

Rappahannock Astronomy Club

Minutes, December 20, 2017, Meeting

In attendance:

Jean Benson
Bart & Linda Billard
Don Clark
David Hiles
Glenn Holliday
Jerry Hubbell

Scott Lansdale
Payal Patel
Tim Plunkett
Ryan Rapoza
Matt Scott

The meeting began at about 7 p.m. Twelve members were present.

Program

Bart Billard and Jerry Hubbell presented "Exoplanet Transit Observation." They talked about having taken taking a course for amateurs interested in observing the transits of extrasolar planets with orbits that pass between Earth and their host stars from the CHOICE program of the American Association of Variable Star Observers (AAVSO). Jerry showed the AAVSO website and the pages for the CHOICE courses, including the exoplanet observing course. He also showed where to find resources for exoplanet observing, including the website astrodennis.com maintained by Dennis Conti, the course instructor, who has a book, *A Practical Guide to Exoplanet Observing*, available for free download. Another website, Bruce Gary's Amateur Exoplanet Archive, provides a download link for his book, *Exoplanet Observing for Amateurs* (also available as a free PDF download—a small run of printed books has since sold out), and for a spreadsheet, BTE_ephemeris, that Jerry and Bart used to predict transits for their early observing attempts.

Bart then described their recent observation using MSRO of a transit of the planet GJ436b, on Saturday, December 16. The BTE_ephemeris spreadsheet showed a predicted transit starting (ingress) at 3:38 a.m. and ending (egress) at 4:35 a.m., with a star visual magnitude of 10.7 and a depth of 26 mmag (26 thousandths of a magnitude). Jerry and Bart thought the star brightness and relatively large transit depth were favorable for detecting with the MSRO 6-inch refractor. Bart explained the notation he had added next to prediction showing the star GJ436 was also TYC 1984-2613-1 or HIP 57087. He put similar identifications alongside other predictions in the ephemeris using lookups in the Stellarium planetarium program, which indicated they came from Simbad. In the case of GJ436, Stellarium found an identification not recognized by the Cartes du Ciel planetarium program on the MSRO computer. Bart showed how to look up the star directly on the Simbad website, where he found the TYC number that worked. The Cartes du Ciel view of the region of GJ436 and an image he and Jerry made to confirm whether they had found it with the telescope had a pair of stars in the Cartes du Ciel display, but only one in the image they took. Bart said it puzzled them for a while as they prepared to observe the transit until they finally realized the program was displaying two different catalog positions representing the same star. What looked like a convenient target and a well-matched reference star were actually just one object. Indeed, the identifier for the extra star in the program was the HIP number that Bart had added to the spreadsheet, and it was actually one of the identifiers that Simbad had found.

Jerry and Bart recorded the data that morning, noticing some periods of cloudiness that produced poor images. The results from the Maxim DL photometry analysis tool showed the calculated magnitudes of the target star and a reference star covering a period from 8.5 hours UT (3:30 a.m. EST) to a little after 11 hours UT. Both stars became dimmer during that time, and the cloudiness showed as some spotty and erratic extra dimming, especially between 9 and 10 hours UT. Some of the worst points were about the time that the dimming of the star by the exoplanet should have been decreasing up to the egress.

Bart noted that the MSRO Clear Sky Chart for that night showed transparency deteriorating by a step during the period he and Jerry were observing. Perhaps that trend accounted for the dimming of the two stars over the whole observation period. For the transit light curve, the differential magnitude (target star magnitude minus reference star magnitude) is plotted. This difference gets rid of most of the intensity variation affecting both stars (like the effects of transparency, for example), although some of the clouds'

effects still showed through as more scattered and inconsistent measurements. The worst of these were discarded. The most striking thing about the light curve was that an arrow indicating the predicted depth of 26 mmag was nearly too long to fit the entire range plotted and was certainly not consistent with the measurements. A transit of that depth would have stood out clearly in the data. Bart explained that it led him to discover an error in the ephemeris spreadsheet that caused the prediction for a different exoplanet to appear for GJ436. When he looked at the tab devoted to their target star, he found the correct depth prediction was 7.5 mmag, not 26. The horizontal lines Bart included in the light curve plot representing the averages of the measurements near the middle of the transit and of those after the egress suggest the depth observed was about 5 mmag. That is more consistent with the prediction given the uncertainties in the individual measurements.

