

First Light Lite

November, 2019 Edition

Jim Lynch – Editor

Modern astronomy revolves around telescopes, be they large or small, earth or space based, optical or lower or higher frequency. So, let us start with our small (though not bad for an amateur group!), earth based 12 ½” optical telescope at Werner Schmidt Observatory (WSO). Thanks to a lot of man-hours being put in by Charlie Burke and a number of other folks, the dome scope is now in “pretty darn good shape”, meaning it should be working well and consistently. Cables, software, computer screens, and other hardware and software were upgraded and updated, and while we obviously can’t rule out a glitch here and there in the future, to first order things are where they should be. One can even run the system from the warm, cozy observatory room below the dome! Again, kudos and thanks to Charlie and his crew!

As one example of what we are doing with the “now operational” WSO scope, during the recent star parties, Gary Walker and Charlie Burke (and other CCAS members) have been showing the visiting public how one makes computer pictures of objects that would, at best, be “faint fuzzies” through the eyepiece of the same scope. Using a CCD camera and the MAXIM DL software for stacking, people are shown how 2-3 one-minute exposure frames of an object can be stacked and assembled into a pretty decent astro-photograph. Of course, longer exposures will be used for more serious imaging, but as a display of how modern amateur gear works, this seems to be a hit with the public.

Another use of the new scope will be taking a serious number of FITS files for imaging objects that we can see well at our latitude. Though the DYHS honors projects are using data from elsewhere for this year’s projects (for M3, M45, and M57), I would hope that WSO can soon supply a library of high quality data images for all club members and students to play around with using the free software that has been made available to the students. Astrophotography is an interesting part of amateur astronomy!

In the future, I'd also like to see our spectroscopic gratings and RSpec software put to use through WSO. We have the basic hardware and software to do this, and have done spectroscopy (using smaller scopes) for student projects. But given our other WSO projects and priorities, that may be a year or so down the road.

Not so far down the road is the dome automation project. We have already formed a fundraising committee, and even before sending out formal requests for donations, we have received \$2750 in initial funds and \$500 pledged in matching funds. This is towards the ~\$10,000 we estimate that the initial phase of the project will take. The technical committee for the dome automation will be meeting soon, as well. So, this project is becoming real!

Our star parties are doing well, aside from Cape weather, but we really could use a little more help with them from our members. Please contact WSO director Charlie Burke if you think you can come and help, even on an irregular basis. For members not as familiar with the equipment, the regular WSO observatory crew are very good at showing you the ropes in very little time.

Last but not least, at the October 3rd CCAS meeting, we were visited by Mr. Mike Gyra of Barnstable HS and about 30 or so of his students. Mike has a well-known and well-regarded astronomy program flourishing at Barnstable HS, and he showed us some of the highlights of that program at the beginning of our meeting. I will talk in more detail about Mike's presentation in the section on "Last Month's Speaker(s)."

An outcome of the Barnstable HS visit by Mike Gyra is a planned collaboration of BHS and CCAS on viewing the transit of Mercury on November 11th. We will be sharing equipment and personnel at the event to be hosted by BHS in Barnstable. Rather than paraphrase, let me just post the short publicity blurb that Mike Gyra prepared and Chris Lynch edited:

Special Viewing of the Transit of Mercury

On Monday, November 11, Veterans Day, Mercury will do a full transit of the sun. The public is invited to attend a special solar viewing at Barnstable High School starting at 7:30 a.m.

Michael Gyra, Director of the David Cole Observatory and Cobb Astro Park, will open the observatory to allow a first hand look at the transit. This event is co-sponsored by Barnstable High School and the Cape Cod Astronomical Society.

Solar telescopes, solar binoculars, SUNSPOTTERS, and solar shades are provided, guaranteeing safe viewing. Mercury starts to appear in front of the sun at 7:36 a.m. It reaches the mid-point at 10:20 a.m. and moves off the sun's disk at 1:04 p.m.

After this, it doesn't occur again until 2032, so take this opportunity to see it now. This celestial event also is an opportunity to experience the unique setting of the Cobb Astro Park, which includes the Human Sundial and Pathway of Discovery. Fun activities also are planned to introduce these features.

