



# *First Light*

The Newsletter of the Cape Cod Astronomical Society



December, 2015

Vol. 26 No. 12

*[Sometimes We Just Need to Look at an Old Friend...](#)*



*...to remind ourselves that the beauty of the night sky  
really matters so much to us...*

*...M45... The Pleiades (Ref 7)*

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**Our Next Monthly Meeting:** is Thursday, December 3rd, at 7:30pm in the D-Y High School library.

CCAS member and scientist Jim Lynch will teach us about **Black Holes - Their Ins and Outs (Mostly Ins)**

To contrast with a lot of misinformation from science fiction on the subject, Jim will show what *real* black holes are like, some of their fascinating attributes and a bit on the history of their study.

**Reminder:** The next “Quarter-Moon-Saturday” Star Party (public welcome) is Saturday, December 19th at 7:30pm. We are also continuing once-a-month “New-Moon-Saturday” “work” evenings for *Staff and CCAS Members only*: December 12th. Please see more information on both these opportunities with schedules on page 4.

**In this issue:** New member / Sturgis Students Visit the Schmidt / Relativity 100 years old! / Moon Rocks! / Black Holes! / Winter Solstice / Geminid Meteors / Moon Occults Venus / predawn Planet Lineup / Mercury High in the Sky / “Crystal Nebulae” / Telescope for Sturgis /

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### **Bright New Stars:**

We welcome Robert Brahm of Sandwich to membership in CCAS. Robert made "First Contact" with us at a Star Party in October and participated in our most recent meeting on November 5<sup>th</sup>. Robert has two telescopes and is researching an update. Welcome to CCAS membership, Robert!

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](mailto:info@ccas.ws)).

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

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### **CCAS News Items and Current Events:**

**Sturgis Students Visit the Schmidt.** Please see page 3.

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### **CCAS Meetings:**

Please note: Many of us will remember Jim Lynch's most helpful tutorial on **Einstein's Theory of General Relativity and Cosmology** presented at our meeting on August 6<sup>th</sup>. Please note that this topic is the Cover and principal story of the December issue of *Sky and Telescope*.

Einstein first published his theory *100 years ago* this December 2<sup>nd</sup>. What better way to shore up your understanding of this topic than by reading the *S&T* article now?

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Many thanks to **Professor Tim Barker**, Professor Emeritus of Astronomy at Wheaton College, who presented **Samples from the Moon** at our meeting on November 5<sup>th</sup>.

Professor Barker is always informative and entertaining, but I don't think we were expecting to be infected by the honest and deep admiration and enthusiasm for the men and women of the Apollo project that he brought to us this evening. Yes, it was fascinating to view the samples of moon dirt he borrowed from NASA.



It was just plain fun to share Tim's enthusiasm for this

project and its players, some of whom he has had personal contact with over the years. Anecdotes Tim relayed demonstrated very clearly that not only was the Apollo project a top-line technical achievement, but it was one accomplished by a very special group of human beings. Thanks to you, Tim Barker, for bringing us these unique insights and your energy.

Thanks also to Hugh Blair-Smith, local sailor extraordinaire present at this meeting. Hugh volunteered many amusing tidbits of his own from his career back in the day writing the machine-level software code that made the Apollo craft navigable. A few years ago, he spoke to us on his Apollo programming work.

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### **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 6<sup>th</sup> 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. He offers these overviews:

#### **For December 3<sup>rd</sup>:**

##### **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!

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

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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.

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**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).

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Mike Hunter, CCAS President, is our Program Chairman. Please contact Mike or [info@ccas.ws](mailto: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!**

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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.

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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.

**Minutes:**

The minutes of the November meeting are on our website; click on the "Minutes" button at [www.ccas.ws](http://www.ccas.ws) or click here <http://www.ccas.ws/minutes/ccasminutes110515.pdf>

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**From the Dome:**

**Sturgis Astronomy Club Students Visit our October 17<sup>th</sup> "Quarter-Moon Saturday" Star Party**

Mention was made in earlier *First Lights* of students at Sturgis West Charter High School forming an Astronomy Club this fall. One student so far, Elaine Kearney, has joined CCAS as a Student Member.

Thanks to Marylou Ricci and Joel Burnett for sending us a report on the visit of Sturgis students to our October 17<sup>th</sup> scheduled Quarter-Moon-Saturday Star Party.



It seems pretty clear from this photo that a good night was had by all. Joel mentioned that they viewed the moon and M11, the Wild Duck cluster, among other sky targets.

Thanks to Observatory Staff Members Bernie Young, Mike Hunter, Marylou Ricci, and Gail Smith and Joel Burnett for making this happen. Sturgis folks, thank you for coming. Please come again soon!

[Ed. We are working on a telescope for the Sturgis group. Please see short article on page 6.]

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CCAS Members: Once again: There are many good things happening these days at The Schmidt. Please consider involving yourself. Contact Bernie or Joel directly if you can help or notify us at [info@ccas.ws](mailto:info@ccas.ws) and we'll pass your interest along.

