First Light Lite

Feb 2, 2025

Jim Lynch – Editor

Message from the CCAS President (written Feb 2nd)

Today on Groundhog Day, Punxutawney Phil saw his shadow, predicting a longer winter. But meteorologists and the jet stream seem to think the opposite. Given that we get clearer skies in cold weather, I may have to go with the "large squirrel" (to quote Bill Murray) here.

We *did* have a nice window of clear skies for our late January star party and again squeezed a good event in between the clouds. The Ecliptic plane was clearly shown visually by Venus, Saturn, Jupiter, and Mars, and again we were able to show some people the Galilean Moons and Saturn's Rings for the first time. Alan Collette's Seestar produced a beautiful image of the Orion Nebula for the visitors in real time. Things like that, where someone gets to appreciate the beauty of even the most easily accessible amateur telescope targets, make our star parties very gratifying to all involved. (And the Seestar worked well despite the cold this time around!)

We also had a great speaker last month, Dr. Stacy McGaugh from Case Western, and his talk will be described below. We will have a recorded talk this month on Space Law, and the topic and speaker, Dr. Andrew Wood from the University of Arizona, will also be described in our Speakers section.

Communications

The mailing list is still slightly problematic, but at least we know the problem areas and are addressing fixing them. We have a list of names of people who are having difficulty receiving our newsletter, and we're working on getting to them individually. If you use Comcast for email, we encourage you to get an additional mail address to use with us. We'll also get back to people with various requests.

Speakers and Hybrid Meetings

Our hybrid meeting format has been working out reasonably well, allowing us both an in-person H&K dinner and DYHS meeting and also a remote Zoom link for those who can't attend the live event. The upcoming meetings will mostly be in this format. Check the newsletter and website for month-to-month variation.

Star Parties

This month, the star party is scheduled for the week of February 24th. The weather has turned very cold, so please dress warmly if you come. But the winter nights are beautifully clear, and the fall and winter sky have some wonderful features to see. There is also a nice parade of planets in the evening sky, which show excellent detail in our outdoor telescopes.

We'd also like to consider again an occasional extra star party in Falmouth, as we have an 8" Dob, a Seestar, and binoculars available there. We have been in touch with the Falmouth HS astronomy teacher, Mr. Cozzens, and are working toward at least one event for the FHS students. Our main problem has been locating an open, light-free venue.

We also have a request from Ms. Ferreira for a star party at the Sandwich Middle School, where we have visited in previous years.

These outreach visits are fun for our members, and also appreciated by the schools and organizations that we visit.

Small smart telescopes

As mentioned previously, CCAS recently purchased both Unistellar and Seestar small, smart telescopes which are very easy to set up and also provide real time stacked images. They both work with iPhones and tablets and WiFi and Bluetooth and can also provide images to a bigger screen. They are excellent for wide-field sky viewing and imaging and provide images quickly, a big consideration for star parties, where people only have a short time to observe the sky. Let me show a Seestar picture taken by Alan Collette at the recent star party always (below) as an example. The Orion Nebula is impressive in binoculars, which we had on hand, but now add the detail you get from imaging, and this really makes an impression. For people interested in doing astro-imaging, these also provide a simple but effective beginning tool. The Seestar S50 price point, around $500, is attractive.

Fig 1. M42, the Orion Nebula

Some Projects for the New Year

We have previously discussed trying to get some "community projects" started for club members, which can be pursued both individually and in groups.

Astrophotography is one, and if any of the readers of this newsletter have purchased a Seestar or Unistellar scope, or want to use CCAS's (for members), these scopes make entry level photography of the sky easy. We're looking at making a collection of new sky photos this year, and the response so far has been great. One of those photos is the M42 one shown above, using a Seestar. Another one, which is on a far more advanced level technically, is shown below, and is from Dr. Frank Isik. This is the result of hours of work and processing, as opposed to the Seestar "quick looks." Much more detail can be seen, but it comes at the cost of investing more time and having sufficient enthusiasm and patience.

Fig 2. Frank took this picture of the Heart Nebula (a Valentine's Day gift to the club!) with his Takahashi FSQ-85EDP refractor on an A-P tracking mount, total of 45 5-minute sub exposures during one rare clear night. Stacked in Siril with star reduction to make the nebula stand out, then post-processed more in Photoshop.

This month's speaker (recorded talk)

Speaker: Dr. Andrew Woods, University of Arizona, Milton O. Riepe Professor of Law & Distinguished Legal Scholar, James E. Rogers College of Law, Co-director, TechLaw Program

Topic: Space Law. A precis from Wikipedia is: Space law is the body of law governing space-related activities, encompassing both international and domestic agreements, rules, and principles.[1] Parameters of space law include space exploration, liability for damage, weapons use, rescue efforts, environmental preservation, information sharing, new technologies, and ethics.[2] Other fields of law, such as administrative law, intellectual property law, arms control law, insurance law, environmental law, criminal law, and commercial law, are also integrated within space law.[3]

Biography: Professor Woods's teaching and research interests include cybersecurity, the regulation of technology, and international law. His scholarship has been selected for the Yale/Stanford/Harvard Junior Faculty Forum, and his articles have appeared in: the Yale Law Journal, the Stanford Law Review, the Vanderbilt Law Review, the Harvard International Law Journal, the Virginia Journal of International Law, and the Chicago Journal of International Law. His work has been cited in The Economist, The Wall Street Journal, The Washington Post, Bloomberg, and NPR. Professor Woods is a contributing editor of the Lawfare blog, and has written for the New York Times, the International Herald Tribune, the Financial Times, and Slate.