Barnstable High School is at 744 West Main Street, Hyannis. Use the entrance at the Knight Auditorium and take the first left at the 1700 Hallway. Halfway down this Hallway, on the right, there is a sign for the Cobb Astro Park.

Upcoming Speakers

Note: We currently have CCAS First Thursday speakers lined up through January. We now are looking for speakers for the 2020 schedule. If you are interested in giving a talk, or know someone who would be a good speaker, please contact Jim Lynch at jlynch@whoi.edu. Thanks!

November 7th – Dr. Mark Reid, HSCfA

Topic: Mapping the Milky Way: the BeSSeL Survey

Abstract:

Over 2000 years ago, Hipparchus measured the distance to the Moon by triangulating from two locations across the Mediterranean Sea. However, determining distances to stars proved much more difficult. Many of the best scientists of the 16th through 18th centuries attempted to measure stellar parallax, not only to determine the scale of the cosmos but also to test Heliocentric cosmologies. While these efforts failed, along the way they led to many discoveries, including atmospheric refraction, precession, and aberration of light. It was not

until the 19th century that Bessel measured the first stellar parallax.

Distance measurement in astronomy remained a difficult problem even into the early 20th century, when the nature of "spiral nebulae" was still debated. While we now know the distances of galaxies at the edge of the Universe, we have only just begun to measure distances accurately throughout the Milky Way. Using the Very Long Baseline Array at radio wavelengths, we now can achieve parallax accuracies of 10 micro-arcseconds! I will present new results on parallaxes and motions of star forming regions from the BeSSeL Survey. These measurements address the nature of the spiral structure, size, rotation speed, and mass of the Milky Way.

December 5th – Mr. Gary Walker, CCAS

Topic TBA

January 2nd, 2020

Dr. Jim Lynch, CCAS

Topic: Basics of Optics for Amateur Astronomers

Last Month's Speakers, October 3rd

Speaker #1 - Mr. Mike Gyra

Director of the David Cole Observatory and Cobb Astro Park, Barnstable HS

As a special guest, Mr. Mike Gyra came to the DYHS and gave an ~20 minute long presentation about the science and arts programs at Barnstable High School, and his amazing efforts in building them and promoting them.

The Cobb Astro Park is perhaps the centerpiece of the unique complex that he, along with others, built essentially from scratch. It (shown below) has beautiful artwork and statuary highlighting both astronomy and the great thinkers (in all fields) throughout the ages. The physical facility, along with the wonderful

programs that were created in tandem with it, are an inspiration to educators and students as well.



Speaker #2 - Dr. Jim Lynch
President, CCAS
Senior Scientist Emeritus, WHOI

Title: Modern Galaxies – A Brief Overview

The first questions I looked at were: what comprises a “galaxy” and what is the morphology of a “typical” galaxy (if you can even say there is a *typical* galaxy)? Since we all, in this club at least, are somewhat familiar with the Milky Way in summer, I took the parochial route and considered our home galaxy “typical.” (Hey, we’re all a bit parochial deep down!) In addressing the Milky Way, I first looked at some statistics and interesting facts. Perhaps the most interesting fact, in terms of sensationalism, is that the Milky way and M31, the Andromeda Galaxy, are due to collide in about 4.5 billion years and eventually coalesce into a giant elliptical galaxy, already named Milkomeda. The second most interesting fact was that, despite M31 having about twice as many stars as the

Milky Way, the two galaxies masses are about the same, as we seem to have more dark matter (which is the “halo” stuff that galaxies form in.) Yay, Milky Way! There are more, but you get the idea.

The next part of the talk was to look at all the various parts and features of the Milky Way, which was a bit of a compendium. Piece by piece, we looked at: stars (of all varieties), dark matter, gas and dust, clusters (both open and globular), the central black hole, the central bulge, the thin and thick disks, the bar, the spiral arms, the halo, the magnetic field, and the Fermi bubbles. Lotsa moving parts! And, given that they are moving, the next topic naturally was an overview of the motions of the components of the Milky Way. (Spoiler alert: they don't move like a rigid body!)

At a certain point, you have to give up on parochialism, and so we started looking at the bigger picture via the galaxy classification scheme. There are actually quite a few types (and subtypes) of galaxy extant: ellipticals, spirals, barred galaxies, irregular galaxies, dwarf galaxies, and many more.

