First Light Lite

July 2, 2023

Jim Lynch – Editor

Message from the CCAS President

The weather, at least as far as observing is concerned, has been dismal. Cloudiness with occasional rain has ruled. And while hazy sun may make for a decent beach day, the few days we've had that the meteorologists considered clear were not good observing weather.

But we've made some lemonade out of lemons and used the time to retune our main telescope after last month's pedestal raising by 16". We still have 1-2 more tasks to do on this, but we should be able to do these in time for our July star party, scheduled for the week time window of 17-22 July (around the New Moon). Our star party will start an hour after sunset when skies are dark.

We also have a great, live speaker (on Zoom too if you can't make the live talk) on July 6th at 7:30 PM. See the writeup below.

In addition, our club members will be giving some astronomy talks at the Centerville and West Barnstable libraries this month. Again, see the writeups below.

Star Party for July (17-22 July window)

As anyone who has been reading this newsletter knows, we have changed our "modus operandi" as regards star parties from what it was pre-Covid. Rather than having 1-2 definite dates per month for a star party, which more often than not were weathered out, we have gone to a six-day weather window centered around the New Moon, which gives us a reasonable chance of a dark, clear night. (And even with this, we've been weathered out a few times the past few months.) But by and large this is a more workable strategy.

We've also gone towards "binocular sky tour" and "smaller scope eyepiece viewing" outdoor activities, together with a "real time video image show" (through the main dome scope camera) in the lower level of WSO combined with a dome

tour. This set of activities tends to give guests the best overall experience, and we will also continue to refine our format.

CCAS and CCAF Elections

Nominations for both all four CCAS officers and one CCAF Board member were due via email by June 15th, and are now closed. As of now, we have the four current CCAS officers nominated, with no new nominations. The current CCAS officers are: Jim Lynch, President; Ashish Dutta, Vice-President; Ken Brink, Treasurer; and Jonathan Hatch, Secretary. Given that, I will likely ask for an "acclimation" vote to re-elect the current CCAS officers at our July meeting.

The current CCAF Board is: Jim Lynch, acting Chair; Janice Marks, Treasurer; Jonathan Hatch, acting Secretary; Gary Walker, member; and George Silvis, member. Charlie Burke sits in ex-officio as Observatory Director. Janice Marks has been filling Gus Romano's term (to 2023) as Treasurer, has done a great job, and has signified her willingness to run for a full term (to 2028). There are other CCAS Board and CCAS Officers actions required, but these need not concern the general membership. For now, we need to elect CCAS Officers (with the four in place standing for re-election) and one CCAF Board member, with Janice Marks willing to stand to continue as a Board member. Again, the vote will be at the July meeting, a slight change in procedure, but still on schedule. We will have both live and Zoom voting, as this meeting and lecture will be live.

Dues

During Covid, we did not require dues, and left them to be entirely voluntary at $30 per family. This year, as we are resuming activities, we are requesting dues at a reduced flat rate of $15 per family (or individual, if there is no family to consider.) Dues will be due July 1st. If you have sent our treasurer (Dr. Ken Brink) dues in the last year, you will be considered to have paid dues for this year. If not, we would ask you to submit them, as this money is used to support our activities with the schools and the public. (We don't buy equipment, as that is the Foundation's function.) Dues should be sent to: Dr. Ken Brink, 16 Greengate Rd.,

Falmouth, MA 02540. If you send your dues to the Observatory or DYHS, they will be delayed in their transmission to the CCAS Secretary.

I'd note that most CCAS activities will be available to those who do not pay dues, but when we eventually have remote observing online, that might be restricted to those who are dues paying members. It is a small amount, and it is hoped you can pay if you wish to be active in CCAS.

This Month's Speaker: Dr. G. Fabbiano, Center for Astrophysics | Harvard & Smithsonian

Time, Date and Place: 7:30 PM, July 6th in the DYHS Library (as well as Zoom).

Title: Chandra & the Supermassive Black Hole (SMBH) – Galaxy Interaction

Abstract: The Chandra X-ray observatory, NASA's Great Observatory for the X-Rays, was launched from Cape Canaveral on 23 July 1999 on the Shuttle Columbia, and has been operational ever since, providing a new detailed view of the energetic universe. In this talk I will introduce Chandra and its unique capabilities, and I will then discuss our studies of SMBH-Galaxy interaction that Chandra has made possible. The discovery that all galaxies host a SMBH in their nuclei led to the realization that the evolutions of galaxies (of which the Milky Way is our home) and SMBHs are interconnected. When a SMBH is 'awakened' by the in-fall of stars or nearby clouds, it becomes an Active Galactic Nucleus (AGN) or quasar. In this phase, a tremendous amount of energy is released, equaling, or even surpassing the total energy output of the 100-1000 Billion stars in the galaxy. This energy, in the form of radiation and winds, interacts with the interstellar clouds in the disk of the host galaxy, leading to the X-ray emission that we are studying with Chandra. A new detailed understanding of the AGN phenomenon is emerging from these observations, not restricted to the immediate vicinity of the SMBH, but that may involve the whole host galaxy. In closing, I will advertise the Chandra Source Catalog and its visual interface that allows a direct exploration of the X-Ray sky.