Professor Woods is on sabbatical for the 2022-2023 year. In the Spring of 2023, he will be visiting at the University of Copenhagen on a Fulbright Schuman Innovation Award. In Spring 2017, Professor Woods was a visiting professor at the University of Texas School of Law, where he taught a class on law and policy in the technology sector. Before that, he was an assistant professor at the University

of Kentucky, a postdoctoral fellow at Stanford University (at the Center for International Security and Cooperation and at the Center on Philanthropy and Civil Society) and a Climenko Fellow at Harvard Law School. He holds an A.B. from Brown University, *magna cum laude,* a J.D. from Harvard Law School, *cum laude*, and a Ph.D. in Politics from the University of Cambridge, where he was a **Gates Scholar.**

Next Month's Speaker(s): CCAS Members

Topic: Recent CCAS Technical Activities

Description: CCAS members are doing a variety of things, from photography to astrometry to star parties to lectures and more. We also have people who would like to be doing some activity, but are not engaged as yet. In the past, we had more "member oriented" talks during the year, and this seems like a good time to revisit that tradition. If members/friends of the club would like to speak, please let me know at jlynchwhoi@gmail.com and/or also send 1-2 PowerPoint slides showing your topic. If we could get 5-10 speakers, it will make an interesting session, as it has done in the past.

Last Month's Speaker: Professor Stacy McGaugh , Department of Astronomy Case Western Reserve University

http://astroweb.case.edu/ssm

Date and place: January 9th, 7:30 PM. At DYHS and on Zoom.

Title: Does Dark Matter Make the Galaxies Go 'Round?

Precis: Our CCAS club is fairly familiar with many of the latest goings on in astronomy and cosmology, at least at the layman level. Thus many of us know that the latest reigning cosmological model is called the ΛCDM model, where Λ is the cosmological constant that describes dark energy and CDM stands for Cold Dark Matter, our "best" theory to describe dark matter. The problem is that neither of these seems to be quite right, and so the model might more aptly be called "ΛCDM?? Really??"

Our last speaker, Dr. Stacy McGaugh, concentrated on the dark matter part of the current cosmological model, and in particular on a different explanation of dark matter that wasn't matter at all, but rather a change in Newton's famous F=ma law

when accelerations are very low, a regime we don't normally encounter in everyday life.

He started out with a rather detailed, multi-branched tree figure, where the branches and offshoots were various theories of what we will generically call dark matter. On the side of the figure was a chainsaw that signified his intent to do a little judicious pruning of this tree.

But, before pruning, he first went into the history and the physics of why we even believe there is such a thing as dark matter (or whatever it is). These are the roots of the tree.

The history of why we pursue DM is centered on two big discoveries. First, (the irascible) Fritz Zwicky discovered early in the 20th century that galaxies in a galaxy cluster were moving about far faster than they should have, and so some "Dunkle Materie" (Dark Matter) needed to be present to make the dynamical books balance. (NOTE: Fritz Zwicky is inevitably called "the irascible" because, well, he pretty much was! He was also quite brilliant and predicted neutron stars and supernovae. One of Astronomy's great geniuses.) Second, when looked at in the latter part of the 20th century, galactic rotation curves also didn't line up with dynamics – the outer sections moved far too quickly. The name Vera Rubin is often associated with this work, but she was one of the many who worked on this observational problem. Definitive work, to be sure, but not solo.

So, there was a problem, and Fritz Zwicky had already proposed a solution. So, easy-peasey – just find out what was missing and problem solved. This simple task generated all the mass branches on Dr. McGaugh's tree. A sampling is: axions, WIMPs, black holes, neutron stars, white dwarfs, brown dwarfs, strange nuggets, Jupiters, and dark clusters. And if you don't hold with exotic, hard to detect forms of matter, you can change the laws of physics in this "terra incognita." So add the branches of: asymmetric gravity, Weyl gravity, and two flavors of MOND (modified Newtonian dynamics).

To date, there have been, to quote the talk: "many, many, many" experiments done and observations made trying to find DM. And, of course, much money has been spent and endless papers written. But to date, no mass-based candidate has been found that fits all the data. Candidates that we know exist fall short of sufficiency, and the hypothesized masses such as WIMPs and axions have yet to be detected.

Theoretically, one has the latitude to tweak the basic equations somewhat, as long as the tweaked equations don't contradict what we already know. Amazingly, a rather simple tweak known as MOND, which just slightly modifies Newton's

Second Law in the low acceleration regime, seems to do a good job in explaining the galactic rotation curve data. Moreover, it is known that the shape of the rotation curve correlates with the surface brightness of the stars seen in the galaxies (called the Tully-Fisher law), which is also described by MOND. When put into a checklist of observations versus predictions, MOND does quite well, which was one of the take-home messages of Dr. McGaugh's talk. Why one would need to tinker with Newton's laws at low accelerations is not known, but that it works seemed pretty obvious by the end of the talk.

The talk ended with Dr. McGaugh's granddaughter (I hope I got that right!) loudly and amusingly debating with a friend whether MOND or Dark Matter were correct. Perhaps the answer will be known in their lifetimes, which are now a century removed from when (the irascible) Fritz Zwicky proposed that there was such a thing!

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.