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**“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	December 19 <sup>th</sup>
Saturday	February 13 <sup>th</sup>
Saturday	March 12 <sup>th</sup>
Saturday	April 9 <sup>th</sup>
Saturday	May 14 <sup>th</sup>

**FOR MEMBERS ONLY:**

**“New-Moon-Saturday” Work Sessions at the Schmidt Continue:**

Starting time is always 7:30pm:

Saturday	December 12 <sup>th</sup>
Saturday	January 9 <sup>th</sup>
Saturday	February 6 <sup>th</sup>
Saturday	March 5 <sup>th</sup>
Saturday	April 2nd
Saturday	May 7th

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](mailto:Joelburnett@comcast.net) or sending an email to [info@ccas.ws](mailto: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](mailto:info@ccas.ws) if you wish to borrow one.

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**December Observing:**

**Observing Resources:**

Please see resources in the December issue of *Astronomy Magazine*, pp 36-43, and *Sky and Telescope*, pp 37-52, 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.

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**Highlights in the Night Sky for December:**

- We arrive at **Winter Solstice** at 11:48pm on Monday, December 21<sup>st</sup>. This event is so named because, as in ancient times, the sun “stands still” on solstice day. That is, it stops its six months’ long trip toward (for us) the south in our skies and begins its six month’s long trip to the north. No matter your location north of the equator, on solstice day the sun is as far south, and as low in the sky at noon as it will get at your location all year. And, happily, as it starts its march north, the days begin to lengthen.
- Cool, clear, and spectacular!  
Maybe 120meteors/hour? Maybe!  
Hopefully we can depend on a good display of Geminid fireballs to dispel our winter gloom this month.  
A “moon-free” **Geminid Meteor Shower** takes place on December 13/14 and 14/15 and, to a lesser extent, for ten days or so on either side of those two peak days. Dark skies make meteors appear brighter and longer. A waxing crescent moon sets in the west “away from” the radiant only a few hours after sunset. Perfect. The radiant, a point in the sky from which the meteors appear to originate, is located near Castor in Gemini. It will be well up (altitude: 51°) in the eastern sky by 11pm on the 13<sup>th</sup>, and near the zenith a bit after midnight. We should get a skyful!
- **Want to see the moon cover up Venus? In DAYTIME?**  
The “bright” skinny edge of a waning crescent moon will catch up with and cover Venus at about 12:43pm midday on Monday, December 7<sup>th</sup>. The Sky Safari simulator suggests both will be about 14° above the southwestern horizon. This is too low for the 16” scope in our Dome, but if key Observatory folks are

able and willing to spring for this event, and if we can be blessed with a nice deep blue sky, any good ‘scope out on the lawn should be able to follow this spectacular coincidence. Bernie Young has developed significant expertise at daytime viewing of bright sky stars and planets. Bernie?

the planet is 20° east of the sun. That means that at sunset his altitude in the southwestern sky is 13° (not the full 20° elongation since the ecliptic has a “tilt”. A half hour after sunset Mercury is still 9° above the horizon.

- Blue giants **Neptune** and **Uranus** continue to be convenient and attractive binocular targets this month. Dimmer (mag 7.9) Neptune is the leader in the parade on the ecliptic setting as early as 9pm on the last day of December. Following about 3 hours behind Neptune, Uranus, at mag 5.8, almost a naked eye target, is about a third bigger and also brighter than Neptune.

Mooncusser’s Almanac and Monthly Alert <sup>1</sup> DECEMBER 2015			
Object	Dec 1 (EST)	Dec 15 (EST)	Dec 31 (EST)
<b>Sun</b>	R: 06:48 S: 16:11	07:00 16:11	07:07 16:19
<b>Moon</b>	R: 21:50 S: 11:13	10:04 20:33	22:28 10:47
<b>Mercury</b> (evening)	R: 07:33 S: 16:32	08:18 17:07	08:23 17:50
<b>Venus</b> (predawn)	R: 03:04 S: 14:14	03:32 14:02	04:07 13:56
<b>Mars</b> (predawn)	R: 01:50 S: 13:35	01:36 12:59	01:19 12:18
<b>Jupiter</b> (mid-night)	R: 00:08 S: 12:48	23:20 11:56	22:20 10:55
<b>Saturn</b> (predawn)	R: 06:35 S: 16:12	05:48 15:23	04:53 14:26
<b>Uranus</b> ("all nite")	R: 13:37 S: 02:27	12:41 01:31	11:38 00:28
<b>Neptune</b> ("evening")	R: 12:07 S: 23:04	11:12 22:10	10:09 21:08
<b>Pluto</b> (not good)	R: 09:15 S: 18:43	08:22 17:50	07:21 16:50

**Minima of Algol<sup>1,3</sup>, December:**

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 two convenient evening occurrences of the Minima of Algol this month: Thursday, December 17<sup>th</sup>, at 8:48pm, EST, and Sunday, December 20<sup>th</sup>, at 5:37pm, 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 Moon<sup>2</sup>** during this month. Please contact your editor for information or sources.