Biography: Giuseppina Fabbiano is Senior Astrophysicist at the Smithsonian Astrophysical Observatory (SAO), a member of the Center for Astrophysics (CfA)|

Harvard & Smithsonian, in Cambridge MA, USA. After completing her studies in Physics at the University of Palermo (Italy) in 1973, Fabbiano joined the group led by Riccardo Giacconi at the CfA that became the major center for X-ray Astronomy worldwide. She was a scientist in the data management teams of the NASA UHURU mission, the first X-ray astronomy satellite, and the HEAO-1/A3 mission. As project scientist for the Einstein Observatory, she was responsible for the data processing system, and was a key member of the successful proposing team for the NASA Chandra X-ray Center (CXC). Today, she is the Head of the CXC Data Systems Division, with oversight of the software, hardware and system groups, as well as the Chandra data processing and archive. Fabbiano is an active astrophysicist, with over 700 highly cited publications (275 refereed). She is a leader in the observational studies of populations of X-ray sources in galaxies, the hot interstellar medium, and the interaction between nuclear massive black holes and the host galaxy. She is the author of two invited reviews in the Annual Review of Astronomy and Astrophysics. Fabbiano is a co-author of the Smithsonian Institution Digitization Strategic Plan (for 2010-2015) and of the 2009 report of the US Interagency Working Group on Digital Data 'Harnessing the Power of Digital Data for Science and Society.' She chairs the US Virtual Observatory Alliance and is a member of the International Virtual Observatory Alliance (IVOA) executive committee, which she chaired in 2016-2018. Fabbiano is a member of the American Astronomical Society (AAS) and the International Astronomical Union (IAU), an elected Fellow of the American Association for the Advancement of Science (AAAS), and Member and former Trustee of the Aspen Center for Physics.

ZOOM INVITATION

Topic: CCAS lecture and meeting Zoom Meeting

Time: Jul 6, 2023 07:30 PM Eastern Time (US and Canada)

Join Zoom Meeting

https://us06web.zoom.us/j/83483005790?pwd=SnNQRnBqdnU2YVZ6WWVGMzZxWklyQT09

Meeting ID: 834 8300 5790

Passcode: 151531

One tap mobile

+16465588656,,83483005790#,,,,*151531# US (New York)

+16469313860,,83483005790#,,,,*151531# US

Dial by your location

• +1 646 558 8656 US (New York)

• +1 646 931 3860 US

• +1 301 715 8592 US (Washington DC)

• +1 305 224 1968 US

• +1 309 205 3325 US

• +1 312 626 6799 US (Chicago)

• +1 360 209 5623 US

• +1 386 347 5053 US

• +1 507 473 4847 US

• +1 564 217 2000 US

• +1 669 444 9171 US

• +1 689 278 1000 US

• +1 719 359 4580 US

• +1 720 707 2699 US (Denver)

• +1 253 205 0468 US

• +1 253 215 8782 US (Tacoma)

• +1 346 248 7799 US (Houston)

Last Month's Speaker: Dr. Peter Plavchan, George Mason University

Date: June 1st, 2023 @ 7:30 PM Eastern

Title: "How to find Earth 2.0"

Biography: Dr. Peter Plavchan is an Associate Professor of Physics and Astronomy at George Mason University, and the Director of the George Mason University Observatories. He earned his undergraduate degree in Physics at Caltech in 2001, his PhD from UCLA in 2006, and he has held appointments at the NASA Exoplanet Science Institute at Caltech, Missouri State University, and a visiting appointment at the University of Pennsylvania.

Dr. Plavchan is an observational exoplanet astronomer, with a focus on the formation and demographics of planets around cool dwarfs, utilizing the radial velocity and transit detection methods. He is the PI of a NASA Probe Mission concept called EarthFinder, is a Co-PI of the MINERVA-Australis telescope array, regularly uses the NASA Infrared Telescope Facility iSHELL spectrometer for precise radial velocities, has served as an Executive Committee member of the NASA Exoplanet Program Analysis Group (ExoPAG), and has received multiple NASA Group Honor Achievement Awards. His research is currently supported by NASA, NSF, and the Mt. Cuba Astronomical Foundation, and his work has appeared in numerous local and national publications.

Links to Dr. Plavchan's websites are found just below.

https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fscience.gmu.edu%2Fdirectory%2Fpeter-plavchan&data=05%7C01%7Cjlynch%40whoi.edu%7C3073d99cb2bf4eded1a608db572db962%7Cd44c5cc6d18c46cc8abd4fdf5b6e5944%7C0%7C0%7C638199626127716700%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=mUOFYOSvdB27DUuTMTm1VzTIrreQsAZY73ZCMiOJ8SE%3D&reserved=0

https://exoplanets.nasa.gov/news/1510/taking-the-astronomical-road-less-traveled/

Precis of talk: Exoplanets have captured both the astronomers' and public's interest over the past quarter century or so, for good reasons. The question of whether or not our Solar System was unique was answered with the first exoplanet detection, and the question of whether or not it is typical has been partially answered since then. Also, we are naturally interested in whether or not Earthlike planets exist in any abundance, as we will no doubt want to head towards them as soon as Ephraim Cochrane discovers Warp Drive. And then there is the issue of star formation, which is directly connected to planetary system formation. So, even with this cursory list, you can see that there are plenty of reasons to care about this topic!

