



First Light

The Newsletter of the Cape Cod Astronomical Society



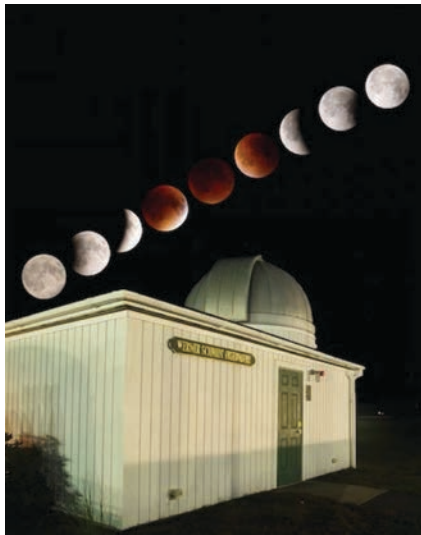
November, 2015 Vol. 26 No. 11

Did YOU Take Some Photos of the September 27th Lunar Eclipse?

Here's a "first eclipse" photo from a college Junior in North Carolina:



...and these two spectacular composites were created by seasoned astrophotographer CCAS members Hank and Mary Lou Ricci:



...How can the moon be in two positions relative to the Dome? Please see page 6 for more information...

Our Next Monthly Meeting: is Thursday, November 5th, at 7:30pm in the D-Y High School library. **Professor Tim Barker**, Professor Emeritus of Astronomy at Wheaton College, will present **Samples from the Moon** at our meeting on November 5th. Tim will show us six ACTUAL samples of material returned from the Moon, waking up special memories of the historic Apollo program, which ended nearly half a century ago.

Reminder: The next "Quarter-Moon-Saturday" Star Party (public welcome) is Saturday, November 21st at 7:30pm. We are also continuing once-a-month "New-Moon-Saturday" "work and discuss" evenings for *Staff and CCAS Members only*: November 14th. Please see more information on both these opportunities with near term schedules on page 4.

In this issue: Eclipse Photos / Planning Student Astronomy Projects / **Moon Samples Coming to CCAS!** / Eastern Standard Time Begins / Leonids / See Uranus and Neptune! / Want more General Relativity? / Telescope Available /

Bright New Stars:

We like to profile new members in our Society in this section of *First Light* each month. If you are a new member and have not yet been so recognized, or might have new information for us (background, astro equipment preferred, interests, etc.) on yourself or someone else, please let us know (email info@ccas.ws).

MEMBERS: PLEASE CONSIDER SUBMITTING AN ITEM OR ARTICLE FOR PUBLICATION IN *FIRST LIGHT*.

CCAS News Items and Current Events:

Planning Astro Projects for Honors Students at Dennis-Yarmouth High School:

We reviewed initial planning for day- and night-time visits to The Schmidt for D-Y students in last month's *First Light*. The focus this month was on more detailed planning of special astro projects for D-Y Honors Students. Please see story beginning on page 3.

The 2015-2016 **Dues cycle** began at our July meeting. Dues for most folks are \$30/year. We need this money to pay our bills and support our Observatory! Please bring your check to the next meeting or mail right away to: CCAS, 34 Ridgewood Rd. Orleans MA 02653. Thank you.

Thank you all for a very good response this time around. We still have several active members who are more than a year in arrears. Please, everyone, "get current" as soon as possible.

The Cape Cod Astronomical Foundation is now participating in the AmazonSmile program (<http://www.smile.amazon.com>); please go to this Amazon login page and sign up. Going forward, 0.5% of the price of all your Amazon purchases will be donated to the Cape Cod Astronomical Foundation when you are a signed-up participant.

CCAS Meetings:

The topic for the October 1st CCAS meeting was the annual **Telescope and Equipment "Show and Tell"** workshop. Each participant gave a brief description of his/her equipment and/or discussion topic. Equipment presented included Mike Hunter's 8" Schmidt-Newtonian, his 4" refractor and a 6" reflector, Gail Smith's heavy duty parallelogram binocular mount particularly suited to multiple observers, Bob Cole's 4" Mak-Cass, Joel Burnett's 8" Dob, and Gus Romano's standard Questar. Hank and Marylou Ricci presented the methodology used in taking and processing astro photos and Gus discussed lunar eclipse photography with a 500mm Nikon lens.

Special Event: In addition, Werner Schmidt's 101st birthday

was celebrated with cake and coffee. Werner is the Founder of our Observatory.

