

## **First Light Lite**

February 1st, 2017

Jim Lynch, Mike Hunter, Gus Romano - Interim Editors

### **Ad Hoc Committee Update**

First proposed last summer, and then delayed for a few months, the Ad Hoc committees have started working in earnest. These are: 1) the Website Committee, headed by Gus Romano, 2) the First Light Committee, headed by Jim Lynch, and 3) the Communications Committee (which includes membership, advertising and outreach), headed by Ed Swiniarski. By the time of the February CCAS meeting, all three groups will have met and outlined initial action items. The three groups will make a report of progress at the February meeting. Anyone interested in contributing to these efforts should contact the appropriate committee chair.

### **Website**

Even though it is temporarily frozen, there is much useful information on the current CCAS website! In your browser, bring up [www.ccas.ws](http://www.ccas.ws).

### **January 5th CCAS Meeting**

First, we'd like to thank our January 5th speaker, Tansu Daylan, a graduate student with the Harvard Smithsonian Center for Astrophysics. His talk was on "The Inner Milky Way Gamma Ray Excess". The formal abstract of his talk was included in the last First Light Lite, so we won't repeat it here. Rather, we will report from our Secretary's notes.

His topic title was: "Probing the GeV Excess using PCAT" (from the 18 July 2016, International Conference on the Identification of Dark Matter, with Stephen K. N. Portillo and Douglas P. Finkbeiner). The test bed for PCAT (probabilistic cataloging; making a catalog of point sources in a given image, i.e., a two dimensional array of photon counts) is the North Galactic Polar Cap, which has a simple background and point sources. Gamma Ray intensity can also be used to infer dark matter. Source of the gamma rays is mostly pulsars. The principal

detector used was the Fermi LAT (Fermi Large Area Telescope) launched in 2008, which images gamma rays. With PCAT "tested and verified as working", can then look at the unexplained excess of gamma ray emissions from the center of the galaxy. PCAT is computationally demanding. Only in the past 10 years has sufficient computer processing power been available to process the data in this study. The take home messages were that PCAT was now a working tool, and that the sources near the galactic center had a high probability of being pulsar sources. JFL note: Large scale computer simulations and probabilistic (Bayesian) analysis methods are a little outside the usual topics that an amateur group sees, and this was a bit of a stretch for CCAS and guests. However, it also was a good bit of "cultural exposure", in that these are real, standard tools for astrophysicists nowadays, and even if we don't pursue them (at our level) as a club, it is good to know they exist and to have some inkling of how they work!

## **Upcoming Speakers and Topics**

Our February 2nd speaker is Jim Lynch. Jim is current CCAS President, a Scientist Emeritus at the Woods Hole Oceanographic Institution (as of his retirement from WHOI on January 1st), and Editor-in-Chief of the Journal of the Acoustical Society of America. His talk title is: "Is the Universe Stringy, Loopy, Neither or Both?"

**ABSTRACT** - It has long been known (since Einstein's early work) that in order to explain the largest scales of the universe, i.e. cosmology, general relativity is the prime descriptive theory. In the last 75 years or so, it has also become apparent that you need to also need to understand very high energy particle physics to understand cosmology. What seemed to be two separate disciplines turn out to merge at the "Planck Scale", where gravity is just as strong a force as the other three familiar forces (the strong, weak and electromagnetic). During the last 50 years, many, many "scientist years" have been invested into trying to develop theory that successfully merges the four forces we know. The two leading contenders at this point in time are string theory and loop quantum gravity. In this talk, I will give a description of how these two theories work, how they differ, what their strong and weak points are, and where things might be going in the future. Please note that, while I have a degree in nuclear and particle physics, these are NOT areas that I have researched through my career. I, like you, am trying to

see modern progress "through a glass darkly." So please be patient with me if I can't answer all your questions immediately! (I DO try to get back to people if I can't answer questions right away, though!) I hope this will be enjoyable, and I promise that it will not be a "math fest" - just concepts!

Our March speaker is Dr. Frank Primini of the Harvard Smithsonian Center for Astrophysics. His title is: "Probing the nucleus of M31 with the Chandra X-ray Observatory".

**ABSTRACT:** M31 is the closest giant spiral galaxy to us, and we believe it's similar to our own Milky Way. It contains hundreds of compact x-ray sources, believed to be the remnants of stellar evolution. In this talk, I'll review some of what we've learned about M31's x-ray population from the Chandra X-ray Observatory and other x-ray telescopes, with particular emphasis on the nucleus of the galaxy. Because of Chandra's superb angular resolution (for an x-ray telescope), it offers a unique perspective on the crowded environment of the nucleus, where we believe lurks a black hole with a mass about 200 million times that of the Sun.

Future talks are: April - Observatory and Foundation Report, May - Stella Kafka, AAVSO.

### **Note From Bernie Young on Asteroid Occultation**

Friends,

Asteroid Hermoine will occult a 12th magnitude star on 2017 02 01 at 01:54 UTC for about 12 seconds. That's 8:54PM EST Tuesday January 31. We are near the centerline of the shadow and nearest of the eight observers currently signed up for this event. I have signed up for it and will open the WSO at 7:00pm. All are invited.