Peter started out his talk discussing the issue of how hard it is (or isn't) to detect exoplanets, and the technologies used to do so. Earthlike planets are generally close to their stars and are harder to observe than Jovian sized planets which reflect more light. This is especially true for dusty young star systems.

To do direct imaging of such planets, Lyot coronagraphs that block the direct rays of starlight are employed and angular differential imaging helps see the planet in contrast. The method of transits, where one sensitively measures the amount of starlight received and looks for dips due to the exoplanet transit partially obscuring the star (and smaller peaks/dips due to the planet's reflectivity in other parts of its orbit) has been a very useful technique and has discovered a number of exoplanets. And the Doppler method, where one examines spectral lines to see if there is any wobble due to planets moving the star around the center of mass point has also been successful. Gravitational microlensing of a distant background star by an exoplanet is also a viable new technique. So, there are a number of detection and measurement methods available, and success depends upon the characteristics of both the telescope used and the system being examined. And improvements in all these methods are expected in the future.

There have been many notable individual successes in this field, and Peter discussed a few of them. Two planets circling the bright young star Beta Pictoris have been seen with direct imaging, and the details of its protoplanetary disc are fascinating. The star Trappist-1 is a cold dwarf that sports a system of seven Earth

sized planets, some of which are in the (temperature) habitable zone. Habitability will depend crucially on having a planetary atmosphere, and spectral analyses are already at a stage where this is an approachable measurement for exoplanets.

The combined exoplanet observation programs have also been very successful, and the Kepler mission (2009) is a very good example. This satellite used the transit method to scan 150,000 stars, and in doing so detected 1000 planets as small as Mercury. It, and other efforts, have determined that Earth-sized worlds are common around stars smaller than our Sun. (These are red dwarfs, which roughly range from 0.2 to 0.8 solar masses, and have extremely long lifetimes.) The combined efforts of the exoplanet programs have netted on the order of 5,000 exoplanets, and at this stage, the statistics of these detections become a valuable analysis tool, not just individual case studies. The field still has a long way to go, and more things to discover, but it also has achieved a degree of maturity that is quite impressive!

Next Month's Speaker: Dr. Tony Stark, Senior Astronomer
Center for Astrophysics | Harvard & Smithsonian

Date: August 3rd, 2023

Title: The Golden Age of Observational Cosmology

Abstract: Thirty years ago, we knew there was almost certainly a "Big Bang", we thought the Universe was "open", and we had observations of a few objects at redshifts $z > 1$. Now the "Lambda Cold Dark Matter Big Bang" model parameters are known within a few percent, including the fact that it is "just closed", and we routinely observe the formation of galaxies at redshifts $z > 6$. We now understand in some detail the story of how the world came to be, from the first fraction of a second after the Big Bang until today, a story that involves the mysterious "Dark Matter" and "Dark Energy." Observational cosmology, a field of study driven by the revolution in technology, is the source of this new knowledge.

Biography: Dr. Antony Stark is a pioneer of Antarctic Astronomy and is a founder and designer of the South Pole Telescope (SPT), which is among the most important instruments for observational cosmology. He is PI and designer of the

Parallel Imager for Southern Cosmology Observations (PISCO), a photometric camera on the Magellan Clay telescope for taking fast simultaneous g, r, i, and z band images. PISCO is being used to take the first images of galaxy clusters discovered by the SPT to determine their mass by gravitational lensing analysis. PISCO is also in use by several groups from Magellan consortium institutions to study asteroids, galaxy formation, exoplanets, and X-ray sources. Stark is a member of the STO and GUSTO balloon-borne telescope teams for Milky Way and Magellanic Cloud TeraHertz spectroscopy surveys of the dominant cooling lines of the interstellar medium.

CCAS Centerville Library Talks (July 5, 12, 19 at 1:00 – 2:30 PM)

Topics: Big Bang, Amateur Astronomy, Black Holes

Speakers: CCAS members Dr. Jim Lynch, Mr. Jonathan Hatch, and Dr. Ken Foote

SPACE OUT in July (1).mp4

The Centerville Public Library is located at 585 Main Street, Centerville. Please use the side entrance as you will see the front entrance is undergoing construction. Parking is available at the front and side of the building. Each program will take place in the lower-level Community Rooms (there is a set of stairs and an elevator for your use).

West Barnstable Library Talk (July 27th, 6:30 PM)

POC: Ms. Julie Williams - Adult Programming
Whelden Memorial Library, 2401 Meetinghouse Way; P.O. Box 147, West Barnstable, MA 02668 wheldenlibrary.org

Topic: Amateur Astronomy and Astrophotography

Speaker: CCAS member Dr. Frank Isik

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. **NOTE:** We are redoing the website, so that this information may become dated soon. We intend to move any currently useful information to our new website.

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.