We are very pleased to confirm that **Professor Tim Barker**, Professor Emeritus of Astronomy at Wheaton College, will present **Samples from the Moon** at our meeting on November 5th. Tim will show six samples in a Plexiglas disk of material returned from the Moon by the Apollo program nearly half a century ago. He will also provide his own glimpses of that wonderful time beginning in the mid sixties when twelve astronauts, supported by 400,000 other Americans who worked on the program, walked on the Moon, engaged in scientific experiments, and brought back lunar samples and their own compelling personal stories. Their work led to a revolution in our understanding of the history of the solar system and our place in it.

Many of us remember that this program was planned about a year ago, but had to be aborted since a "Government Shutdown" at that time prevented shipment of the moon rocks to Professor Barker. Tim assured us he has the samples in hand this time around.

Like Astrophysics? ..."for Dummies?" Come to our December and January Meetings:

Jim Lynch joined CCAS about this time a year ago. He is a senior scientist in the Applied Ocean Physics and Engineering Department at WHOI in Woods Hole. Many of us discovered at the CCAS meeting on August 6th that Jim knows a good bit of physics and can convey complex ideas clearly for us novices: he wowed us that night with a most intelligible overview of **Einstein's Theory of General Relativity and Cosmology**.

We are pleased to announce that Jim will present two additional Astrophysics chapters at the CCAS meetings for December and January; these overviews from Jim:

For December 3rd: **Black Holes - Their Ins and Outs (Mostly Ins)**

Black holes are among the most exotic species in the celestial zoo, and are widely publicized in movies, television shows, and magazines. But, by and large they are rather poorly represented by these media as "gravitational super attractors" that greedily gobble up anything even remotely near them; they then leave the neighborhood dark. In this talk, I will attempt to show you what *real* black holes are like, and their fascinating attributes. The history of their discovery is also intriguing: their possible existence was first discussed mathematically as early as 1783; black holes were convincingly shown possible in 1916, but they were not given any credence until the late 20th century.

For January 7th: **The Big Bang**

In the beginning...

The story of the Universe's origins is perhaps the most fascinating story in modern science. At this point in time, there are many excellent television and Internet shows available for download which discuss the Big Bang, the initial moment of creation. And while I will unavoidably

repeat some of this material in my talk, I'd also like to "paint outside the box" a bit, and show some aspects of Big Bang physics that are not discussed so often. This is a decidedly hard topic, being the confluence of general relativity and quantum field theory (two of science's most mathematically intricate theories), but I'll try hard to keep the focus on the basic concepts!

Thank you, Jim, for volunteering double duty!

As of today, we are still looking for a speaker and topic for our February meeting.

Looking ahead, we are very pleased to announce that **Professor Larry Marschall** of Gettysburg College, astronomer, teacher and always an excellent speaker, will speak to us in March on **Comets' Tails - an Update on the Rosetta Mission**. More information when available.

Reminder:

Gus Romano (or his delegate) "hosts" a Dutch-treat dinner gathering for members and friends on 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! The H&K is at 1196 Rte 28, South Yarmouth, about a half mile west of the Station Avenue/Main Street intersection with Rt. 28 (traffic light).

Mike Hunter, CCAS President, is our Program Chairman. Please contact Mike or info@ccas.ws if you have any leads on speakers for February or April and beyond.

Members, *PLEASE* participate in the effort to recruit good speakers to present programs in astronomy and related sciences at our meetings.

Please let us know if you have any leads...

or, even better, volunteer to give a talk yourself!

Minutes:

The minutes of the October meeting are on our website; click on the "Minutes" button at www.ccas.ws or go to <http://www.ccas.ws/minutes/ccasminutes100115.pdf>

From the Dome:

Planning for Astronomy Projects for D-Y Honors Students - Fall 2015

An extraordinarily rich program of special Astronomy Projects for D-Y Honors Students has been planned by Bernie Young, Research Director at The Schmidt in collaboration with Jim Mitchell, D-Y "Earth and Space" course science teacher, and supporting members of the Schmidt Observatory Staff.

Projects include:

- Rotation of the Sun
- Sunspots
- Celestial Navigation: determining geographic position from Noon sun Altitude Measurements
- Lunar Occultation of single and double stars
- Magnitude of Stars whose brightness varies over time
- Astrophotography
- Spectroscopy
- Astrometry Using a Cross Staff (more info below.)

The planning team also has done a lot of thinking about elements key to a successful student project such as Writing of a Project Proposal (background, main task, approach), Software Used and Source (if any), Equipment Used with Specifications, Activity, Results, Manuals Used, References, and Final Report.

