



First Light

The Newsletter of the Cape Cod Astronomical Society

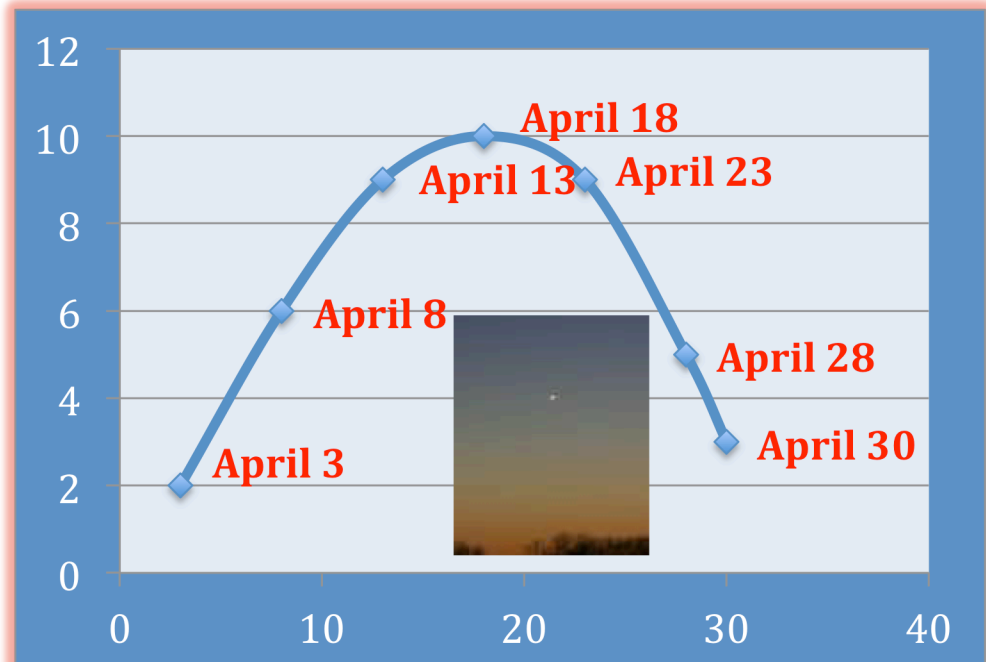


April, 2016Vol. 27 No. 4

Mercury will be Bright and Visible “Naked-eye” (and for Sure with Binoculars) Above the Western Horizon Much of the Month...

.....Its Best Appearance this Year.....

*This Chart shows Mercury’s **Altitude** above the Western horizon at 45 minutes after sunset for dates in April at Cape Cod. Visit a Bay beach at sunset. More info on p 5.*



Our Next Monthly Meeting: is Thursday, April 7th, at 7:30pm in the D-Y High School library. Joel Burnett, Director of our Schmidt Observatory, will speak on “**The State of the Observatory**” at the meeting. Special topics will be presented by other speakers.

Reminder: The next “Quarter-Moon-Saturday” Star Party (public welcome) is Saturday, April 9th at 7:30pm. We are also continuing once-a-month “New-Moon-Saturday “work” evenings for *Staff and CCAS Members only*: April 2nd. Please see more information on both these opportunities with schedules, including a look forward to the summer schedule, on page 3.

In this issue: A Special Month for Mercury / One new member / Star Party Schedules and Times / Blue-sky Occultation of a Bright Star / Best Mars Season in Ten years /

Bright New Stars:

We welcome Nate Pappalardo of Sturgis High School to Student Membership in CCAS. Welcome, Nate!

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:

CCAS Meetings:

Many thanks to CCAS President Michael Hunter for his informative presentation of **LIGO: Laser Interferometer Gravitational-Wave Observatory: Brief Introduction and Overview of a Millennial Event** at our meeting on March 3. Mike presented a very clear portrait of what LIGO is and what our facilities in Hanford, Washington and Livingston, Louisiana look like. This research and building of the massive interferometers began in 1992; scientists knew early versions were inadequate but persistence and patient funding finally made it possible to announce success.

On Thursday, February 18, 2016, scientists from the California Institute of Technology and the Massachusetts Institute of Technology announced that they had measured gravitational waves (G-waves)... ripples in space-time. The actual measurement took place on September 14, 2015 at the Washington and Louisiana LIGO locations.

The results allowed deduction of size and mass properties of an immense black hole, the first time properties of such an entity could be calculated from the interferometric data collected at two sites 1000 miles apart. For the first time, we have actually "seen" a major astronomical object that emits no light!

Please see Gus Romano's Minutes of Meeting (reference below) for more information.

CCAS' own physicist, Jim Lynch, will teach us more about LIGO, the science, recent developments, and expectations at a CCAS meeting in the fall.