One of the features of galaxies is that they, by and large, like to hang out in groups. Our galaxy is a prominent member of just such a group (of about 50 galaxies) called the Local Group. This group includes the Magellanic Clouds, the Andromeda Galaxy, M33 (also visible to the naked eye in dark skies), and many smaller galaxies. The next level up is galaxy clusters (hundreds to thousands of galaxies) and superclusters (tens of thousands of galaxies). When one gets to this biggest picture of superclusters (hundreds of megaparsecs scale) and above, the universe seems to arrange itself into sheets and filaments surrounding huge voids. The “filament/void” structure is homogenous at this scale and larger, which has a profound implication for models of cosmology.

One of the questions I am eminently unqualified to answer is: where is galaxy research heading in the future? Luckily, I am qualified to be a good lead-in and straight man for the next talk by Mark Reid of HSCfA, who will be talking about just that type of research! So, come by DYHS November 7th, and see just modern research into galaxies looks like!

PS I was profoundly disappointed that nobody got the “Galaxy is in the Bell of Orion” reference on the title slide. Was everybody neuralysed?

October Meeting Minutes and CCAS Business

Due to the talks running a bit long, we didn't hold our usual business meeting after the lecture. Society and Foundation business will be discussed during the month at the CCAS Officers and CCAF Board meetings, and our regular discussions will resume in November.

Star Parties

After August until mid-June, we will (generally) have two regularly scheduled Star Parties each month taking place at 7:30 -10:30pm on the *Saturday* closest to the date of First Quarter Moon (about 7 days old). This is an increase from our old schedule of one per month in the fall, winter, and spring.

From June through August, we have three regularly scheduled Star Parties each month taking place on *Thursdays* at 8:30-10:30pm.

When the moon is near its First Quarter, the terminator (the line dividing light from dark) is favorable for viewing sunlight or shadow on the sides of craters. This time is also favorable for observing the dark side of the moon occult (visually cover) stars in the sky as the moon moves in its orbit. Depending upon the calendar, we may also be able to observe planets and other celestial objects.

Here is the schedule for "Star Parties" up to January, 2020; **the public is cordially invited!**

Nov 2nd

December 7th

POSSIBLE CANCELLATIONS for Star Parties: Cancellations will be very rare since we have lots to do "inside" as well as outside. Even if the forecast is "iffy"; the Staff Leader for the night may elect not to cancel in spite of possible clouds. If clouds arrive after staff and guests have convened, a virtual Star Party will usually take place indoors to include overviews of the sky for that night using computer simulations with our big screen TV, videos of interesting sky events recorded previously, demonstrations and/or training on the use of scopes and other equipment, and consultation/discussions on things astronomical, etc.

However, sometimes a solid forecast for overcast or rain or a storm will result in cancellation of a given Star Party. **IF IN DOUBT ABOUT THE WEATHER AND**

THE STATUS OF A STAR PARTY, CALL THE OBSERVATORY AT 508-398-4765 AFTER 7:45 pm. No answer means the event has been cancelled.

Directions to Dennis Yarmouth HS and Schmidt Observatory

For information on the location of our Dome behind Dennis-Yarmouth High School, click on the purple button "Old Website" and once there, click on "Meeting Location" viewing the two maps that are there: external for the Dome, and internal to locate the high school library where meetings are held.

For meetings, drive in the south entrance road and go around behind the main building. Park in the lot about halfway down the building and go in the back door and turn down the hall to your left to find the library.

For Star Parties at the Dome, drive in the north entrance road all the way past the north side of the main high school building, through a gate, and on to park near our Dome.

H&K directions

Please be reminded that Gus Romano or his delegate host a dinner gathering for members and friends each CCAS meeting night (before the meeting) at the South Yarmouth Hearth & Kettle restaurant at 5:45pm; (the meetings begin at 7:30 at D-Y.) The speaker for each meeting is always invited. Please join the group to dine and talk about all things interesting, including astronomy, each month before our meeting. The H&K is at 1196 Rt 28, South Yarmouth, about a half mile west of the Station Avenue/Main Street intersection with Rt 28 (stop light).