Measuring the Size of the Universe with a Point-and-Shoot Camera

Observations of the June 5, 2012 Transit of Venus

by George A. Alers, Research Scholar in Residence

Wednesday, March 6, 2013  6:30pm
(presentation will follow Astronomy Club business starting at 6:00pm)
Fisher Science, Bldg. 33, Room 287

The Transits of Venus are rare events and stand out in history as yielding the first measurements of the distance between the earth and the sun. This dimension is important because it establishes the Astronomical Unit which is the basic unit of distance in defining the size of solar system, the distance to the nearest stars and beyond that to the size of the universe.

This talk describes the adventures of the author as he traveled to Hawaii in early June of 2012 armed only with his pocket-sized digital camera and no telescope. Dr. Alers viewed the transit from a beach on the northwest corner of the Big Island of Hawaii, along with over 200 other amateur astronomers equipped with chronometers, telescopes, and digital imaging devices. With the aid of a tripod and a simple solar filter, a series of photographs of the sun were taken with a Canon ELPH 300HS Power Shot digital camera. Using formulae taken from the internet, these photographs allowed the Astronomical Unit to be measured at 142 ±19 million kilometers which differs from the accepted value by only 4.7%.

In addition to recording the features of the Transit, the trip to Hawaii included a close-up view of the Keck Observatory which stands at an elevation of 14,000 feet on Mauna Kea Mountain. Lectures by one of the Keck astronomers, Dr. Alex Filippenko, provided the tour group with the latest news on the observation of solar systems associated with nearby stars as well as some details on the recent improvements in observational astronomy being implemented at the Keck Observatory.

Dr. Alers received his PhD from the University of Iowa. His thesis work used ultrasonics to study the properties of metals. In addition to being an amateur astronomer, he currently is using novel ultrasonic techniques to locate corrosion damage in buried gas pipelines.

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