Asteroid and Cometary Occultations

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Occultations of stars by minor planets and comets can be used to determine the diameter of the occulting body. With photoelectric equipment, it might also be possible to measure the diameter of the occulted star or to resolve close binary systems at the same time.

On 1983 May 29, (2) Pallas occulted the 4.7-mag. star 1 Vulpeculae. A star this bright is occulted by one of the four largest asteroids only once every 60 years. Timings were sent by 130 observers in Florida, Louisiana, Texas, Arizona, Sonora, and Baja California, making it the best-observed asteroidal occultation to date. Asteroidal grazing phenomena were confirmed for the first time. The star is a spectroscopic binary. Several observers timed contacts of the 6th-mag. companion, determining the separation to ± 0.0004 arcsec. An elliptical fit to the timings projected onto the plane of the sky has been made. Unfortunately, clouds prevented timings from near the southern limit, so about 100° of Pallas' circumference was not observed.

The occultation of 14 Piscium by (51) Nemausa on 1983 September 11 was observed from approximately 50 stations from south-eastern Alabama to south-eastern Virginia. Photoelectric observations were made with portable 36-cm Schmidt-Cassegrain telescopes operated by Ted Dunham and Richard Baron (MIT) at sites near Emporia, VA, and in eastern NC. Another portable photoelectric station recorded the occultation at the Mark Smith Planetarium at Macon, GA; Glenn Schneider of the University of Florida directed the effort. A fourth photoelectric record was obtained at the NASA Langley Research Center, Hampton, VA. Joan and David Dunham obtained a television record at Essex Meadows, VA a southern suburb of Norfolk.

Video-records of close approaches to 6th-mag. stars by Comets Giacobini-Zinner and Halley showed no dimmings by cometary matter. Theoretical models show that material dense enough to cause noticeable dimming is usually present only within 10 km of the nucleus. Astrometric errors were large, so nearly 100 stations were needed for confirmed timings from two or more sites. During a close Halley appulse in November, observers at separate sites near Brisbane timed similar large dimmings for half a minute. Large amounts of dust may be released sporadically, causing dimmings over large distances. The 5-fold difference in dust detected by the two VEGA spacecraft seems to confirm this.

Another occultation of a 8.7 mag. star, SAO 104751 by Pallas on 1983 May 4 should be mentioned. A 23.49-second occultation was recorded photoelectrically

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at the Engelhardt Observatory in Kazan (USSR), the only observation of this event. Unlike the condition for any of the May 29th observers, the sky transparency was good and conditions were photometric at Kazan on May 4th. A report was published by V.B Kapkon in *Soviet Astronomy Letters*, **10**, p.26 of the English translation (p.67 of the original, edition of 1984 Jan.–Feb.). The observations show a dimming before and after the occultation. Kapkov has prepared a computer-generated model, and suggests that the dimming may be due to a cloud of dust grains and gas resulting from meteorite impacts on Pallas.

References

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Note: The results of the Pallas 1983 May occultation of 1 Vulpeculae have been submitted for publication in *Astron. J.*