Upcoming Meetings:

Joel Burnett, Director of our Schmidt Observatory, will speak on "**The State of the Observatory**" at the CCAS meeting on Thursday, April 7th. In additions to Joel's main presentation, other members of the Observatory Staff are expected to speak on specific topics and activities taking place over the last year or currently in progress at the Schmidt.

Bernie Young, Director of Research at the Schmidt Observatory will discuss "**The Transit of Mercury**" at the

CCAS meeting on Thursday May 5th.

We are very happy to report that with assistance from Peter Williams, a postdoc at hscfa who recently helped us to acquire two excellent telescopes donated by his family, Jim Lynch has made contact with several scientists at the Harvard-Smithsonian Center for Astrophysics in Cambridge, many of whom have expressed an interest in speaking at CCAS monthly meetings.

The first of these new hscfa speakers will be **Anastasia Fialkov**. Anastasia is a theorist working with radioastronomy observers; she will speak to us at our June 2nd meeting on **the 21-cm line of neutral hydrogen**, a wavelength of light which can be observed from very early times. She will discuss the properties of this signal and what it can tell us about the very early stages of the universe.

We are very pleased to report that **Professor Emeritus Larry Marschall** of Gettysburg College, astronomer, teacher and always an excellent speaker, will speak to us at the CCAS meeting on July 7th on **new information about Pluto** gleaned from data collected by NASA's New Horizons 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 September 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!

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.

The minutes of the March meeting are on our website; click on the “Minutes” button at www.ccas.ws or click here <http://www.ccas.ws/minutes/ccasminutes030316.pdf>

From the Dome:

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 and we'll pass your interest along.

“Winter” Schedule of “Quarter-Moon-Saturday” Star Parties Continues; Summer Schedule of Weekly Thursday Events begins June 23.

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.) Please note: in May and June, start times will be **8:30pm** because of the 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 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” follows. *Public always welcome.*

The **April** event at the Dome will begin at **7:30pm:**

Saturday April 9th

The **May** and **June** events will begin at **8:30pm:**

Saturday May 14th
Saturday June 11th

The Summer Schedule of Every Thursday** Star Parties at The Schmidt Observatory begins Thursday, June 23rd, and ends on August 25th. Starting time: 8:30pm; ending time: 10:30pm. (**Except on CCAS Meeting Nights which will be July 7th and August 4th.)

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

The continuing schedule for “New-Moon-Saturday” Member Work Sessions follows:

The **April** event at the Dome will begin at **7:30pm:**

Saturday April 2nd

The **May** and **June** events will begin at **8:30pm:**

Saturday May 2nd
Saturday June 4th

These meetings, held each month on the Saturday closest to the New Moon, 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 including maintenance.

If you are a CCAS Member, and not yet involved at the observatory, this is your opportunity to join in, have fun, share stargazing, learn 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.

April Observing:

Observing Resources:

Please see resources in the April issue of *Astronomy Magazine*, pp 36-43, and *Sky and Telescope*, pp 41-56, and Reference 5 for good guides to the sky. See *AM*, p41-43, *S&T*, pp 50-51 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 April:

Mercury is “the STAR” during April: Please see page 1 and the continuing story beginning on page 5.

Crescent Moon Occults Bright Star Aldebaran: It isn’t often that we are treated to the dark leading edge of a new or quarter moon “snuffing out” a *bright* star while we watch... but you will have your chance if you can be at a good telescope before sunset on Sunday, April 10th. On that day, for folks on Cape Cod, the new crescent moon will

cover bright star Aldebaran, mag 1, in Taurus, at about 6:53pm, about 22 minutes *before* sunset.

Using care NOT to look at the sun nearing the horizon, you should be able to find the trailing lit edge of the four-day-old 17%-lit crescent moon with your telescope at azimuth 249° (30° east of the sun) and altitude 44° just before Aldebaran is being covered up. The dark leading edge of the moon opposite the crescent will cover the star.

If the sun is too bright for you to see the star being covered, Aldebaran should reappear at the *lit* side of the moon at 8:02pm, about 45 minutes *after* sunset. At reappearance for Cape Codders, the star should be at azimuth 263° and altitude 33°.

This will be a special experience if you can overcome the technical challenge.

