

# First Light Lite

July 1, 2022

Jim Lynch – Editor

## Message from the CCAS President

### **Cape Cod Astronomical Society (CCAS) is back “live” *yet again***

Last month, we celebrated our *second* “live, in-person” CCAS meeting at our basecamp location at the Dennis-Yarmouth HS Library. We also had our traditional H&K pre-talk dinner with our guest speaker, Dr. Larry Marschall. We used a Zoom link as well as having a live talk, as we did in Falmouth last month. This “hybrid” approach takes a bit more work, but is well worth it, as we can now have distant speakers (if that works best for the speaker) on Zoom, or allow the audience for our live speakers to view from home or in person. Covid isn’t entirely through with us yet, and gas is expensive, so the Zoom option remains a good one for people.

### DETAILS

Dinner attendees pay for their own dinner, unless they are speakers from 2020 and 2021 or the current speaker, who will be guests of CCAS. (We previously had invited all of our speakers to dinner, but couldn’t do so in 2020-21 due to Covid.)

The Zoom link is sent to anyone interested. If someone didn’t get a link and wants one, either pass on this newsletter to them or contact Jim Lynch at [jlynchwhoi@gmail.com](mailto:jlynchwhoi@gmail.com) by COB the day before the meeting and he will send the link. (Those already on the CCAS mailing list receive it automatically via our newsletter, see below.)

### **Star Parties (as per last month)**

As we’ve just signed a one-year extension of the existing contract between the Cape Cod Astronomical Foundation (CCAF, our non-profit organization legal component) and the Dennis-Yarmouth Regional School District (DYRSD), in

order to allow time for long-term negotiations, we also will have use of the Werner Schmidt Observatory (WSO) this coming year, and so will be planning star parties there in the near future. We still are talking about safety rules and logistics, as well as tuning and testing some equipment, but once we have those details ironed out, the weather is now more agreeable, and we're as eager as anyone to be back outside and doing a little observing! The beginning of August looks possible, but again, stay tuned!

### **School Projects and Activities**

With our contract extension in place, we took the next step of talking to the DYHS teachers about projects with their students for next fall. The talks on June 22<sup>nd</sup> were very productive, and we will be maintaining contact with the teachers through the summer.

We also are continuing efforts to coordinate with other Cape schools.

### **Elections**

Each year in July, we hold elections for CCAS Officers and also for one CCAF Board member. Vote is by voice acclamation at the meeting. Let me start with the CCAF Board member.

We have one at-large slot to fill, and George Silvis has placed his name in nomination.

Turning to CCAS, Jim Lynch (President), Ashish Dutta (Vice-President), and Ken Brink (Treasurer) have placed their names for re-election. We have no nominees for Secretary, but we can both nominate a Secretary and vote the same night. This is a position that has been unfilled for a while, but one that we can very much use, especially as our activities are spinning back up, and communications will be a key component. The Secretary interacts with our meetings, website, historical records, public relations, and internet communications.

### **Dues**

Our dues have traditionally been \$30 for members (including families), \$15 for college students, and free for high school and younger. Due to Covid

curtailing our activities, we have made dues voluntary for the past two years, though we've still gotten a good response. This year, we will reinstate dues, as we get back to full activities. The CCAS dues go to undertakings that benefit students and the general public, so we hope you can sign on. However, if you can't afford dues, please know that most all of our activities will still be open to you – our bottom line is that we are here to share the skies.

If you have already paid your dues during this calendar year, thanks. You are up to date. If you are not sure, please check with Ken ([kbrink@who.edu](mailto:kbrink@who.edu)). To send dues, please mail to: Ken Brink, 16 Greengate Rd., Falmouth, MA 02540.

## **JBCC Event**

As many of you know, we also have occasional star parties at various locations remote from DYHS and WSO. One such will be held at Camp Edwards in July. This event will include a lecture about amateur astronomy (which should be rather familiar to those receiving this newsletter), followed by a one-hour star party. The star party will be held close to a full moon, so our binocular sky tour and 8" Dobsonian should be adequate for viewing. We are hoping to attract some new faces at this limited attendance event, and perhaps some new members. The ad below appears in the Falmouth and Bourne newspapers.

### **Summer Stargazing at Camp Edwards on Joint Base Cape Cod**

The Cape Cod Astronomical Society is offering an evening of astronomy and stargazing on Tuesday, July 12 (rain date July 13 or 14).

The event is free, but space is limited to 30 people. For information and to sign up, please email Kathleen Kolva at [kathleen.a.kolva.civ@army.mil](mailto:kathleen.a.kolva.civ@army.mil) or call her at 339-202-9307.

## **Speakers**

### **Last Month's Speaker**

**Dr. Larry Marschall, Gettysburg College**

**June 2nd, 2022**

**Title: The Astronomer's Disappearing Sky**

**Abstract:** Since the dawn of the space age in 1957, tens of thousands of satellites have been launched into orbit around our planet, and though most of them fell back to earth as their orbits decayed, many remained in orbit, and others fragmented, littering our neighborhood with an estimated million bits of space debris larger than a centimeter in size. This population is about to increase significantly with the launch of "satellite constellations" that promise to provide cheap and global wireless internet service. SpaceX, already operative in its early stages, plans to deploy as many as 42,000 satellites when it is complete, and competitors from several other US, European, and Chinese firms will soon join the growing swarm. These satellites, while representing an important advance in communications and industry, present a unique challenge to astronomy, in some cases threatening cutting-edge research at the world's largest telescopes. I'll present a description of how these new satellites will affect the darkness of the night sky, and describe the measures astronomers and satellite operators are developing to mitigate their effects.

