

First Light Lite

Apr 1, 2019

Jim Lynch - Editor

This has been a rather busy month, on many fronts! Much more intro is not needed, so let me get to it.

Outreach was very active this month. A STEM activity at Sandwich High School entitled “STEM Journey VI” was scheduled for March 2nd, and CCAS had a booth reserved. Our new brochures and some nice science demonstrations were ready to go. Unfortunately, snow got in the way, and the event was cancelled. The event is now rescheduled for Saturday, May 4th from 3-6 PM. It should be a good one, featuring 40 booths and a ham radio connection to the International Space Station. A second outreach activity that did happen was a star party at Sandwich HS, on March 6th. Despite some *really* cold temps and a nasty wind chill, a good number of people, young and old, showed up for a night of clear skies. Most prominent and accessible that night was the Orion nebula, which was the star (forming region) of the show. (This is also a nice lead-in to our April speaker!)

Next, I got to speak at a Bourne Newcomers Club meeting on March 12th, about CCAS, amateur astronomy in general, and a few “teasers” about our lecture topics. Next, we participated on March 29th in a “Reading Will Take You to Other Worlds” event, sponsored by the DY school district libraries, and held at the DYHS library. A number of people (many in SF costumes, as encouraged by the event) visited the WSO, and were shown what we have for observing facilities. At all these events, we had sign-up sheets for the newsletter, and there was a lot of interest shown by people to come to our star parties and lectures. We will be contacting them via this mailing and also be setting up any special star parties requested.

Next on the list is the new telescope, which has been ordered, but which has been slightly delayed (installation in May, perhaps?) due to back orders. In the interim, a 14” Celestron scope is being set up, so that star party visitors can get a good view from inside the dome. The CCAF board members have agreed upon a special celebration event for the new scope in mid-June (if all goes as planned).

Finally, let me mention an idea that was floated at our last two meetings, and which met with reasonable acceptance. The idea was to have all our club members sign onto some “hands-on” projects, akin to the projects given to the DYHS students, to test them out, as well as to get involved (if not already) with some real observational astronomy. This would be done by groups, pitched at a level commensurate with amateur astronomy, and include at least one experienced member to help each group. I have created, using the DYHS projects and an excellent book entitled “Astronomical Discoveries You Can Make, Too,” a first order list of projects. I will discuss that list and “logistics” in detail at the April meeting, during the business portion of the meeting. These projects are designed to be do-able by amateurs without technical backgrounds, so I hope people will not be reluctant to try them. Some of the best fun in astronomy is seeing how this stuff actually works!!!

Upcoming Speakers and Topics

**April - Dr. Charles J. Lada, Senior Astrophysicist
Harvard-Smithsonian Center for Astrophysics**

Exploring the Great Hunter: Unlocking the secrets of star birth in Orion.

The constellations of the winter sky harbor some of the most spectacular objects known to astronomy. For example, within the boundaries of Orion, the Great Hunter, is the nearest Giant Molecular Cloud, Though invisible to the eye, Giant Molecular Clouds are the largest and most massive objects known in the Milky Way galaxy. The one in Orion spans nearly the entire extent of the visible constellation. These immense dark clouds of gas and dust are also the coldest objects in the universe and the most prolific birth sites of stars and planets in the Milky Way. In this lecture I will present a tour of the visible and invisible Orion, my favorite constellation. I will reveal some of the secrets of star birth that astronomers have wrestled from the Orion Molecular Cloud using observations across the electromagnetic spectrum. In this tour we will encounter mysterious protostars, bipolar jets and outflows, infant star clusters and the proto-planetary disks where new systems of planets are currently being formed. I will also discuss what we have learned from studying Orion about range of masses that stars

acquire at their birth (the so-called initial mass function or IMF). Finally I will describe the important underlying connection between the Great Orion Nebula and the famous Hyades and Pleiades star clusters, all prominent in the Winter sky.

May - Mr. Jim Mitchell and DYHS Students - Astronomy Honors Program plus Dr. Mike Hunter – Observatory Update

June - Dr. Marion Dierickx, HSCfA, Topic TBA

Last Month's Speaker - Dr. Jim Lynch CCAS, "The Formation of the First Stars and Galaxies - Dr. Loeb's Book Simplified for Us Amateurs"

We have been fortunate to have had a number of talks here on the topics of the Dark Ages and “reionization”, when the first stars and galaxies formed and when the “recombined” (giant misnomer) neutral hydrogen was again ionized (the first time being the primeval plasma.) As Dr. Ken Brink talked about plasmas in February, and since I had recently read Dr. Abraham (Avi) Loeb’s book(s) on “How did the first stars and galaxies form?”, I figured it might not be amiss to continue this topic. My approach was pitched a little bit more towards the physical processes that occur in forming the stars and galaxies, and in reionizing the Interstellar Medium (ISM).

On the Big Picture scale, we’re looking at huge clouds of gas condensing into structures – but what governs this? It’s basically a tug-of-war between gravity pulling gas in and pressure pushing gas out. The physics pits the “free fall time” against the “speed of sound.” If the gas can fall freely (under gravity’s pull) to the center of the cloud faster than a sound wave (the pressure rebound) can travel to the surface of the cloud, the cloud collapses! This is called the “Jeans criterion” after its originator, James Jeans.

Temperature plays a major role, as the speed of sound increases with the temperature. This has an interesting implication...if the universe heats, the Jeans Mass clouds get more massive, and if it cools, less so. So now the game becomes a question of heating and cooling mechanisms, which I talked about in some detail.

After the dust settled, we saw that the latest take on things (to the best of my knowledge, anyway!) was that early galaxies were rather small critters, but that the earliest stars (Population III) were perhaps “monsters of the midway” which output gobs of ionizing UV light, lived only a few million years, and died rather spectacular deaths. The ionizing light from these stars was likely a big factor in “reionizing” the neutral hydrogen that was sitting around after the (grossly misnamed) “recombination” event.

But the first stars probably weren’t enough to fully reionize the interstellar medium (ISM). They likely needed help from active galactic nuclei (AGN, i.e. quasars and their cousins), which were active in the early universe. And even with that help, complete reionization probably took the second generation of stars to accomplish!

Another topic that came up is the formation of large galaxies later in time. Both the increase in Jeans Mass and galactic cannibalism are likely culprits here. Also associated with this question is the finding that pretty much all large galaxies have supermassive black holes at their centers!

Finally, we looked at the observational side of the coin...what experimental efforts are going on to observe the formation of structure after recombination? Large telescopes, especially radio telescope arrays, play a large role here.

March Meeting Minutes and CCAS Business

Our CCAF officers gave the latest update on the status of our main observatory telescope replacement. We're looking at about two months (guesstimate) overall for the new scope to be installed, and will be training a core of people on the computer software needed to use it.

Jim Lynch discussed the “projects” idea with the members, and as noted the “yes’s” won the day. 😊

Jim Lynch also discussed making some upgrades to our website, and pursuing membership more aggressively this year.

Star Parties

From September thru June, we will 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 July 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 spring "Star Parties" up to June, 2019; **the public is cordially invited:**

April 6th and 13th

May 4th and 11th

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 half way 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 Dutch-treat 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).