Bart and Jerry concluded they were encouraged with the quality of the data they got even with the unfavorable conditions affecting much of their data. They found ways they could be better prepared for the next attempts and learned there are two more up-to-date transit prediction resources they will take advantage of in the future. Two of these, [EDT](#) (Exoplanet Transit Database) and NASA [Exoplanet Archive](#), are listed in the resources slide at the end of the presentation. Bart said he and Jerry would definitely try more exoplanet observations. A PDF of the presentation is available on the club website on the [monthly programs page](#).

Old Business

- Communications—Scott Lansdale first called on Payal Patel to present her proposed designs for a card to hand out to people interested in RAC. She listed some options she considered, including size, what to add that the current business card design omits, and whether to have cards printed one-sided or front and back. She included a short description about RAC and information on the website and how to find RAC in Twitter and Facebook. Payal also had pricing information from several printers, and she noted that getting two-sided printing did not make too much difference in cost. Don Clark suggested boldface for the star party and meeting information on the back of the two-sided example. Linda Billard offered to wordsmith it for shorter sentences to give more impact for the star party and meeting information. Linda thought Payal's suggestion of using bullets was a good idea. There was some discussion of using a color astrophoto in place of the monochrome image Payal used as an example. Linda suggested getting permission from the photographer for using the image chosen. Discussion seemed to suggest members favored trying front and back and starting with a set of 250 cards. Jerry made a motion to authorize an expense up to \$50 to try to have 250 cards ready by next meeting. The motion was approved after a second by Payal. Linda and Payal agreed to work together in the next week or two to polish up the design.

Payal raised a question about paying Meetup for allowing a larger number of users. She said she is paying \$9 per month from her own pocket for a small number of Meetup members. To make that work she may have to enforce cutting off users who do not attend meetings or star parties often enough (perhaps at least once every 6 months). To avoid that would require paying more than she could afford. Jerry said he thought she should be reimbursed for what she is paying now.
- MSRO—Jerry said MSRO is getting more users and they are starting to implement some scheduling. He said Myron is hoping to build some credibility in order to seek possible funding. Jerry also said Explore Scientific is going to loan MSRO a larger refractor to install and test. He said his Explore Scientific PMC-Eight mount controller was named a “hot product of 2018” in the January issue of *Sky & Telescope*.
- Recent Events Held—Scott described the trip to Randolph-Macon on December 2 to tour the new observatory. The clouds subsided enough for some views during the fading twilight. Alberio showed nicely in the twilight. The Caledon star party December 16 was a success.
- Treasurer's Report for November 30, 2017—Tim Plunkett's report showed five dues payments, with Astronomical League dues included with two. Payments to Don Clark for ISP fees and Glenn Holliday for the pizza purchase for the election meeting left a total of \$1.72 incoming for the month. The number of paid memberships for 2018 reached eight last month.

New Business

- *Stargazer* Update—Linda said she would soon send out emails to remind contributors. The next issue is due out at the beginning of February.
- Request for Donation of Club Telescope—Glenn discussed the request made on the rac_group list for donation of a club telescope to be a gift for the person's grandson. He suggested that the club does have telescopes that are not used much, but on the other hand, we would want to be circumspect in verifying that the request was legitimate and not some kind of scam. Some members suggested it would be better for the person to come (with grandson) to a meeting or star party to see different types of telescopes and find out what would be suitable for the grandson. They are in Dale City, so NOVAC might be closer.
- Caledon Programs for 2018—Glenn talked about programs for Caledon. The Caledon people were pleased with this year's programs and suggested they could be done in the Visitor's Center in the winter to allow programs at star parties year around. Glenn said he wants to encourage others in the club to do some of them. Linda suggested asking Scott Busby to do some, since his retirement was just days away.

Next Meeting

The next meeting is on Wednesday, January 17, 2018, at the Headquarters Library on Caroline Street, downtown Fredericksburg. We will be in room 2.