**Precis:** Light pollution is a worldwide problem, and it reaches us on Cape Cod along with everywhere else. It is a special nuisance for ground-based astronomy (including our WSO). Larry's opening slide, a "before and after" picture of the night sky during the 2003 blackout in the Northeast, made that point quickly and clearly. A house with a washed-out sky and a few stars showing is replaced by a gorgeous view of the heart of the Milky Way in a dark sky. This is what we're missing on both a personal and professional level.

Astronomers put their ground-based telescopes in dark sky locations to help cope with this, but as time went on, other sources of light pollution appeared with increasing frequency – satellite, space junk and aircraft. From a few hundred objects in space orbit in 1962, the number has climbed in 2019 to over 19,000. 27,000 objects are currently being tracked by NASA, and literally millions of pieces of debris now orbit the Earth. These objects reflect considerable light back to Earth, and the newest satellites are brighter than 99% of existing objects. For any of us who have done Astro-imaging, the verdict from this is obvious – and bad.

Recently, a new concern has arisen – communication satellite constellations. Spearheaded by SpaceX, these constellations (which will number up to 20,000 satellites) will be in Low Earth Orbit (LEO) and offer great communications worldwide. But they are also launched in large numbers at once, and each satellite reflects considerable light. The streaks that it leaves on Astro-images basically kills the information in whatever pixels it hits, and also can create ghost images. For astronomy tasks like “recognizing interesting objects in a field of many other (similar) objects,” these are a disaster.

A major victim of this light pollution will be the Vera Rubin Observatory (VRO), an important new astronomy facility that will scan the sky with 2,000 images per night. It has planned a ten-year survey of the sky during 2022-2032 that will look at 37 billion stars and galaxies, and look at ten million alerts every night. These detections will be significantly impacted by bright satellite trails. Sadly, its goals of understanding dark matter and energy, mapping the Milky Way, and also mapping transient objects in the Solar System (e.g. asteroids that could give Earth a serious headache) will very likely be compromised, and increasingly so as more satellites are launched.

But the VRO will not be the only astronomy victim of satellite constellations. Observatories worldwide will lose optical data from imaging systems, and numerous ongoing astronomy projects will be impacted. A nice example of a famous space-based facility, the Hubble Space Telescope, being afflicted with satellite streaks brought home the point that even space based telescopes will suffer some serious data loss.

The problem for astronomical optical imaging systems is now apparent, so the obvious question is: what can be done about it? Three strategies were proposed: 1) reduce the numbers of satellites, 2) track and avoid them, and 3) reduce the brightness (reflectivity) of the satellites. Let’s look at each one. As to reducing the number of future satellites, things do not look promising. The Starlink system being implemented by SpaceX and Elon Musk will very likely put up 10,000 plus satellites, and a number of other companies have also filed with the FCC to put up more hardware. Europe, China, and India are also in the mix, and the numbers could go as high as 60,000. As to door #2, the astronomy community is working hard in that direction, and this may be the most promising direction to pursue. As to reducing the reflectivity of the satellites, initial efforts from SpaceX held some

promise, but a recent Sky and Telescope article relates that those efforts are going away, and satellites are again becoming brighter.

The brightness of a satellite determines its “signal to noise ratio” against a given astronomical target, with the smallest number being the best. Given the modern miracle of LIGO pulling out an impossibly small signal from impossibly large noise, the field of signal processing was also discussed as a possible remedy for some of this interference. Based on the discussions, not much hope was placed in this being effective, as the types of noise and signal play a large role in determining how much processing gain can be had, and the satellite streak noise characteristics looked to be nasty.

The final “takeaway” slide that Larry showed was a bit bleak, to be honest. The bullet stating “half of observatories predict critical failure if there are 20,000+ LEO satellites” was chilling. Given the priority that commercial firms place on the financial bottom line, often in disregard of environmental concerns, I for one am not overly optimistic that they will do much to help. My guess is that avoidance and (if possible) signal processing gains by the astronomers themselves will help ameliorate some of the problem. I hope I am wrong about commercial firms and right about the astronomers!

To conclude, let us all thank Larry for a very important and timely talk!

## **This Month’s Speaker**

**Dr. Antony Stark**

**Harvard Smithsonian Center for Astrophysics**

**July 7th, 2022**

**Title:** Astronomy's Final Frontier: the Dark Ages at High Redshift

**Abstract:** Between the emission of the Cosmic Microwave Background 380,000 years after the Big Bang and the galaxies a billion years later are the Dark Ages when the first stars were born. We can see what came before, and what came after this epoch, but there are mysteries to be cleared up. How did the first stars form, and what were they like? How did the black holes in the center of

galaxies get so large so fast? But these observations are very hard: it's far away, highly redshifted, and faint. These are the targets for the newly-launched James Web Space Telescope, the new generation of giant optical telescopes, and the Atacama Large Millimeter Array. Gravitational lensing helps magnify the earliest, tiny galaxies.

## **ZOOM Link for this month's CCAS talk**

**PLEASE NOTE: We are assuming that an internet connection will be available and thus providing the link below. If for some reason it is not, you will be notified. Also, while the link is set to open at 7 PM, the meeting will start formally at 7:30 PM.**

James Lynch is inviting you to a scheduled Zoom meeting.

Topic: CCAS July 7 2022 Zoom Meeting Link

Time: Jul 7, 2022 07:00 PM Eastern Time (US and Canada)

Join Zoom Meeting

<https://us06web.zoom.us/j/82883402151?pwd=T0tGSjdwblldDSVhDckE2Ym9NRDdkdz09>

Meeting ID: 828 8340 2151

Passcode: 234301

One tap mobile

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+1 346 248 7799 US (Houston)

+1 720 707 2699 US (Denver)

Meeting ID: 828 8340 2151

Passcode: 234301

Find your local number: <https://us06web.zoom.us/j/kc4USUk11v>

### **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 CCAS “hosts” 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).