



First Light

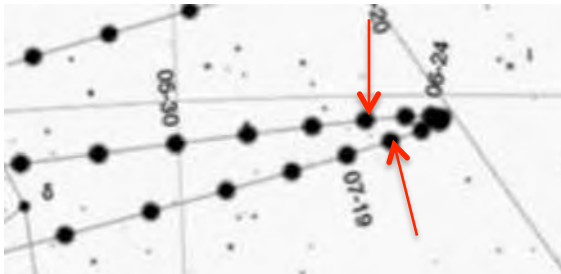
The Newsletter of the Cape Cod Astronomical Society



August, 2016Vol. 27 No. 8

MARS BACK ON TRACK AFTER JUNE REVERSAL, Part II

“The Theory”



“The Theory”: As presented in last month’s *First Light*, the schematic at left shows how Mars, in retrograde motion against the background stars east-to-west since April...should turn back to its more normal west-to-east motion against the background stars (stationary on/about July 1). The *top arrow* shows its expected position on June 14...

...still moving westward; the *bottom arrow* shows its expected position on July 14 moving east after “making the turn.”

Well, did Mars make the turn?

Indeed, Mars did make the turn and here’s the observation of the event.



Lucky with clear nights for most of the period, a team of folks including Bernie Young, Research Director, Nate Pappalardo, Sturgis student, and astrophotographer extraordinaire, Hank Ricci, studied and photographed Mars movement at our Schmidt Observatory from June 14th (top arrow) thru July 13th (bottom arrow.). **Please see page 4 for more information on the creation of this remarkable image.**

Our Next Monthly Meeting: is Thursday, August 4th, at 7:30pm in the D-Y High School library. HSCfA Professor **Antony A. Stark** will speak on **Cosmology with the South Pole Telescope:** new discoveries from the detection and analysis of faint features in the Cosmic Microwave Background.

Reminder: The Summer Schedule of Every-Thursday Star Parties at The Schmidt Observatory continues in August on Thursday, August 11th, at 8:30pm-10:30pm. The summer series ends on August 25th. All events open to the public.

In this issue: Mars back on track; a spectacular astrophoto / Election of Officers / New CCAS Dues Cycle / Dance of the Planets / 150 METEORS PER HOUR! / Saturn’s Retrograde / CCAS *Stuff!* / “One of My Favorite Things” / Telescope for Sale / one more look at “Mars in the Stars”

Bright New Stars:

We are happy to welcome Professor Emeritus (at Boston University) Allan Pierce to membership in CCAS. Allan lives in East Sandwich and was introduced to us by Jim Lynch. In his first contact with us by email, Allan volunteered that he is a "dilettante, interested in all science, a retired college professor, (PhD in physics from MIT 1961)." Welcome to CCAS, Allan!

We are also pleased to welcome Ron and Karen Hill of Mashpee to membership in CCAS. Ron and Karen enjoyed a Star Party at The Schmidt on June 30th ("We had a group come by while in the observatory and got pressed into service. Helping the group view Saturn"!) They joined our club at our July meeting. Ron and Karen are experienced amateur astronomers, having at home a 10" Dob, a 9.25" Celestron Schmidt-Cassegrain and two other scopes. They have an active interest in astrophotography. We hope they enjoy their membership and participate actively in society events, particularly at The Schmidt.

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 Officers and CCAF Board Members Elected at July Meetings:

Here are the results of the elections which took place at our July meeting:

Officers of the Cape Cod Astronomical Society:

<u>President-Elect*</u>	Jim Lynch
<u>Vice President</u>	Mike Hunter
<u>Secretary</u>	Gus Romano
<u>Treasurer</u>	Peter Kurtz

Members of the Board of Directors of the Cape Cod Astronomical Foundation:

<u>Treasurer</u>	Gus Romano
<u>Secretary</u>	Joel Burnett**

* Mike Hunter will serve as President until Jim Lynch retires from his position at WHOI later this year.

** Joel will fill out the remaining two years of Werner Schmidt's term.

CCAS Meetings:

Many thanks to **Professor Emeritus Larry Marschall** of Gettysburg College, astronomer, teacher and always an excellent speaker, who updated us on the history of **Pluto** at our July meeting and provided an excellent overview of new information gleaned from data collected by NASA's New Horizons mission to our dwarf planet.

Upcoming Meetings:

We look forward to the presentation of HSCfA Professor **Antony A. Stark** at our August 4th meeting on **Cosmology with the South Pole Telescope**. Here is his abstract:

The South Pole Telescope (SPT) is designed for observational cosmology, the detection of faint features in the Cosmic Microwave Background. After many years of preliminary work at the Amundsen-Scott South Pole Station, the South Pole Telescope became operational in 2007, and has been scanning the sky around the Galactic Poles ever since. Discoveries include detection of clusters of galaxies by the Sunyaev-Zel'dovich (SZ) effect, first detection of lensed galaxies in the early Universe, and measurement of features in the Cosmic Microwave Background. We'll discuss how these results contribute to understanding the Big Bang and the formation of structure in the Universe.

This is a new chapter for us at CCAS following on the talk by HSCfA Post-Doc Colin Bischoff way back in August 2013 in which he introduced us to the work at the South Pole Station searching for B-mode radiation in the CMB. At that time, there was some evidence for B-mode radiation but the data was confounded some by interferences in the signals.

The next monthly meeting: is Thursday, September 1st, at 7:30pm in the D-Y High School library.

