



First Light

The Newsletter of the Cape Cod Astronomical Society



July, 2015

Vol. 26 No. 7

Are we lucky or what ? !!

This month we can appreciate *three* important events in the life of Pluto and related astronomical science all of which require *“being in the right place at the right time.”* Consider that *if* Pluto had not been well along on its very patient and gradual (one elliptical orbit is 247 earth years!) way toward its most recent perihelion (closest to sun), about 29.7AU (about 4.44 billion km), Clyde Tombaugh *would not have been able* to see the faint dot of light on one photographic plate in 1930 that was moved just a bit from its position in a plate taken a few days before.

This month, to be particular, at 8am EDT on July 14th, the New Horizons spacecraft, launched almost exactly eight years ago, passes within 8000 miles of Pluto. Consider that *if* Pluto right now were not only just a bit (26 years) past that same most recent perihelion (September 5, 1989), if it had been near or at aphelion (farthest from sun, 49.3AU (about 7.3 billion kilometers), *it would have taken* not eight years to reach the dwarf planet, but about 13 years to reach the target; and that nearly doubling of distance and time would have strained communications with earth.



We continue the story beginning on page 5 of this *First Light*. We hope you will be amused to know that *something very special you can do* using the 16” or 18” ‘scopes at The Schmidt Observatory almost any clear evening this summer season *also depends on the happy coincidence* that Pluto is very close to us in its orbit during our lifetimes.

Our Next Monthly Meeting: is Thursday, July 2nd, at 7:30pm. We are pleased to announce that Alicia Soderberg, a professional astronomer from Harvard, will speak at that meeting on **Supernovas**. **Yes, the meeting is on July 2nd, the Thursday before the 4th of July.** As always, public welcome.

Reminder: Special “Leap Second: Star Party, Tuesday, July 2, 7:15pm ; “Every Thursday” Summer Season Star Parties begin July 9th, 8:30pm. Public welcome.

In this issue: Pluto: Lucky Three Times / *Four* New Members / 200 Eighth Graders / Building a High School Astronomy Club / CCAS Interviewed by *Falmouth Enterprise* / Leap Second Star Party / Venus and Jupiter Slow to Separate / Astronomy Programs at CCMNH /

Bright New Stars:

We are pleased to welcome *four* new members into CCAS this month, two of which are new *student* members.

Welcome to Mike and Jeanne Karaim to membership in CCAS. Mike and Jeanne live in Brewster, and are both retired Microbiologists. Both are active in the Nauset Model Railroad Club in Orleans. They first became active amateur astronomers when they purchased a Celestron 8" SCT back in the '80's. While they have enjoyed backyard astronomy since then, only recently, having been busy with job changes and moving, have they renewed interest in our hobby. After "finding" us on the web, and an exchange of emails, Mike and Jeanne came to our June 4th meeting and joined the society. They have expressed an interest in participating in CCAS tasks and will soon begin work with our Treasurer in building and maintaining a database of interests of CCAS members.

We welcome Morgan Farber of Chatham to membership in CCAS. Morgan is a student at Cape Cod Academy who first contacted us about membership on May 31. Morgan is interested in learning about the night sky, loves photography, and just recently has begun experimenting with astrophotography. Morgan attended our "Celebrate the Solstice" Star Party on June 22 (more on that below) and we wish to thank him for inviting his friend, Paulina Zuckerman, now also a new student member (see below), to that event.

Finally, we welcome Paulina Zuckerman of Chatham to membership in CCAS. Paulina contacted us by email the day after her very enthusiastic participation in our "Solstice" Star Party on June 22. Paulina is a senior at CCA and has been experimenting with photography of the night sky with her dslr camera. Some of what Paulina had to say in an email:

"Experiences I've had looking into the sky include confusion over constellations, photographing whatever I can get into focus and staring at the sky in complete awe. My favorite things about looking into the sky include being outdoors, seeing bats and the occasional owl fly overhead, meteors, and never running out of things to see. I didn't know Cape Cod had an Astronomical society until my friend had joined and encouraged me to do so, too. After visiting the other night, I was hooked."

A big welcome to Mike, Jeanne, Morgan, and Paulina!

