Rappahannock Astronomy Club

Minutes, July 16, 2014, Meeting

In attendance:

- Bart & Linda Billard
- John Gray
- Ron Henke
- Glenn Holliday
- Scott Lansdale
- Jim McCloud
- Lauren Nicholson
- Tim Plunkett
- Peter Turek

Acting Vice President Glenn Holliday called the meeting to order at 7 p.m. Eight members and two visitors were present.

Program

Bart Billard presented a program on his first International Occultation Association (IOTA) annual meeting. The meeting took place at the University of Maryland Observatory in College Park, the weekend before our club meeting. Bart said the program was packed with presentations, and he would try to give an idea of the flavor of the meeting in case others might be interested in future IOTA meetings. An example of the "flavor" was the barbeque on Saturday evening, pictured on the IOTA meeting webpage, which was hosted by Joan and Dave Dunham. They also provided food and snacks for attendees during the meeting, and Bart's only expenses were the drive up Saturday and back home Sunday, along with overnight lodging. (There was no charge to attend the meeting.)

Bart showed the IOTA webpage, explaining occultations (see "What is an Occultation") before describing a few talks at the meeting. He explained the diagram showing the Moon passing between the Earth and a star, with a shadow cast on the ground that moves across a swath of the Earth's surface. The shadow on the ground is not discernable, but an observer in the path looking at the star would see it disappear for a while and then reappear (although if the limb of the Moon where one of those events occurs is sunlit, that disappearance or reappearance would require a very bright star to be seen). If observers at different locations time the interval between the disappearance and reappearance, those nearer the edge of the path will get a shorter time than those nearer the middle. An observer at the edge of the path would see a "graze." Because of mountains and valleys on the limb of the Moon, a graze observer could see more than one disappearance and reappearance. Timing these events can allow a team of observers arrayed near the edge of the shadow path to measure the topography of a portion of the Moon's limb.

Asteroid occultation timing is similar, although it is rarer to have good enough predictions to allow several observers to measure a graze. Bart showed how a picture of the shape of an asteroid emerges from a plot of the results of the timing by a team of observers. In the plot, parallel trails represent where the star was visible to each observer, and gaps in the trails represent where the star was not visible to the corresponding observer. In answer to a question, Bart noted that adjustments had to be made for differences in positions of observers along the path of the shadow, and the plot appears as if all the observers were in a single line perpendicular to the path of the shadow. Then the blank areas of all the trails line up to indicate the shape of the asteroid's shadow. An outline was added around this blank area in the shape of a nearly circular ellipse. Additional questions highlighted some of the details of this shape determination. One is that the shape could change with rotation. The shape would represent one cross section of the asteroid, and additional measurements of other occultation events would be needed to develop a three-dimensional picture. Also, where there are gaps between observers, as in the example Bart showed, details of the shape would not be revealed. John Gray answered a question about which asteroids were spherical, saying they had to be on the order of 300 kilometers in diameter to gravitationally pull themselves into spheres. Bart speculated the circular model might be a starting point used when there was limited data.

Bart had another example from a warmup timing attempt the night of July 14–15 (the week before the meeting). Dave Dunham sent an email with the prediction the morning before the event, and Bart gave it a try, although he was only prepared to do a visual timing instead of using video. (He had a shortwave

radio tuned to WWV and an MP3 device to record the WWV time signal along with his observations of the target star.) The email included a way to pre-point the telescope to another star at the same declination as the target 2 hours 10.5 minutes before the event so the telescope was pointed at the right place when the occultation occurred. Bart said he was successful with pre-pointing, but the sky was so bright he could barely see the target star. There was a period when he realized he was not seeing the target, but he was only able to report the reappearance. He said his "reappearance" was about 48 seconds after the predicted time of the occultation. The preliminary results plot confirmed it was probably an effect of seeing and the marginal star visibility. Bart's observation was likely a few kilometers north of the shadow's path.

Bart also included some slides from the talk by Elizabeth Warren, the University of Maryland Observatory coordinator. She spoke on the observatory's history, the equipment, the programs, and people, prior to taking attendees on a tour of the facility. This year is the 50th anniversary of its dedication. The observatory has held open houses on the 4th and 20th of each month for about 45 years. It has a 20-inch Bent Eichner Cassegrain telescope in the west bay and several other telescopes: an 8-inch NASA Astrograph, a 14-inch Celestron SCT, and a 7-inch Astro-Physics refractor in the east bay along with her personal 6-inch Astro-Physics refractor; and six 8-inch Celestrons and four other telescopes that can be set up outside.

Bart briefly touched on other topics covered and showed slides from a presentation by Ted Blank on making a video camera adaptor to use an Orion Go-Scope 80 as a mobile occultation timing station. He also talked a little about a March attempt at timing an occultation of Regulus by Erigone and showed some slides from a talk about the next predicted occultation of Regulus by (1669) Dagmar in May of next year. The March attempt was spoiled by clouds, and next year's will be a daytime event with Regulus low in the sky for the Washington, DC, area. IOTA's presentations page provides downloads for most of the talks, as well as links to videos of the presentations on YouTube. The meeting was streamed on the web for those who could not attend in person.

Scott Lansdale also briefly talked about the 2014 meeting of the Society of Amateur Radio Astronomers (SARA), during the week of June 30 at the National Radio Astronomy Observatory in Green Bank, WV. There were talks about the Search for Extraterrestrial Intelligence, receiver development, and porting Sudden Ionospheric Observation monitoring to Raspberry Pi, a credit-card-sized single-board computer based on Linux. It reportedly would be a better solution for continuous operation than the current equipment based on a PC with a sound card. Scott said there was an associated conference focused on radio observation of Jupiter. He was interested in radio outbursts or storms of synchrotron radiation resulting from the volcanically active satellite, Io, which spreads ionized particles into the strong magnetic field around Jupiter. Scott said he was purchasing an antenna pair designed to observe these storms at 20 MHz. The antennas are designed to run east–west and are phased to direct the beam toward Jupiter. He hopes to use the antennas in his attic to avoid objections from his homeowners' association, although it may not be the ideal distance from the ground. The projects are packaged for middle and high school students. SARA dues are inexpensive, and mostly support 6,000 such educational projects.

Old Business

- Treasurer's Report—For June Tim Plunkett reported receiving dues and a donation from a new member. Paid membership for the year is now 25.
- Star Parties, Events, and Meetings—The June 28 star party was a successful event. Glenn participated in the concurrent Great American Campout at Caledon, which had about 80 participants, and he was only able to stop by the star party when the last club member was packing up. Linda Billard estimated we had about 20 people stop by to look through telescopes. In addition to club members, two other couples came with telescopes. Fireflies put on quite a display during the evening.

  Glenn said he expected a Girl Scout astronomy event for October but had not received registration materials yet.

  August is our picnic for club members only. No one has volunteered to come up with some entertainment activity. In the past, Scott Busby has run a gift exchange. Scott Lansdale volunteered to take his radio astronomy equipment for a demonstration. The club Personal Solar Telescope could also be set up.
- Communications Committee Report—Linda said she had not had a lot of time for work on the next newsletter, but she had some people who should be giving her articles in the next week. She thought these would allow her to get the newsletter out on schedule. Glenn said he was not doing a lot of work on the website. He noted the software filters were still catching a lot of SPAM. He also noticed

other sites with some of the same SPAM appearing in the comments. Apparently these sites did not have as good filters.

New Business

- No new business was discussed.

Next Meeting

The next meeting is the club picnic on Saturday, August 23, 2014, at Belmont Observatory.