Jupiter and its Moons Continue to Perform This Month:

As you can discern from the rise and set times for Jupiter and the sun in the chart below, **Jupiter** is well up in the sky by sunset evenings in April. Do continue to enjoy the big planet and the antics of its moons this month. The moons are easy to spot with even modest binoculars if you can find clear skies in a reasonably dark location

Mooncusser's Almanac and Monthly Alert ¹ APRIL 2016			
Object	APRIL 1 (EDT)	APRIL 15 (EDT)	APRIL 30 (EDT)
Sun	R: 06:22 S: 19:06	05:59 19:21	05:37 19:38
Moon	R: 02:46 S: 12:46	13:24 03:04	02:08 12:40
Mercury (in the sun)	R: 06:44 S: 19:53	06:38 21:07	06:03 20:48
Venus (predawn)	R: 05:51 S: 17:35	05:35 18:07	05:19 18:43
Mars (late nite)	R: 23:36 S: 09:07	22:49 08:15	21:46 07:09
Jupiter (all nite)	R: 16:37 S: 05:35	15:36 04:37	14:33 03:36
Saturn (late nite)	R: 00:15 S: 09:44	23:18 08:47	22:16 07:46
Uranus (evening)	R: 06:43 S: 19:42	05:50 18:51	04:53 17:56
Neptune (in the sun)	R: 05:14 S: 16:22	04:20 15:29	03:22 14:32
Pluto (predawn)	R: 02:28 S: 11:58	01:33 11:03	00:33 10:03

Mars Begins Best Showing in a Decade: April 1 sees Mars well on its way to the closest approach it will make to

earth this year as it will be at opposition this time in the part of its elliptical orbit that is close to earth. The disc is 11.9" in diameter on April 1, enough to see some surface features with a small telescope on a clear night with good seeing.

At closest approach date, May 30th, it will appear as an 18.6" ping pong ball. Not bad.

At opposition on May 22, Mars will shine at mag -2.1. It will be larger than 14" April 17 thru July.

There is one challenge: because of its location in the skydome, at declination -16°, Mars will not get much higher in the sky than about 30° this trip by earth for Cape Codders.

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

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: Monday, April 4th, at 8:58pm, and Sunday, April 24th, at 10:42pm.

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.

Moon Phases, April, 2016

New Moon, Thursday, April 7th, at 7:24am EST

Moon is at perigee, same day: HIGH TIDES

First QTR, Wednesday, April 13th, at 11:59pm EDT

Full Moon, Friday, April 22nd, at 1:24am EDT

Last QTR, Friday, April 29th, at 11:29pm EDT

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

THE BEST OF MERCURY IN 2016. POSITIONS AND PROPERTIES OF THE PLANET ON THE WESTERN HORIZON DURING APRIL

*Mercury will be Bright and Visible "Naked-eye" (and for Sure with Binoculars) Above the Western Horizon Much of the Month...
.....Its Best Appearance this Year.....*

*The Chart shown on page 1 and the data in the table below show Mercury's **Altitude** above the Western horizon at 45 minutes after sunset for dates in April at Cape Cod.*

Visit a Bay beach at sunset!!!!

April Date	Magnitude	Diameter "	% illum.	45 minutes after sunset	Distance from Sun	Azimuth °	Altitude Above Horizon, °
3	-1.3	5.5	88%	19:53:00	19°	282	2
8	-0.9	6.1	73%	19:58:00	19°	284	6
13	-0.4	6.9	55%	20:04:00	19°	286	9
18	0.3	7.9	37%	20:09:00	20°	289	10
23	1.1	9.1	23%	20:15:00	20°	290	9
28	2.3	10.3	11%	20:20:00	20°	293	5
30	2.9	10.8	7%	20:22:00	20°	294	3

You may enjoy Mercury's best appearance of 2016 if you visit a west-facing Cape Cod beach almost any clear night in April 45 minutes or so before sunset. Please examine the altitude chart on page 1 and the data table above. You will find that at 45 minutes *before* sunset each night:

- Early in the month the planet is low (2° altitude) but very bright (mag -1.3) because it is 88% illuminated (3/4 phase.)
- As the days go along, it is dimming but not enough to be of concern, particularly if you have binoculars helped, if possible with a tripod mount.
- Still at a bright mag 0.3 at mid month, it is fatter albeit less illuminated, but...
- This is well compensated by how far (note altitudes) above the horizon (separated from the sun) it becomes: 10° above the horizon 45 minutes after sunset on April 18, the date of its greatest eastern elongation (separated from the set sun by 20!)
- At mid month, the speedy little planet is still above the horizon *near twilight's end*.
- Gradual demise: after the 18th, it continues to dim (albeit its apparent diameter stays near 10") and it gets lower and lower in altitude at 45° after sunset.

Do get out and watch this special performance of Mercury during April at least twice: once when it is bright and not so high, and once when it is at greatest elongation. And if you observe at a Cape Cod Bay beach, more than likely you will see and maybe photograph a spectacular Cape Cod sunset!

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
<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 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

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. 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 April: <http://www.astronomy.com/magazine/sky-this-month/2016/02/mercury-reaches-its-peak>
 - 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>
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