We also had an inquiry during June from a student at Sturgis West who is interested in *starting an Astronomy Club* at her school. A bit more on that below. Elaine Kearney is not yet a member but, for sure, is already a "Bright New Star!"

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

CCAS News Items and Current Events:

Members, please make every effort to participate in our July 2nd meeting. Not only will we have an excellent presentation from a Harvard astronomer, but we will have our **annual election and will begin a new Dues cycle.**

We will be voting for excellent candidates for President, Vice President, Secretary, and Treasurer of the Society and also to re-elect a current member of the Cape Cod Astronomical Foundation Board of Trustees.

The 2015-2016 **Dues cycle** begins 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 July meeting. We have several active members who are more than a year in arrears.

If, perchance, you forget to bring your check, please mail right away to: CCAS, 34 Ridgewood Rd. Orleans MA 02653. Thank you.

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:

Thanks to Mike Hunter, former President of CCAS and current at-large member of the Executive Committee, for his challenging, wide-ranging, and informative presentation entitled: "**No Theory of Everything, Why Strings, and a Whole Lot of Inflation**" at our June meeting. Mike provided a refresher on current cutting-edge concepts in cosmology spiced with many amusing philosophical observations about the way science works, about the way science should work, and its limitations. Please see Gus Romano's minutes for more information.

We are pleased to announce that Alicia Soderberg, a professional astronomer from Harvard, will speak on **Supernovas** at our meeting on July 2nd. **Yes, the meeting is on July 2nd, the Thursday before the 4th of July.** As always, public welcome.

We are also pleased to announce that one of our own, Jim Lynch, will present **General Relativity and Cosmology: The Mathematics De-Mystified** at our

meeting on August 6th. Jim sent us this introduction:

When asked by a reporter if it were true that only three people in the world understood Einstein's Theory of General Relativity, the famous astronomer Sir Arthur Eddington thought carefully and replied, "And who would the third one be?" This tongue-in-cheek reply only helped enhance the mystique of Einstein's theory, which, to most people, is shrouded by the forbidding appearance of tensor calculus. However, the underlying meaning of the math embodying Einstein's theories is NOT "rocket science", and can be understood by all in rather simple terms. In this talk, I will give a quick look "under the hood" of how General Relativity and cosmology work, based on the classical theory. I won't guarantee you can solve these famous equations after the talk, but I will try hard to make sure you know what they mean! But be prepared to look at a little maththis IS Einstein, after all!

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, former President, and Charlie Burke, CCAS Vice-President are our Program Co-chairs. Please contact either one of them or info@ccas.ws if you have any leads on speakers for upcoming meetings after July

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 June meeting are on our website; click on the "Minutes" button at www.ccas.ws or go to <http://www.ccas.ws/minutes/ccasminutes060415>.

From the Dome:

Many "Happenings" at The Schmidt in June:

Two hundred 8th grade science students from 14 classes taught by 3 teachers at D-Y visited the Werner Schmidt Observatory between June 10th and 16th to view the sun and learn more about science and astronomy than they ever expected. Please see the story by Bernie Young on page 5 of this issue.

The last Quarter-Moon-Saturday Star Party of the "winter" season took place on June 20.

The Summer Solstice (which took place on Sunday, June 21, at 12:58pm) was celebrated by CCAS with a special Star Party convened at 8:30pm at The Schmidt on Monday, June 22.

CCAS received a very interesting email from a student at Sturgis (West) Charter School on June 10th. Elaine Kearney is planning to start an astronomy club at her school and is seeking advice, counsel, and support from us. She is also looking for telescopes her club might soon use. We have sent Elaine's request to several CCAS members and members of the Observatory Staff asking them to contact Elaine and get involved. If anyone has an interest in supporting Elaine's startup in any way or might have a telescope to donate, please let us know by sending an email to info@ccas.ws We will put you in direct contact with Elaine.

CCAS received an inquiry from Chris Kazarian of the *Falmouth Enterprise* on June 2nd asking to interview someone in CCAS in connection with an article he is writing on stargazing. Members Hank Ricci and Jim Lynch are in contact with and providing information to Mr. Kazarian. We hope to learn the publication of this article.

