

First Light Lite

July 4th, 2018

Jim Lynch - Editor

Another month gone by, but a good one! We DID have a June Star Party, despite the day being the only rainy one over a clear two week period. Murphy slowed us down, but didn't stop us, and we hosted half a dozen visitors (who got a nice WSO tour) as well as putting up some shelving. The CCAS and CCAF officers and trustees have also done a lot of "plotting and planning", and we'd like to engage our Society members in what look to be some great future activities. We also have a full slate of officers for the July elections. Finally, July is "dues month", and with this year's dues paid, we will have enough in the CCAS account to do some really interesting things! So, please come to the July meeting, and join in the activity!

July 5th CCAS Seminar

Dr. Jim Lynch, CCAS and WHOI

"Spectroscopy - Observational Basics, with a Live Demonstration"

CCAS now has some laboratory and solar capabilities in spectroscopy, specifically via the RSPEC commercial systems. I will show what these are using a gas discharge tube setup, diffraction gratings and the RSPEC Explorer system (which is different from the RSPEC Star Analyzer eyepiece grating we've seen/used before.) Seeing the optical spectral lines of various elements live is both pretty and informative!

Upcoming Speakers and Topics

July - Dr. Jim Lynch, CCAS. Spectroscopy - Observational Basics, With a Live Demonstration.

August - Dr. Anastasia Fialkov and Dr. Marion Dierickx, HSCfA. Titles TBA.

September - CCAS Astrophotography! CCAS members.

October - Dr. Tony Stark, HSCfA. Cosmology topic.

November - Dr. Martina Arndt, Bridgewater State. Solar Eclipses.

December - Dr. Jim Lynch, CCAS. The Solar System - Its Formation and Basic Dynamics

Last Month's Speaker - Abstract and Precs

Dr. Ken Brink, CCAS and WHOI

Abstract - Tides and Tidal Forces

Tides are the most predictable of all ocean phenomena because they are forced by the sun's and moon's gravitational attraction. These heavenly bodies both have well-known periodicities that, in turn, lead to tidal regularity. A combination of centrifugal and gravitational forces acts on the ocean, atmosphere and even Earth's crust to drive tidal motions having periodicities that reflect combinations of regular periods, such as Earth's daily rotation combined with the moon's rotation around Earth. Ocean tides are complicated by the complex geometry of the ocean basins, so that there are "quiet" areas, along with resonant "hot spots" such as the Gulf of Maine/Bay of Fundy system. Tidal currents dissipate, leading to extraction of energy from the rotational motion of the moon around Earth, for example.

Ultimately, this type of drag changes the length of the day and of the lunar month. The heat created by extreme tidal dissipation is what keeps the moon Europa's ocean partly liquid as it orbits Jupiter. Even more extreme tidal forces can be found as objects revolve around black holes, leading to the destruction of the orbiting bodies.

June Talk Precs (Courtesy CCAS Secretary Katie Sisson)

June's meeting featured Dr. Kenneth Brink. His physical oceanic expertise shed light on the nature of tides and on their celestial implications.

Tides are highly predictable phenomenon that occur throughout the universe resulting from gravitational forces. Particularly for Earth, tides can be easily observed in the semidiurnal rise and fall of our oceans. Tides are a result of the combined effects of moon's gravitational pull on Earth, and the centrifugal force of Earth rotating around the Sun. Gravitational pulls are *different on opposite sides* of

the Earth – this difference is the key to understanding tides (not the overall strength of gravitation that creates tides). The exact frequency and amplitude of tides are subject to the combined frequencies of the moon's orbit, earth's rotation, earth orbit.

Lunar resonance – moon shows the same face to the Earth.

Period of strongest tides is about 12.42 hours, and not 24, because the moon advances 12 degrees after each Earth rotation in its monthly orbit

Tidal flux – heads toward land, gets hindered by bathymetry, and creates sloshing.

The strongest tides are on the continental shelves

Largest tidal ranges are that way because of resonances (like the Bay of Fundy)

Atmospheric tides exist, not just water!

Internal waves – Toy with two different density fluids, one over the other, shows waves on interface. Can see them in ocean at tidal frequency!

Tidal dissipation is the transformation of tidal friction into heat. In other words, the turbulent energy created by orbital and tidal forces dissipates as heat.

Tidal dissipation is the main damping system of moon revolving around earth or earth around the sun

Moon's orbit is getting larger

Europa – 10-30 km of ice over and ocean over a rocky core

Huge tidal dissipation from Jupiter's gravity

Stable, chemicals and minerals present – good for prospect of life?!

Roche limit – tidal forces can pull bodies apart if not cohesive/stable enough

Produced Saturn's rings – small bodies being pulled apart and flattened along a plane

Stars that approach black holes

George Darwin – used novel tools to predict tides – not just empirical data used in the old days

Also had guest HS student speaker, Ian Wojtowicz, who talked about his personal journey as an amateur astrophotographer. A precis of his talk appears below.

Ian Wojtowicz is a junior at Barnstable High working on astrophotography. He does his work on a 14" Celestron Schmidt-Cassigrain telescope with a Losmandy Titan mount. Along with his mentors Mike Renzi, Mr. Gyra and Albert Brox, Ian has created images of M81*, M42, M109, M51. Ian appreciates the level of detail and precision required for using complex software such as Pixinsight, Maxim, and CCD stack editing to create images. Many different components need to come together to produce just one image. For example, the lens, collimator, the weather, hardware, software component etc.

Collimation

Cleaning and lubricating gears – reduces slewing problems

Issues arise – which is a good problem solving exercise

Pointing model error – balancing scope, tightening of worm gear (Fine tuning)

Filters give more detail

Exposures for each color get stacked and calibrated (basic editing)

More advanced editing possible

Camera only understands intensity – so need color filters as well as luminance.

June Meeting Minutes and CCAS Business (Courtesy CCAS Secretary)

The society is in need of a vice president. Particularly need someone who will focus on gaining and maintaining membership.

Charlie Burke is the new director of WSO.

Our telescopes need people to operate them. Anyone and everyone is welcome to learn. We have detailed cheat sheets that will help, and will schedule future training sessions.

We are currently working on a brochure which will hopefully be finished (as a good draft) by the July meeting for distribution and discussion at the meeting.

A "Beginners guide to astronomy" website creator contacted us to see if any interest.

The CCAS Day of astronomy is fast approaching. It will be a big public event sometime near the end of summer. Ideas for activities will be discussed at the July meeting.

Yearly dues are due at the July meeting - \$30 (preferable by check).

Star Parties

From September thru June, we will have one regularly scheduled Star Party each month taking place at 8:30-10:30pm on the Saturday closest to the date of First Quarter Moon (about 7 days old).

From July through August, we will have three regularly scheduled Star Parties each month taking place on Thursdays at 8:30-10:30pm.

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 schedule for summer "Star Parties" up to September, 2018; **the public is invited:**

July 12, 19, 26

August 9, 16, 23

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.

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).