- The predawn “dance of the bright planets” continues now for the third month. A centerpiece example: on December 1<sup>st</sup>, look to the southeast at 5am and see **Jupiter** above **Mars** above **Venus**, each equidistant from its neighbor, pointing in an absolutely straight line to the near horizon. Arcturus on the left and Spica to the right complete a great photo-op.
- The 2015 evening **Saturn** show is over. Start looking for Saturn as a “Morning Star” toward the middle of the month.
- After pretty much hiding behind the sun last month, **Mercury** “stars” anew in December. At midmonth, it should be easy to find in the early evening sky (about a half hour after sunset.) Later in the month, the mag -0.6 planet is even better separated from the sun. You can see in our Mooncusser’s Almanac that on the 31<sup>st</sup>, he sets about 90 minutes *after* sunset; at greatest eastern elongation on the 28<sup>th</sup>,

**Moon Phases, December, 2015**

Last QTR, Thursday, December 3<sup>rd</sup>, at 2:40am EST  
**New Moon**, Friday, December 11<sup>th</sup>, at 5:29am EST  
 First QTR, Friday, December 18<sup>th</sup>, at 10:14am EST  
**Full Moon, Friday, Christmas Day<sup>\*</sup>**, at 6:11am EST

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

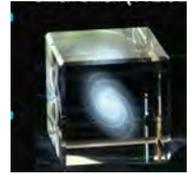
**A PORTION OF THIS PAGE IS INTENTIONALLY LEFT BLANK TO REMIND ALL MEMBERS THAT THERE IS ALWAYS PLENTY OF ROOM IN *FIRST LIGHT* FOR YOUR CONTRIBUTIONS.**

## **“Crystal Nebulae”**

Now and then the emails we receive at [info@ccas.ws](mailto:info@ccas.ws) include advertisements. It is very rare we pass these on to you.

But the “Crystal Nebulae” enterprise has such elegant products we could not resist sharing this information.

The company creates 3” clear glass cubes containing embedded three-dimensional sculptures of astronomical objects. So far, they have created the Milky Way, the Sun, Saturn, and a model of the Universe.



These are designed by Professor Michael Merrifield, an astronomer/Head of the School of Physics & Astronomy at the University of Nottingham. Beautiful and scientifically correct.

A great gift from/to any astronomy buff. For more information, please visit their website: [www.crystalnebulae.co.uk](http://www.crystalnebulae.co.uk).

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## **More on the Homemade 6” Newtonian Reflector Donation.....**

We wish to bring you up to date on the homemade 6” Newtonian reflector telescope for which we posted information in this space last month.

A Mrs. Joan Buffington of Brewster has donated the telescope, made some years ago by her husband, to the Cape Cod Astronomical Foundation.

Peter Kurtz has picked up the ‘scope and will refurbish it a bit before, in turn, donating it from CCAF to a student group forming an Astronomy club at Sturgis West.

Peter will also write an operator’s manual for the telescope (homemade equatorial “pipe” mount with motor R.A. drive) and, when all is ready, provide tutorials to the Sturgis students on its use.



Many thanks to Mrs. Buffington for her donation and to her husband “Buffo” who built such a beautiful ‘scope.

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## Cape Cod Astronomical Society

President	Michael G. Hunter	5083643370(cell)
Vice President	Ed Swiniarski	5088965973
Secretary	Gus Romano	7819294770
Treasurer	Peter Kurtz	5082550415
Observatory Director	Joel Burnett	5082217380
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Mailing Address: A. P. Kurtz, CCAS Treasurer, 34 Ridgewood Rd,  
Orleans MA 02653

## Cape Cod Astronomical Foundation

Chairman Emeritus	Werner Schmidt	5083629301
Chairman	Mike Hunter	5083859846
Vice Chairman	Ed Swiniarski	5088965973
Director of R&D	Bernie Young	5083941960
Secretary	Joel Burnett	5082217380
Treasurer	Gus Romano	7819294770
Observatory Director	Joel Burnett	5082217380
Observatory Phone Line		5083984765

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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.

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### **REFERENCES AND NOTES FOR THIS ISSUE:**

- 1) Information for The Mooncussers 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  $\gamma$ Andromedae to Algol's west, mag 2.1, and  $\epsilon$ Persei to its east, mag 2.9. S&T's reliable calculator for Minima of Algol dates and times can be found at: <http://www.skyandtelescope.com/observing/celestial-objects-to-watch/the-minima-of-algol/>
- 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/2015/10/a-gemlike-shower>
- 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>
- 7) This *film photography* image was obtained by [Matt BenDaniel](#) on October 13, 2001 from Pearce, Arizona with an autoguided Astro-Physics 130 EDF at f/6.7. It is an 78-minutes exposure on unhypered Kodak PPF 400 film. [http://messier.seds.org/more/m045\\_m2.html](http://messier.seds.org/more/m045_m2.html)