Finally, Jim Mitchell, D-Y Teacher of their *Earth and Space* course and long-time supporter and liaison with CCAS sent Bernie Young these very supportive words about evolution in CCAS support of D-Y science programs and students in recent months including broadening participation by CCAS members:

The Earth and Space course has been going very well, I'm pleased with the improvements in the program and student engagement. The students seemed to have enjoyed the first semester on "Space" more than the second semester on "Earth", thanks to their connections with the Observatory and all the work of staff and club members. I cannot thank you all enough. Please pass my thanks on to Warren and others.

Thanks, Jim.

CCAS members, if you have not yet been involved with students, get involved! You'll find it good for the students and good for you.

Looking ahead:

Bernie Young will host a LEAP SECOND Star Party at The Schmidt Tuesday, June 30th starting at 7:15. A *leap second* is a one-second adjustment that is occasionally applied to Coordinated Universal Time (UTC) in order to keep its time of day close to the mean solar time, or UT1. The Leap Second will be added to our systems at 7:59:59 EDT. We can watch how it affects our Video Time Inserter and record video of the event. Bernie will give a short tutorial on the *leap second* before adding it to our systems. Afterward, star viewing will take place if it is clear. At 9:17 Jupiter moon Io occults Europa. Join us. Rain or shine!

Beginning July 9th there will be a Star Party open to the public at The Schmidt Observatory every Thursday beginning at 8:30pm. The last such event for this summer will take place on August 27.

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. If you wish to borrow one.

Observing:

Observing Resources:

Please see resources in the July issue of *Astronomy Magazine*, pp 36-43, and *Sky and Telescope*, pp 43-61, and Reference 5 for good guides to the sky. See p 41 in *Astronomy*, and also reference 6 for positions of the moons of Jupiter and Saturn. We also note, on page 7, resources on Pluto and the New Horizons spacecraft arriving at Pluto.

Sky Highlights for July:

Very clearly, Pluto and New Horizons are the "big story" for us and all astronomers this month. More on our look at that "Are We Lucky or What," just below.

But brighter planets continue to "shine" in July. Watch **Venus** and **Jupiter**, still only 1° apart on July 1st, continue to slowly drift apart after their near conjunction separated by only 0.30 on June 30th. And of course, Jupiter is still plenty high in the early evening sky in the first part of July so

study of the Galilean moons is always instructive (including the occultation of Jupiter's moon **Europa** by its moon **Io**, which you can observe at the special Star Party scheduled for 30 June (see above.)

Finally, **Saturn** and its moons, higher in the sky, take center stage during July.

Note: we have two full moons during July, on 7/1 and 7/31. Tradition calls the second occurrence a "blue" moon. Blue moons occur rarely.

Moocusser's Almanac and Monthly Alert¹			
JULY 2015			
Object	July 1 (EDT)	July 15 (EDT)	July 31 (EDT)
Sun	R: 05:10 S: 20:19	05:19 20:13	05:34 20:00
Moon	R: 19:36 S: 05:24	05:24 19:35	19:51 06:19
Mercury (predawn)	R: 03:51 S: 18:38	04:32 19:41	06:16 20:32
Venus (early evening)	R: 08:43 S: 22:37	08:29 21:49	07:37 20:32
Mars (close to sun)	R: 04:46 S: 20:01	04:34 19:44	04:22 19:20
Jupiter (early evening)	R: 08:40 S: 22:39	07:59 21:51	07:13 20:56
Saturn (“sll nite”)	R: 16:54 S: 02:48	15:56 01:51	14:52 00:47
Uranus (late night)	R: 00:48 S: 13:48	23:53 12:54	22:51 11:51
Neptune (evening)	R: 23:16 S: 10:21	22:20 09:25	21:16 08:20
Pluto (evening)	R: 20:18 S: 05:49	19:21 04:52	18:17 03:47

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

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 is one convenient evening occurrence of the Minima of Tuesday, July 14th, at 9:12pm.

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.

Moon Phases, July, 2015

Full Moon, Wednesday, July 1st, at 10:20pm EDT
Last QTR, Wednesday, July 8th, at 45:24pm EDT
New Moon, Wednesday, July 15th, at 9:24pm EDT
First QTR, Friday, July 24th, at 12:04am EDT
“Blue” Full Moon, Friday July 31st, at 6:43am EDT

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

NOTICE: NEW COPIES OF THE BROCHURE INTRODUCING CCAS AND ITS ACTIVITIES WERE PRINTED DURING FEBRUARY; INQUIRE AT info@ccas.ws IF YOU WISH COPIES.