The depth of effort Bernie and Colleagues have put into this planning is remarkable. To stimulate interest in signing up for specific projects, Bernie and his team have created several informative and invitational project overviews. For example, in "Overview of an Astronomical Laboratory Spectroscopy Exercise" Bernie introduces the subject of Astronomical Spectroscopy, proposes the kinds of activities which might be involved (viewing the spectra of a star; processing the data to learn facts about that star, etc.) He then goes on to suggest attributes the project should have to promote success; e.g. what kinds of observations can be made in one or two nights; will the observation data require analysis? ...compilation of results, and writing of a report, etc.

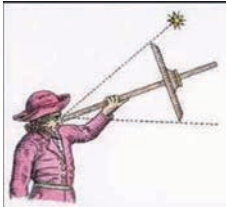
Students' visits to The Schmidt are scheduled so that students can become acquainted with and hopefully commit to participating in one of this year's possible projects.

CCAS members who will have worked with D-Y Student Projects in the past and/or will be working on the 2015 program include Ed Swiniarski, Gail Smith, Joel Burnett, Greg McCauliff, Lee LaBarre, Gus Romano, Warren Mumford, Hank and Marylou Ricci, Joyce Burchstead, Bob Cole, and Mike Hunter.

Bernie and Jim Mitchell have also planned a series of night

sky viewing sessions for Jim's students this fall. We hope to be able to update you on those Astronomy Nights in future editions of *First Light*.

Most CCAS members likely will understand the basic shape of the Projects enumerated at the beginning of this story. "Astrometry using a Cross Staff" might be new to many of us.



What is a Cross Staff? As shown in this illustration of the medieval astronomer, a Cross Staff is a simple tool for measuring angles. It was used in ancient times and not so ancient times to measure angles between heavenly bodies and angles between such targets and the horizon. The crosspiece on the instrument can be moved in or out to "save" the angle between stars or a star (or planet) and the horizon. Tick marks on the main staff allow the angle to be read after the instrument is adjusted to "meet" the separation of bodies of interest.

CCAS Members: Once again: There are many good things happening in these programs. Please consider helping. Contact Bernie directly if you can help or notify us at info@ccas.ws and we'll pass your interest along.

"Winter" Schedule of "Quarter-Moon-Saturday" Star Parties Continues:

Want to know what a "Quarter-Moon-Saturday" Star Party is? Our website ("Star Parties and Activities Info" button) describes it this way:

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

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 good for observing the dark side of the moon occult (cover) stars in the sky beyond it as it moves in its orbit.

The continuing schedule for "Quarter-Moon Saturday Star Parties" thru January is given following. All events begin at the Dome at 7:30pm on the following evenings and end at 9:30pm: *Public always welcome.*

Saturday	November 21 st
Saturday	December 19 th
Saturday	January 16 th

FOR MEMBERS ONLY:

"New-Moon-Saturday" Work Sessions at the Schmidt Continue:

Starting time is always 7:30pm:

Saturday	November 14 th
Saturday	December 12 th

These meetings, held each month on the Saturday closest to the New Moon, are to provide a regular opportunity for CCAS members to work on projects at the Dome and/or to become better acquainted with our equipment and more involved with Dome activities and operations.

If you are a CCAS Member, and not yet involved at the observatory, this is your opportunity to join in, have fun, share stargazing and learning about observing and using our equipment with the Observatory Staff.

As always, "Private" group or individual observing sessions at the Werner Schmidt Observatory may be scheduled by contacting Observatory Director Joel Burnett at Joelburnett@comcast.net or sending an email to info@ccas.ws

Our Society exists to promote observing! Help us promote this objective by asking for time at the Dome! CCAS has both 8" and 14" Dobsonian telescopes for loan to members. Contact info@ccas.ws if you wish to borrow one.

November Observing:

Observing Resources:

Please see resources in the November issue of *Astronomy Magazine*, pp 36-43, and *Sky and Telescope*, pp 37-55, and Reference 5 for good guides to the sky. See *AM*, p41, *S&T*, pp 46 and 47 and reference 6 for positions of the moons of Jupiter and Saturn and special phenomena of the moons of Jupiter this month.

Highlights in the Night Sky for November:

- Eastern Daylight Time gives way to **Eastern Standard Time** at 2am on Sunday, November 1st. “Fall Back” your clock.
- Ah! **The Leonid fireballs!** The 2015 Leonid Meteor shower goes on all month but peaks November 17-18. Look for meteors in the east northeast anytime early in the evening but prime time will be after Leo rises in the east and the pre-quarter moon sets in the west... after about 11pm. The Leonids are not very “thick” (only about 15/hr.) but because they hit our atmosphere head on at a very high relative speed, fireballs are common.

