First Light Lite

December 29, 2025

Jim Lynch – Editor

Message from the CCAS President

Please excuse this late arriving FLL issue. Again, some circumstances slowed me up: a December Acoustical Society Meeting followed by a family visit followed by a sinus problem. The first two were fun, the latter not so much. But the club was again active, though maybe not quite as much as in October.

Outreach

Our star party outreach events that we hoped to have with Dennis-Yarmouth HS and Falmouth HS did not occur before the ending of the fall term, as we had hoped, but are being rescheduled for the winter semester, and should be exciting, especially using the new Seestar smart telescopes.

Our usual star party, scheduled for the week of December 15-19th, was postponed due to weather, including some *very* cold weather. Our star party in January is scheduled for January 12-17, and hopefully this will be a better weather window.

The big outreach event of November was our visit to Joint Base Cape Cod, where a good-sized audience came expecting a star party and lecture. True to form, the weather window we expected disappeared, and so we gave a two-hour extended talk about things astronomical. The audience was thankfully quite tolerant of the change, and we look forward to visiting JBCC again, perhaps in the coming year, under clearer skies.

However, our First Thursday guest speaker *did* show up, and his talk will be discussed later in this newsletter. The Far Side of the Moon sounds like a book title (and probably is) or an old Pink Floyd album, but it also describes a real, planned NASA mission, which we look forward to seeing happen!

Upcoming Events and Requests

Girl Scout troop 84516 has asked us for a star party date, which we hope to arrange soon.

We also have requests for talks on astronomy from the Centerville, Whelan, and Orleans libraries, and are working to arrange solid dates for these.

And as mentioned, we will be arranging star party events with DYHS and FHS.

Some Other Happenings of Interest

Part of amateur astronomy is learning about astronomy, both as a hobby and as an exciting field of research. There are three possibilities emerging that our friends and members might find of interest, all free.

The first is a long-established course on amateur astronomy given by the Kalamazoo Astronomical Society. This begins January 17th, and there should still be time to get a spot. The information is as below.

Kalamazoo Astronomical Society

Looking Up Since 1936

Hello, Astronomy Enthusiast!

The Kalamazoo Astronomical Society is pleased to announce that our now-world-famous Introduction to Amateur Astronomy lecture series will return in early 2026 as part of our 90th anniversary celebration. People new to the hobby of amateur astronomy are the target audience for this five-part series. You are one of the approximately 900 people who registered for the previous installment in 2024, with about 152 earning a Certificate of Completion by attending all five parts.

If you missed the series, couldn't finish it, or need a refresher, you now have another opportunity to earn a certificate! Here’s the full schedule:

Date Topic Time (EST)

January 17th Our Place Among the Infinities 1 – 3 pm

January 31st Discovering the Night Sky 1 – 3 pm

February 14th Binocular Basics 1 – 3 pm

February 28th Telescope Tutorial 1 – 3 pm

March 14th The Art of Astrophotography 1 – 3 pm

The series will again be offered exclusively on Zoom. Admission is still FREE, but those interested in attending are asked to register through our website:

https://www.kasonline.org/amastro.html

Thank you for taking the time to read this invitation. We hope you do us the courtesy of passing it along to anyone else you think might be interested.

Clear skies!

— Richard S. Bell

KAS President

A second opportunity will be offered to all by CCAS later this year and is currently in the organizational stage. Peter Pilon and other CCAS members are forming an astrophotography group that will focus on using the new, inexpensive smart scopes as well as our dome telescope at the Werner Schmidt Observatory. He and other experienced members are then planning to offer a course on that for members and friends. More details will be forthcoming in the near future, but if you're interested in astrophotography, please contact our Cape Cod Astronomy email [cca@capecodastronomy.org] and let us know.

A final opportunity, which is dependent on interest, is a short course in astronomy science. This would be at a descriptive level, and use only the most basic physics and algebra equations. Some understanding of the science of the wonders we look at in the sky increases the enjoyment of observing and isn't as hard to acquire as you might think! Again, please let us know via our website if you might be interested.

Initiatives and Committees

We again wish to devote some time to committee structure and currently are looking at the following committees: Website, History, By-Laws and Organization, Advertising and Publicity, and Membership. These committees should not be

overly strenuous as regards workload, and hopefully you might be interested in engaging in one if you have not done so already!