Two hundred 8th Graders learn about and view the Sun at The Schmidt During June

[Thanks to Bernie Young for sending us this review of a very excellent series of visits...]

Two hundred 8th grade science students from 14 classes taught by three teachers visited the Werner Schmidt Observatory between June 10th and 16th to view the sun and learn more about science and astronomy than they ever expected.

The centerpieces of the viewing were our Coronado Solar Max II Double Stack 60mm and Lunt LS100THa Double Stack 100mm Hydrogen-alpha solar telescopes. These telescopes block all solar photons other than a very narrow bandwidth of red light, photons emitted when an electron of a hydrogen atom falls from an excited state while orbiting the nucleus. The double stack filters are tuned by the user to accommodate the Doppler shift, which occurs as part of the sun is rotating away from us and the other part which is rotating towards us. We typically tune the hydrogen-alpha filters to reveal the most *spectacular prominences* (which appear at the edge of the solar disk) and the *filaments* which appear as curved dark lines within the disk. If the sky is clear and the viewing good, we can even see more subtle textural features within the solar disk.

Student also viewed sunspots using our regular 16” Meade Schmidt-Cassegrain telescope safely filtered with Baader solar film.

All classes receive some instruction about the sun, our telescopes, TV raster generation, celestial coordinates, and solar energy conversion. A big hit was a steadily chugging Stirling Cycle engine (purchased 40 years ago from Mason & Sullivan on Higgens-Crowell Road.) Heat to power the engine is provided, in this case, by collecting and focusing the power of sunlight as shown in the photo; (the little engine and its flywheels sit under the light collecting dish).

Of course, there are always some cloudy days, which were filled with computer slide show presentations including photographs of the sun just like we would see on a clear day.

Thanks to Hank and Mary Lou Ricci, Joyce Burchstead, Bob Cole, Mike Hunter, and Warren Mumford who helped setup and operate the telescopes and share their knowledge with the students.



Are we lucky or what ? !!

...continued from page 1.

[*A note on distances: Pluto at perihelion (the point in its elliptical orbit at which it is closest to the sun) is about 29.7AU (about 4.44 billion km) from the sun. One AU is the distance from the earth to the sun, now defined at 149.6 million km.]

OK. Let’s find out what lucky opportunity we have now at The Schmidt as promised at the beginning of this story on page 1.

We learned the notion that were it not for Pluto’s being in approach to this era’s perihelion, Tombaugh probably never would have seen the faint moving dots on his photography plates that proved the existence of a planet as far and farther than Neptune.

...(continues on next page)

We also learned that if, as happened, we launched the New Horizons spacecraft to chase Pluto in July of 2007, were it not for the happy circumstance that right now Pluto is only a bit past perihelion, the spacecraft might not reach Pluto for FIVE MORE YEARS ... and ... at the distance of aphelion, might be too far away to communicate effectively with earth!

Well, Pluto WAS working toward the perihelion of the current era when Tombaugh discovered it in 1930 (then it had only about 50 years of its 247 earth year orbit to get to perihelion); and ...

And Pluto IS going to be reached THIS MONTH after only an eight year journey to Pluto's current position in its orbit (only about 26 years *beyond* perihelion.)

Well what's in it for *you* any clear evening this summer if you come to The Schmidt Observatory to a scheduled Star Party?

Pluto has been relatively easy to observe on a clear night in summer for several summers now using the 16" Schmidt-Cassegrain telescope up in our Dome or the 18" Dobsonian reflector out on our lawn.

How can this be possible with such elementary equipment?

Simple answer: Pluto is still not that far from its 1989 perihelion. NOW is the time for you come to The Schmidt to look at Pluto!

Pluto's current position in our evening sky is a bit above, and a bit to the left of the Sagittarius teapot. If you look on the night following the New Horizon flyby; (flyby is July 14th), you should be able to see Pluto from Cape Cod in the south at altitude 23° (10:30pm) or 26° (11:30pm). On July 14, Pluto should be at mag 14.1 (on a night with good seeing, our big scopes can see up to about mag 18.) Granted it would be helpful if Pluto were higher in the sky than 23° or 26° (better "seeing" higher in the sky with less atmosphere to look through), but if there is little wind and not too much water vapor in the air, *you should be able to see Pluto yourself* at our own Observatory! It also has to help that, by coincidence, Pluto reaches opposition on July 6th and thus is at peak brightness of the year this month.

