

Rappahannock Astronomy Club

Minutes, March 14, 2012, Meeting

In attendance:

- Benjamin Ashley
- James Baker
- Barton & Linda Billard
- Scott Busby
- Don Clark
- George Clarke
- Joe & Sherry Francis
- Rob Friedel
- Glenn Holliday
- Jerry Hubbell
- Mike Masters
- Javier & Ruby Valverde
- Carol Williams

President Jerry Hubbell began the meeting at 7 p.m. after introductions. Fifteen members and a visitor were present.

Program

Jerry Hubbell presented “Photometry and Astrometry for the Amateur Astronomer.” He traced the history of photometry to the Greek astronomer Hipparchos, who catalogued stars and created the first stellar magnitude system by ranking stars from 1st (brightest) to 6th magnitude. With the help of the work of English astronomer Norman Pogson, this system was standardized as a logarithmic scale. The range of 5 magnitudes from 6th to 1st was found to cover a factor of 100 in brightness, so in the standardized scale a brightness ratio of 2.512:1 corresponds to a magnitude difference of -1 (the brighter star is one magnitude less than the dimmer). Photometry progressed in the 20th century with the development of standard filters for measuring the flux of light from stars and the publication of a list of standard stars by Arlo Landolt, in which the measured brightness in each of the filter pass bands is available for professional and amateur astronomers to use in calibrating their instruments. For example, the V-band is the filter band that most closely resembles the response of the eye, and it is used by the American Association of Variable Star Observers for comparing visual observations of variable stars with photometric measurements made with instruments. As the 20th century closed, increasing availability of charge-coupled device (CCD) cameras and pioneering work by amateurs such as Richard Berry and James Burnell has allowed many amateurs to learn the process of making photometric measurements. Jerry summarized the steps and calculations used to make calibrated measurements comparing the brightness of objects with standard stars. It is not necessary to have your own telescope or CCD camera to get involved. Jerry illustrated this with a light curve made from measurements of the Minor Planet (4150) Starr that he obtained online using the Sierra Stars 0.61-meter Astrograph (<http://www.sierrastars.com/>). The curve shows the brightness of the asteroid varying by about 1/4 magnitude as it rotates.

Hipparchos also figures in the history of astrometry. About 190 BC, he used catalogs created by his predecessors Timocharis and Aristillus along with his own observations to discover the precession of the Earth’s axis. This precession is one reason catalogs of star positions are defined for a specific time period, or “Epoch,” of some 30 to 50 years. Before the era of astronomical photography, positions could be measured with telescopes fixed to move along the meridian—the imaginary line in the sky that an object crosses when it is due south of the observer and reaches its highest elevation in the sky. The moment an object crosses the center of the telescope’s field of view, marked by a reticle, it is measured with a precise clock. The object’s coordinates are found based on that time and the elevation angle of the telescope. With the introduction of astrophotography, measurements of relative positions of objects could be made by careful x-y measurements on photographic plates. Jerry showed a photograph of a measuring engine used by the University of Virginia Leander McCormick Observatory as an example. These relative position measurements can now be made with CCD images. To calibrate positions, Jerry recommended the US Naval Observatory CCD Astrograph Catalog (UCAC) series. With the help of software, an amateur can digitally adjust the center position, scale, and orientation of a CCD image to

match catalog stars seen in the image. He or she can do it manually by clicking controls for each adjustment and watching the matching of the indicated positions of catalog stars with the stars in the image or with the help of automated solving algorithms in some software versions that can do most, if not all of the work.

Jerry concluded his presentation with demonstrations of some of the techniques using actual CCD images and software. A copy of his presentation is available on the Club website at [Photometry and Astrometry for the Amateur Astronomer](#).

Old Business

- Treasurer's Report—The report for February showed no expenditures and receipt of dues from two members. Paid membership for 2012 has reached 22, and 3 members have paid dues for next year or beyond.
- Star Parties, Events, and Meetings—Tricky weather forecasts resulted in a decision not to cancel the primary star party at Caledon on 18 February. The conditions then looked more unfavorable as the afternoon wore on, and Glenn Holliday was the only member who gave it a try. When he arrived at Caledon, he found a group of Cub Scouts there for another event who expressed interest in returning after getting something to eat. Glenn told them he would be there unless it was overcast, but they did not return. One carload of visitors from Fredericksburg with friends from New York arrived later. For a while, there were sufficient breaks in the clouds for some binocular observing. Scott reported on the 18 February backup date at Belmont. Bart and Linda were the only visitors, and Scott and Bart did the stargazing while Linda and Debbie stayed inside to do quilting. The evening was clear, but cold and windy. Bart tried using his new astrolabe to compute where to point the telescope. Scott also looked at the possibilities for siting his observatory.
- Status of Club Loaner Equipment—Matt Roles has the 8-inch Dob, Brenda the 6-inch Orion GEM Reflector, Shannon McCurdy the Orion Dobsonian, and Mike Masters has the webcam. Mike said Dave Bentz has asked to borrow it next.
- June 2012 Transit of Venus—Bart Billard and Mike Masters described the possibilities for setting up to view the transit at three locations in the Fredericksburg area. Bart described the area of the Spotsylvania YMCA and Patriot Park located on Smith Station Road near the end close to Route 1. Mike described areas in Pratt Park near the Stafford YMCA on Butler Road and in Duff Green Park on Route 3. Both parks are not far outside Fredericksburg. After discussion and a look at layouts online, Mike made a motion to vote on Pratt Park or Duff Green Park as the location for an outreach. Joe seconded the motion, and Pratt Park was chosen on a show of hands.
- Star Party Request for St. Margaret's School—Mike received no new communications about the request.
- Star Party Outreach Request—David Abbou has had a request from Stafford Elementary School for a stargazing event and has scheduled 28 April (Astronomy Day). He has said in email to the Club mailing list that members may participate as long as they let him know in advance so he can provide attendees' names to the School. There was some discussion about past Astronomy Day outreach events held at Border's and whether there is another venue we could find to continue the practice.
- Recent Astronomy Presentations—it was reported that David also gave presentations at Stafford Elementary on 13 March. Two were for fourth graders totaling about 100 students, and a third was on astronauts and space for 4- and 5-year-old Head Start students. His presentations were well-received, and he already has an invitation for next year.
- RAClub.org Website Status—Mike noted that this month's featured image is one of Jerry's asteroid images.

News/New Business

- Star Party Requests—Jerry said Myron has received a request for three star party dates (one for each library location) from the Fauquier County Library. Myron is working with Ann McDuffie of the Fauquier County Library to arrange dates in July and August. Mike Masters received an email from Jane Towner of Northumberland Preservation, Inc. requesting a star party for the Northumberland community. The proposed location would be the two schools near Kilmarnock that the group owns. They are looking for a spring or fall date. Mike listed three possible fall dates and said he would be

willing to go with enough volunteer support. Jerry Hubbell and Joe Francis thought they could support an event, and after some discussion Mike concluded he could suggest 10 November or 22 September as possible dates. Glenn said he had received a request for a return visit Hartwood Days event to take place 8 September. He indicated he already had a commitment for that date, and it was concluded that the Club could not support the event this year.

Next Meeting

The next meeting is Wednesday, April 11, 2012, at the Central Rappahannock Regional Library Headquarters, 1201 Caroline St., in Fredericksburg. Introductions will begin at 6:45 p.m.

Submitted by Bart Billard, Secretary