Speakers

This Month's (January) Speaker: Dr. Keaton Bell, CUNY NY

Topic: White Dwarf Asteroseismology

Date: January 8th, 7:30 PM

Place: Both at the DYHS library and on Zoom (speaker will be remote)

BIO: Assistant Professor Keaton Bell is an observational astronomer who studies the structures of white dwarf stars from their vibrations. Dr. Bell earned his PhD at the University of Texas at Austin, where he observed for over 200 nights on the 2.1-meter telescope at McDonald Observatory, and now he mostly works with video data of the entire sky collected by NASA's Transiting Exoplanet Survey Satellite (TESS). Dr. Bell worked as a postdoc at the Max Planck Institute for Solar System Research in Göttingen, Germany, and was an NSF Astronomy and Astrophysics Postdoctoral Fellow at the University of Washington before joining the faculty of the Queens College Physics Department of the City University of New York (CUNY) in 2022.

Abstract: Queens College astronomer Keaton Bell uses video recordings from space telescopes to measure vibrations of dead stars called white dwarfs. White dwarf stars are the glowing hot embers left over when most stars run out of nuclear fuel. Some white dwarfs vibrate spontaneously, revealing resonant frequencies of the stars that can be used to map their interior structures. This presentation will describe the physics of stellar vibrations by analogy with the physics of musical instruments, which Keaton teaches a course on at Queens College. We will discuss the importance of studying white dwarf stars and review how the QC White Dwarf Research Group studies their structures by interpreting video recordings of vibrating white dwarfs. This talk will explain some of the newest breakthroughs in the field of white dwarf asteroseismology.

Last month's Speaker: Dr. Paul O Connor, Brookhaven National Laboratory

Date: Dec 4th

Topic: “Radio light from the far side of the Moon. The LuSEE-Night NASA mission to operate a radio telescope on the lunar far side.”

BIO: Paul O’Connor is a senior scientist in the Instrumentation Department at Brookhaven National Laboratory. He attended Brown University, earning a Master’s degree in electrical engineering in 1977 and a Ph.D. in physics in 1980. He joined AT&T Bell Laboratories as a member of the technical staff in 1980 where he developed high-speed semiconductor devices and integrated circuits before joining BNL in 1990. O’Connor’s research interests involve low-noise signal processing systems for particle and astrophysics, photon science, medical imaging, and nuclear nonproliferation. O’Connor is a Member of the American Physical Society and Life Senior Member of the IEEE. He holds the Distinguished R&D and Outstanding Mentor awards from BNL, the Medal for Research Achievement from the Australian CSIRO, and the Howard Wheeler Award from the IEEE. Paul O’Connor is an author of about 150 publications and has seven patents for microelectronic and detector technologies.

Precis: Paul’s talk started out with a “shameless plug” for Brookhaven National Laboratories, which for those of us familiar with the great work it has produced over the years was already preaching to the choir. (My grad school roommate was a PI on the Relativistic Heavy Ion Collider project there. 😊)

He then went on to some cosmology, starting with the cosmic Dark Ages, the early universe period between recombination (a misnomer – it is when hydrogen atoms just started to form/combine from the previous hot plasma state) and reionization (when very bright new stars produced enough UV light to re-ionize the neutral hydrogen that had formed.)

Next, he discussed the 21 cm hydrogen line, radio astronomy’s favorite target for many reasons. As the universe expands, this emission line from Dark Ages hydrogen will be redshifted down from 1420 MHz to 1 – 50 MHz (HF). The Dark Ages, as presently understood, extend from 400,000 to 1.1 billion years after Big Bang.

Terrestrial radio observations in this HF band are challenging for three reasons: 1) the Earth’s ionosphere, 2) human generated interference, and 3) the galactic foreground radiation. So, what do you do?

If you are NASA, you consider going to the far side of the Moon! This gets rid of such Earthly bugbears as: clouds, rain, the ionosphere, auroras, any magnetic field and extensive air showers. Any radio interference from Earth is also blocked!

Enter the Firefly Aerospace Blue Ghost Mission 2, slated for 2026. This is a collaboration of Brookhaven National Laboratory, Lawrence Berkeley National Laboratory, and Firefly Aerospace, with the former two providing the science packages and the latter providing the vehicle.

Landing a package on the Moon isn't exactly a piece of cake, but the Blue Ghost Mission 1 did land successfully on the nearside of the Moon, so there is some confidence in the present design.