- with good “seeing” during November, you might be able to see it without optical aid.
- **Neptune** plays second fiddle to Uranus this month: it is dimmer (mag 7.9) and is about 3 hours farther along in its passage through our skies than is Uranus (Neptune sets earlier), but we have ‘scopes at The Dome that will bring Neptune right to you. Make a point to visit both distant planets this month.

Minima of Algol^{1,3}, November:

Algol, a variable double star in Perseus, shines normally at mag 2.1 but once every 2.87 days dims to mag 3.4. The dimming is caused by the dimmer of two self-orbiting stars eclipsing the brighter as viewed from earth.

There are three convenient evening occurrences of the Minima of Algol this month: Wednesday, November 4th, at 10:06pm EST; Saturday, November 7th, at 6:55pm EST, and Friday, November 27th, at 8:37pm EST.

Using binoculars or a small telescope, try to begin viewing two to three hours before the minima to watch the dimming (record magnitudes now and then by comparing Algol with neighboring constant magnitudes) and up to two to three hours after the minima to watch the brightening.

Declination Tables for the Moon² during this month. Please contact your editor for information or sources.

Mooncusser’s Almanac and Monthly Alert¹ NOVEMBER 2015			
Object	Nov 1 (EST)	Nov 15 (EST)	Nov 30 (EST)
Sun	R 06:12 S: 16:35	06:29 16:20	06:47 16:11
Moon	R: 21:10 S: 11:19	09:52 19:38	20:53 10:39
Mercury (in the sun)	R: 05:20 S: 16:16	06:25 16:16	07:29 16:30
Venus (predawn)	R: 02:16 S: 14:47	02:36 14:31	03:02 14:15
Mars (predawn)	R: 02:17 S: 14:52	02:05 14:16	01:51 13:38
Jupiter (predawn)	R: 01:45 S: 14:36	01:01 13:46	00:12 12:51
Saturn (eve till 11/8)	R: 08:16 S: 17:59	07:29 17:09	06:38 16:16
Uranus (“all nite”)	R: 15:38 S: 04:30	14:41 03:32	13:41 02:31
Neptune (“evening”)	R: 14:05 S 01:03	13:10 00:07	12:11 23:08
Pluto (not good)	R: 11:10 S: 20:39	10:17 19:45	09:19 18:47

- The predawn “dance of the planets” continues this month: for example, at 5am on November 3rd, a bit more than an hour before sunrise, dim **Mars** and bright **Venus** are nearly on top of each other both about 7° below **Jupiter**.
- The 2015 evening **Saturn** show is about over. You can still view the planet very low in the southwestern sky until about November 8th.
- Ever seen **Uranus** through a telescope? Don’t miss the chance this month! Many people know Neptune is blue... but Uranus is a big blue ball too. Bright (mag 5.7) Uranus is placed well up in the sky (transits about 9pm, altitude 51° for us in the S SE sky) during evening viewing hours. On a dark night

Moon Phases, November, 2015
Last QTR , Tuesday, November 3 rd , at 7:24am EST
New Moon , Wednesday, November 11 th , at 12:47pm EST
First QTR , Thursday, November 19 th , at 1:27am EST
Full Moon , Wednesday, November 25 th , at 5:44pm EST

NOTICE: NEW COPIES OF THE BROCHURE INTRODUCING CCAS AND ITS ACTIVITIES ARE AVAILABLE; INQUIRE AT info@ccas.ws IF YOU WISH COPIES.

A PORTION OF THIS PAGE IS INTENTIONALLY LEFT BLANK TO REMIND ALL MEMBERS THAT THERE IS ALWAYS PLENTY OF ROOM IN *FIRST LIGHT* FOR YOUR CONTRIBUTIONS.

Photos for the September 28th Lunar Eclipse

Here's some more information on the photos and photographers presented on page 1.

The misty black and white photo of the 40% eclipsed moon shown at the top of the page was sent to us by Emily Pittman, Junior pre-Medicine major at the University of North Carolina at Chapel Hill. Emily is a granddaughter of your editor who is *very* pleased Emily viewed some of the eclipse and sent us this "first astrophotography attempt." Emily reported she was busy studying the night of the eclipse, but "dragged my roommate outside to check its progress a few times, and managed to catch a pretty cool picture early on (before the clouds started getting 100% in the way)."

... taken before mid-eclipse on a Samsung WB350F with ISO 800, shutter speed of 1/8, and aperture f/5.9. Good job, Emily!

Thanks to CCAS members and experienced astrophotographers Hank and Mary Lou Ricci for the incomparable eclipse sequence photos also shown on our first page.