Bernie

Occult Watcher, ver. 3.7.0.14 - Werner Schmidt Observatory (UTC -05:00)

Synchronise now Configuration Add-ins Help

Asteroid Name	Event Date, UT	Magn.	Rank	Travel Dist.	Lat
<b>My Events</b>					
(121) Hermione **	Wed 01 Feb, 01:54 UT	12.0	100	3 mi N	13
<b>All Events</b>					
(146) Lucina **?	Fri 13 Jan, 00:09 UT	12.1	96	445 mi N	17
(9840) 1988 RQ2	Sat 14 Jan, 01:19 UT	9.2	2	158 mi N	13
323P/SOHO**	Sat 14 Jan, 03:23 UT	8.8	1	277 mi N	02
(42277) 2001 SQ51	Sat 14 Jan, 07:14 UT	7.7	2	440 mi SW	13
73P/Schwassmann	Sat 14 Jan, 11:24 UT	10.8	0	6043 mi SW	14
(29809) 1999 CQ103	Sat 14 Jan, 22:49 UT	12.9	6	140 mi N	20
(1000) Erda	Sat 15 Jan, 00:00 UT	11.0	100	27 mi NE	04

L [IOTA Updates]

you | center | shadow | 1-sigma | 2 & 3-sigma limits

**(121) Hermione occults 4U 594-40853**

Event time: 01:54:49 UT      Constellation: Gemini

Error in time: 2 sec      Star altitude: 64° E

Position: In the shadow, 3 mi from the central line      Sun altitude: -44°

Max duration: 12.4 sec      Moon altitude: 2° W

Magnitude drop: 0.5-0.8 m      Moon distance: 112°

Combined magnitude: 11.8-12.2

Star magnitude: 12.9 m

There are currently 8 announced stations for this event.  
1 of them is yours.

[Show online map with stations](#)    [View details on the web](#)    [View station sorts](#)

Idle **There is a new version of OccultWatcher available!**

## Star Parties

Winter season once per month "QUARTER MOON SATURDAY STAR PARTIES", **all open to the public**, began September 10th, 7:30-9:30PM.

From September thru June, we will have one regularly scheduled Star Party each month taking place usually \*\* at 7:30-9:30pm on the Saturday closest to the date of First Quarter Moon (about 7 days old).

(\*\* In May and June, these events start at 8:30 because of later sunset times.)

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 remaining schedule for “Quarter-Moon Saturday Star Parties” thru June, 2017; **the public is invited:**

Saturday February 4th

Saturday March 4th

Saturday April 1st

Saturday May 6th

Saturday June 3rd

**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.

## Observatory and Education News

### 2017 PREPARATION FOR STUDENT PROJECTS

(by Bernie Young)

We made a quantum leap in offering 12 different projects to 20 honors students in Jim Mitchell's Earth, Space, and Energy class. We had four active mentors from the Society and even more offering to be on standby if needed.

Each project had about a half dozen files of reference material to help the students prepare for observation and data gathering. Then I realized that life in the 21<sup>st</sup> century isn't as convenient as I assumed. Each student/partner had a 15 minute kickoff meeting with a mentor. My hope was that the students would have the project files, read them, and have some familiarity with what they were attempting. Fifteen minutes is not enough time to introduce a project, and the reference files could not be transmitted because the computers the students were given have no USB drive. I wrongfully assumed that I could load each set of files on their thumb drives, but few had them. After the orientation sessions the files were loaded on the teacher's computer. He read them and emailed them to the students.

Next came the observation sessions. These were usually frustrated by clouds. Imagine capturing the spectrum of Vega and not even being able to see it through the clouds. We got a spectrum, but the hydrogen absorption lines were mostly a guesstimate, except for a big notch where water absorption (clouds) dominated. Clouds were a big problem for six weeks.

We did get some observing done, but students often could not stay; band practice, anxious parents, and ride arrangements shortened many observing sessions. That's tolerable for taking a quick picture of Neptune, but limits the experience of observing the changing brightness of a short period (3-5 hour) eclipsing binary pair. We did see a dramatic 1 magnitude change in the brightness of U Cep (want to revisit this unique target more often).

A second round of meetings with students focused on getting their reports started, mostly sans planning, observation, and analysis. Vocabulary development was to be demonstrated in a presentation. After a third round of meetings it seems some of the students still hadn't got their reference data and had a chance to read it. While I come from a background of self study, there are other learning techniques that must be used to reach the complete spectrum of learners.

Recognizing the problems we had, there is already a program underway to prepare for next year. We will preload a previously donated and idle computer with the programs we use at the WSO to predict events and record and analyze data. We will loan that computer to Jim Mitchell for use in his classroom. Progress here was swift; George Silvis and Joel Burnett have been corroborating and already Jim Mitchell has uploaded all the reference material we had at the beginning. I have accessed this computer from home at George's home and modified and uploaded new material.

In the next eight months we must prepare a data set of WSO observations for each project to be used in the event students cannot observe due to weather, event timing, or scheduling difficulties. Some other tasks are: Develop a vocabulary list of keywords pertinent to each project. Students will develop their own list of PPT presentation introducing each project topic; Write detailed Instructions for the use of software; Preload the computer with freeware used by WSO and example data sets with predictions, observations, and analyses for each project; Write-up for each project in addition to reference materials; Print Data Recording sheets for logging data where applicable; Address daytime viewing policy; Address weekend viewing policy; Make video records for any project that requires observation; Prepare a write-up for general topics that may be unfamiliar to students; magnitude, TV raster technique; UTC/GMT; etc.

Hopefully we will be prepared for some of the problems that occur extraneous to astronomy!

## **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).