One further note on how lucky we are to be looking at Pluto in the sky right now: Pluto is moving gradually away. CCAS members visiting The Schmidt in the year 2105, when Pluto will be near its next *aphelion*, will need likely at least a 36" telescope taking long exposure photos. It's a lot easier right now!

Here's a little more information on Pluto, its discovery, and the New Horizons spacecraft and flyby.

A bit more on the discovery of Pluto:

Pluto was discovered on February 18, 1930. Clyde Tombaugh had been hired by the Lowell Observatory to take photos of areas of the sky expected to contain the possible planet that might be causing aberrations in the orbit of Neptune. Percival Lowell had run calculations indicating about where to look. Tombaugh took his photos on big plates at the focal plane of a wide-field 13" Newtonian Telescope (pictured). He discovered a faint white dot in one of the photos taken in January 1930, that "wandered"... the faint dot was in a different position in a photo taken a few days before. Voila! We have a planet!

It's interesting to note that this 13" telescope is about the same size as the 13" Dobsonian our late colleague Jon Greenberg owned and used in teaching astronomy classes on his home deck for many years.



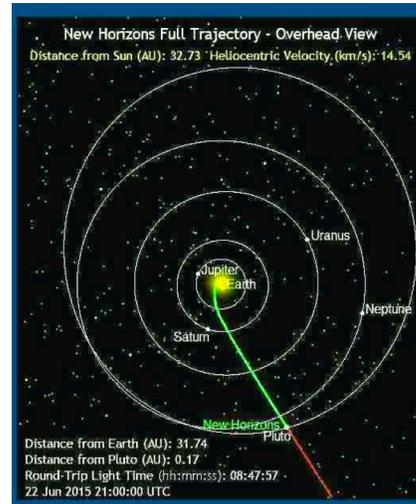
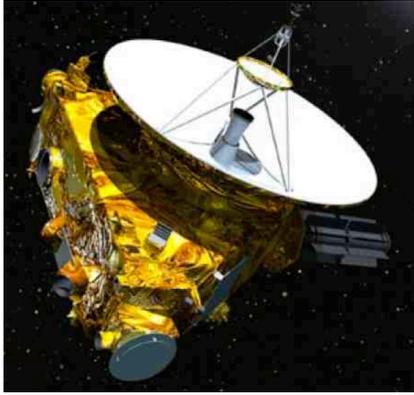
Tombaugh's '13" Astrograph

We said earlier that Tombaugh was lucky that Pluto was working its way toward the 1989 perihelion (29.7AU) when he took his photos.

Modeling today (using the Sky Safari Plus night sky simulator) indicates that in January of 1930, when Tombaugh took his photos, Pluto was 40.3AU, about 6 billion km from the earth, mag 15.1. It is far closer to us now

A bit more on the New Horizons spacecraft and the Pluto flyby that will take place this month:

The New Horizons spacecraft was launched almost exactly (7/15/07) eight years ago. It will have a very quick flyby as it is still travelling at about 31,000 mph.



And a little more pertinent information:

- The average distance to Pluto is 39.5AU, 5.9 billion km.
- Brightness and Apparent Magnitudes: One star is 2.512 times brighter than another star if the difference in their apparent magnitudes is 1. So if you know a star's apparent brightness is 25 times brighter than another star, the magnitude difference is calculated as follows: $25 = 2.512^x$ $\log(25) = x * \log(2.512)$ $1.3979 = x * 0.4$ x is 3.49 So a star 25 times brighter than another has mag 3.5 mag units smaller (more negative) than the dimmer star.
- New Horizons arriving at Pluto is:
 - the July Cover Story for *S&T* "Pluto at Last" (story page 20; New Horizons and Pluto tracks, pp 52 and 53,)
 - is also the Cover Story for *Astronomy* "Pluto, the Inside Story...New Horizons Flyby" (story, page 22; timeline chart for the five-hour approach and flyby, page 45; a very nice story "Hunt the Last Planet" including finder charts and Pluto's track for all of July on pp 46 and 47.)