Hank and Mary Lou provided the following support information:

A Supermoon total lunar eclipse was observed by approximately 50 people at the Werner Schmidt Observatory on 27 to 28 September 2015.

The umbra shadow first touched the "left" side of the moon at 9:07pm and the last part of the umbra departed the "right" side at 12:27am.

The collage on the left by Hank consists of 9 eclipse images *superimposed on an image of the Werner Schmidt Observatory*. The eclipse images show the major eclipse phases and were taken with a 500mm focal length lens.

Mary Lou took over 70 images from a single location outside The Schmidt that were assembled into the composite picture shown on the right. Her camera sat on a tripod and she used an 8mm focal length fisheye lens. The exposures ranged from 1/1000 second ISO800 f/7.1 at full moon and were changed as needed to let in more light as the eclipse progressed; the exposure at totality was 1/2 second ISO1600, f/3.5.

You will note that the path of the moon over The Dome in one photo is different in the other photo. How can that be? Hank *superimposed his moons* over a separate image of the observatory using software; Mary Lou has the true perspective from her tripod! Some photographers are trickier than others!

Thank you, Hank and Mary Lou and Emily Pittman for exquisite records of this event. Thanks also to the 50 or so folks that convened to enjoy this event at The Schmidt on September 27th.

Announcement of Seminar:

CCAS member Jim Lynch gave us a most informative presentation on General Relativity and Cosmology at our August 6th Society meeting. For anyone who missed Jim's talk, or would benefit from a second viewing, please consider attending Jim's presentation, again, **General Relativity and Cosmology**, at the Smith Conference Room at WHOI in Woods Hole, 12:15 – 1:00 pm, Wednesday, November 25th. Jim says he will present this talk in Einstein's honor: *November 25th is exactly the 100th anniversary* of Einstein's original presentation of his theory on General Relativity at the Prussian Academy of Science.

Homemade 6" Newtonian Reflector 'Scope Available:

A Brewster woman emailed info@ccas.ws announcing the availability of this telescope. Her husband built this 'scope himself including grinding the lens. They no longer can use the instrument. Anyone interested in this telescope please contact info@ccas.ws and we will put you in contact with the owner. Thank you.



Cape Cod Astronomical Society

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Cape Cod Astronomical Foundation

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Vice Chairman	Ed Swiniarski	5088965973
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Treasurer	Gus Romano	7819294770
Observatory Director	Joel Burnett	5082217380
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The **Cape Cod Astronomical Society** meets at 7:30 pm on the first Thursday of every month in the library of the DennisYarmouth Regional High School in Yarmouth, Massachusetts. Meetings are open to the public. Membership dues are \$30 for adults, \$15 for students in two year colleges and part year residents, and no charge for spouses or for students in K12 schools.

REFERENCES AND NOTES FOR THIS ISSUE:

- 1) Information for The Moocussers Almanac and Monthly Observing Alerts was extracted from Sky Events, Astronomy Magazine Online (Astronomy.com), Stargazing.net's Planet Rise/Transit/Set calculator (<http://www.stargazing.net/mas/planet2.htm>), *Astronomy Magazine*, *Sky & Telescope Magazine*, *Sky and Telescope Skywatch 2011*, and other sources. The *Observer's Handbook, 2010 and 2011*, published by The Royal Astronomical Society of Canada is also an important reference, particularly for information on lunar libration and declination and the minima of Algol.
- 2) Information on how Libration and Declination Maxima and Minima can make visible parts of the moon normally hidden was reviewed in the January2007/January2008 *First Light*. Quick recap: Max Long brings to view extra right side; Min Long, extra left side; Max Lat, extra north side; Min Lat, extra south side. Max Dec puts it high in our sky during its transit; Min Dec puts it low.
- 3) Algol is an eclipsing variable star in Perseus which has its brighter component eclipsed or covered by its companion once every 2.87 earth days. When the dimmer component is not eclipsing the brighter, Algol appears typically about magnitude 2.1; when eclipsed, magnitude 3.3 The minima usually lasts about two hours with two hours on either side to bring it back to mag 2.1. Good comparison stars are γ Andromedae to Algol's west, mag 2.1, and ϵ Persei to its east, mag 2.9.
- 5) Here is the web address for Astronomy Magazine's "The Sky This Month" online for November:
<http://www.astronomy.com/magazine/sky-this-month/2015/09/predawn-planet-parade>
- 6) S&T's interactive Java utility for showing the positions of Jupiter's main moons for any date and time:
<http://www.skyandtelescope.com/observing/objects/planets/3307071.html>
for Saturn's moons: <http://www.skyandtelescope.com/observing/objects/planets/3308506.html>