sunset. People in Asia and parts of Europe and Africa will be able to view the second part of the transit, but only a few people (e.g., in Japan and Australia) will be able to observe the entire transit.

Several international projects have been organized to observe, photograph, and measure the transit. In addition, there are numerous websites that offer information about the history, the importance, and the details of transits.⁴ Such websites also help bring people together from all over the world so they can compare their observations and determine the distance from Earth to the Sun.

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¹More information on transits of Venus can be found online at http://en.wikipedia.org/wiki/Transit_of_Venus

²D. Hudon, "A (not so) brief history of the transits of Venus," *J. R. Astron. Soc. Can.* **98**(1), 6–20 (2004), available online at http://people.bu.edu/hudon/transit_jrasc_final.pdf

³E. Maor, *Venus in Transit* (Princeton U.P., Princeton, 2004).

⁴See, for example, www.venus2012.de and www.transitofvenus.nl.