Paul next discussed the instruments that will be placed on the Moon, and it quickly became apparent that he was a nuts-and-bolts electrical engineer! (When you see a couple of printed circuit layout boards featured in the slides, it is a pretty broad hint!) He methodically went through the instrument block diagrams, the (nasty!) environmental constraints, and the operations plan. The antenna, amps, spectrometer, and transmission system were the highlights.

The mission constraints were the first on the list. The power at night is limited to 20W, a dim night light's worth. The power during the day is a "profligate" 100W worth. The total mass of the instrument portion is a svelte 130 kg, 50 kg of which is battery). The data to that can be sent back to Earth is a modest 6GB/lunation (lunar month).

The surface environment was next. The word "harsh" would be sufficient but, to provide detail, Paul noted the particulars. The day/night cycle is 29 Earth days, as we all know. The temperature is one of the biggest challenges, going from -180 to +125C with a gradient (dT/dt) of up to 5C/hr. Now add a vacuum of 2x10-12 torr and a radiation field that is ~250X terrestrial or ~2.5X LEO strength. Kind of a hard place to work in!

But work it must, and so an operational plan was discussed. In sequential order, the lander first shuts down. Then, during the Lunar night, L-N observes and data are astored to memory. During the Lunar day, the L-N charges its battery, moves antennas, and transmits data via a relay satellite. Rinse and repeat.

Given that all goes well, LuSEE-Night will perform sensitive observations of the radio sky at 0.5-50 MHz from the radio-quiet Lunar far-side. Looking at the photo of the LuSee-Night lander, it seems to be a simple, unprepossesing antenna that will be placed in a quiet location. But it will be an amazing technical feat to get this instrument to where it's going, and to operate it in incredibly adverse conditions. If it does work, or better yet when, we will get a look at one of the most inaccessible parts of our universe!

Next Month's (February) Speaker: Dr. James Lynch, CCAS, WHOI, ASA

Title: "Cosmology – the large and small of it"

Date: Feb. 5, 2026

Place: Both at the DYHS library and on Zoom (speaker will be live)

BIO: Dr. James Lynch obtained his B.S. in Physics from the Stevens Institute of Technology in 1972 and his Ph.D. in Physics from the University of Texas at Austin in 1978. He currently holds the position of Senior Scientist Emeritus at the Woods Hole Oceanographic Institution. Dr. Lynch is a Fellow of the Acoustical Society of America (ASA), a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), former Editor-in-Chief of the IEEE Journal of Oceanic Engineering, and current Editor-in-Chief of the Journal of the Acoustical Society of America. He is recipient of the Walter Munk Award (2009), the Oceanic Engineering Society Emeritus Award (2019), and the ASA Gold Medal (2021). His primary hobby is amateur astronomy, and he is the current president of the Cape Cod Astronomical Society.

Abstract: Cosmology is the study of the universe on the largest scales – things like galaxies, clusters of galaxies, what the universe is made of, the Big Bang, and the eventual fate of the universe. And it is now a well-developed branch of science, with a very accurate model at its core, the so-called ΛCDM (Lambda Cold Dark Matter) model.

But it still contains many major mysteries. We don't know what dark matter and dark energy are, which comprise 95% of the universe. Recent Hubble and James Webb Space Telescope observations show that large scale structures are forming earlier than our theory predicts. Even the "cosmological constant", which is a leading contender for dark energy, seems to be changing over time.

Strangely, the explanation for these large-scale phenomena may lie in the very smallest scale of the universe, the Planck scale.

In my talk, I will discuss both the large and the small-scale aspects of cosmology. Maybe, as when in "Men in Black" Agent J asks Frankie, the alien pug dog, how the galaxy can be contained in a tiny orb on the cat's collar (the "Bell of Orion"), the answer Frankie gives is the correct one. "You humans! When will you learn that size doesn't matter? Just because something is important doesn't mean it's not very small."

From what I've discovered so far, Frankie has it right. See if you agree!

Directions to Dennis Yarmouth HS and Werner 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 along 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. You can (and should) park on the grass there.

H&K directions

CCAS hosts a dinner gathering for the speaker (if available), members and friends on meeting nights (just before the meeting) at the South Yarmouth Hearth & Kettle restaurant at 5:45pm; (the meetings begin at 7:30 at D-Y.) Please join the group to dine and talk about all things interesting, especially astronomy, 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). **NOTE:** Since Covid, we have a mix of fully remote and hybrid in-person+ remote meetings. Check the newsletter and/or website to see what the format is each month! There are no dinners when the meeting is fully remote.