Some credits:

The path from earth to Pluto (NASA): <http://pluto.jhuapl.edu/Mission/Where-is-New-Horizons/index.php>

Photo of Tombaugh's Astrograph:

... A 13-inch (330 mm), f/5.3 astrograph at the Lowell Observatory (a refractor with a 3 element lens)

https://en.wikipedia.org/wiki/Astrograph#/media/File:Lowell_astrograph.jpg

Photo of the New Horizons Spacecraft:

<http://pluto.jhuapl.edu/Mission/Where-is-New-Horizons/index.php>

Announcing Several Excellent Astronomy Programs at the Cape Cod Museum of Natural History During July

Thanks to Teresa Izzo of CCMNH for sending us this information on upcoming events:

On Wednesday, July 8th, at 11:30am, CCMNH will present a film, **Invisible Universe Revealed: 25th Anniversary of the Hubble Telescope**.

On Friday, July 10th, at 1:00pm, Dr. Chuck Kunesh will present **Planet Quest, The Search for Another Earth**, an update on the search for extrasolar planet systems.

Dr. Kunesh's presentation will first explore the major and minor planets that orbit the sun in our own solar system, and then look back at what people from ancient times through the 20th century thought about the possibility of other solar systems around other stars. He will discuss how astronomers discovered the first Jupiter-like planets orbiting other stars by using something called the "radial velocity method", how the Kepler spacecraft has discovered thousands of additional planets by using something called the "transit method", and the future plans that astronomers have to find more Earth-like planets around nearby stars and to look for evidence of life on those planets.

The following Friday, July 17th, at 1:00pm, Dr. Kunesh will present **Interstellar Travel...How can we do it?**

Dr. Kunesh's presentation will examine the problems with and the potentials for interstellar travel. He will first discuss how the recent discovery of thousands of planets orbiting other stars (including at least one Earth-sized planet orbiting a very nearby star) has heightened interest in interstellar travel. He will then show how very distant the night sky stars are from Earth, and how that distance makes journeys to the stars extremely difficult. He will discuss advanced propulsion systems such as nuclear fusion and anti-matter engines that might make such travel possible, as well as other methods of propulsion that could eliminate the need to carry fuel for the trip. He will also explore how loopholes in some of Einstein's theories might eventually allow us to break the speed of light barrier and make very rapid journeys to distant stars and their planets.

Chuck Kunesh is an astronomer from western Pennsylvania and received his Ph.D. in physical chemistry from the University of Pittsburgh. He is a member of the Lehigh Valley Amateur Astronomy Society in Allentown, PA and has given numerous talks on astronomy and space travel in schools and at astronomy events. He currently resides in Bethlehem, PA, but spends as much time as possible at his vacation home on Cape Cod. *[Ed. Please note Chuck has been to one or two CCAS meetings in the past and has offered to give a talk at one of our meetings when that can be arranged.]*

These programs are free with Admission to the Museum. For more information on these programs, please contact Ms. Izzo at 508-896-3867, ext. 137 or 133

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Cape Cod Astronomical Society

President	Position is Open	
Vice President	Charles Burke	5083949128
Secretary	Gus Romano	7819294770
Treasurer	Peter Kurtz	5082550415
Observatory Director	Joel Burnett	5082217380
<i>First Light</i> Editor	Peter Kurtz	5082550415

Mailing Address: A. P. Kurtz, CCAS Treasurer, 34 Ridgewood Rd,
Orleans MA 02653

Cape Cod Astronomical Foundation

Chairman	Werner Schmidt	5083629301
Vice Chairman	Michael Hunter	5083859846
Director of R&D	Bernie Young	5083941960
Secretary	Ed Swiniarski	5088965973
Treasurer	Pio Petrocchi	5083621213
Observatory Director	Joel Burnett	5082217380
Observatory Phone Line		5083984765

The **Cape Cod Astronomical Society** meets at 7:30 pm on the first Thursday of every month in the library of the Dennis Yarmouth 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 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 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 April: <http://www.astronomy.com/magazine/sky-this-month/2015/05/venus-dazzles-at-dusk> See also S&T resources online at <http://www.skyandtelescope.com>
- 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>