In March, we were treated to Mike Hunter's presentation on LIGO (Laser Interferometer Gravitational-Wave Observatory) and its detection, reported in February, of gravitational waves caused by the merging of two humongous black holes.

Jim Lynch, CCAS President Elect and physicist from WHOI, will update us on **LIGO** at this meeting, and overview its capabilities to detect important cosmic events.

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 Vice President, is our present Program Chairman. Please contact Mike or info@ccas.ws if you have any leads on speakers for October 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!

CCAS Dues:

The 2016-2017 dues cycle began on **July 7th**. Dues for most folks are \$30/year. Please pay your 2016-2017 dues this month if possible, even if you have been accustomed to making payment at other times of the year.

If you consider yourself an active member and are eligible to pay dues, please do so early in the upcoming cycle.

We need this money to pay our bills, pursue outreach, and support our Observatory! Please bring your check to the meeting or 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.

The minutes of the June meeting are on our website; click on the “Minutes” button at www.ccas.ws or click on this link: <http://www.ccas.ws/minutes/ccasminutes070716.pdf>

From the Dome:

The Summer Schedule of Every-Thursday Star Parties at The Schmidt Observatory continues in August on Thursday, August 11th, at 8:30pm-10:30pm. The summer series ends on August 25th. All events open to the public.

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.

Studying Mars Retrograde:

Please see the next page for more on our front-page story about the retrograde motion of Mars and the fantastic composite astrophotography taken by Hank Ricci of the “ending of the Mars retrograde of 2016”.

August Observing:

Observing Resources:

Please see resources in the August 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, 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 August:

- No fewer than *five* planets dance around each other in the night sky this August:
 - **Mercury, Venus and Jupiter** adorn the pre dusk sky in the west. Jupiter, Venus and Mercury (greatest eastern elongation, that is, separation from the sun, on August 27th) form an isosceles triangle 30 minutes after sunset on August 23rd; Jupiter and Venus are separated by less than 0.1° on August 27th

Moonscuser’s Almanac and Monthly Alert¹ AUGUST 2016			
Object	AUGUST 15 (EDT)	AUGUST 15 (EDT)	AUGUST 15 (EDT)
Sun	R 05:36 S: 19:58	05:50 19:39	06:06 19:14
Moon	R: 04:50 S: 18:57	17:44 03:35	05:43 18:52
Mercury (evening)	R: 07:36 S: 21:00	08:14 20:35	07:56 19:39
Venus (low, eves)	R: 06:53 S: 20:46	07:27 20:32	08:05 20:12
Mars (evening)	R: 15:08 S: 00:20	14:43 23:45	14:21 23:13
Jupiter (early evening)	R: 09:12 S: 21:48	08:30 20:59	07:44 20:03
Saturn (evening)	R: 15:43 S: 01:18	14:48 00:22	13:46 23:19
Uranus (evening)	R: 22:53 S: 12:04	21:57 11:08	20:53 10:03
Neptune (evening)	R: 21:15 S: 08:24	20:19 07:27	19:15 06:22
Pluto (all nite)	R: 18:20 S: 03:47	17:24 02:50	16:20 01:46

- **Saturn and Mars** dominate the southern sky in early evening most of the nights of August. The two planets form a tight package with Antares at 9pm in the southwest. Please see the note on page 6 concerning Saturn’s

recovery from its 2016 retrograde motion this month and observing programs planned at The Schmidt to record this event.

- **Neptune**, mag 7.8, followed on the ecliptic by **Uranus**, mag 5.8, continue to be nicely placed in the night sky in August. Try even with binoculars or a small telescope!
- Finally, the **Perseid Meteor Shower** is expected to be “better than ever” peaking at 2am high in the northeast.

The shower is expected to be one of the best, possibly 150 meteors/hr, for two reasons:

- 1) the first quarter moon will have set;
- 2) Jupiter’s gravity has recently moved the debris field from comet 109P/Swift-Tuttle closer to the earth’s orbit.

[Note, don’t limit looking to after midnight; earlier, just look away from the moon for a good show.]

- **Minima of Algol^{1,3}. August:**

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 Algol this month: Thursday, August 11th, at 11:11pm.

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, August, 2016

New Moon, Tuesday, August 2nd, at 4:45pm, EDT
First QTR, Wednesday, August 10th, at 2:21pm, EDT
Full Moon, Thursday, August 18th, at 5:27am, EDT
Last QTR, Wednesday, August 24th, at 11:41pm, 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 ARE AVAILABLE; INQUIRE AT info@ccas.ws IF YOU WISH COPIES

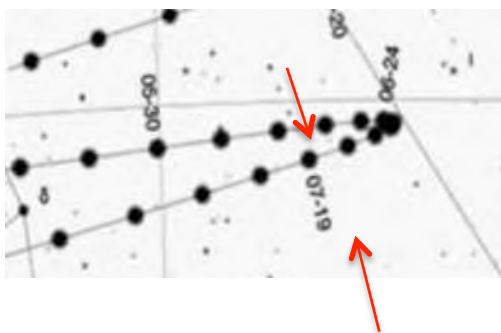
HERE’S MORE INFORMATION ON [THE RETURN OF MARS FROM RETROGRADE](#) FROM PAGE 1

MARS BACK ON TRACK AFTER JUNE REVERSAL

Part II

“The Theory”

“The Theory”: As presented in last month’s *First Light*, the schematic at left shows how Mars, in retrograde motion against the background stars east-to-west since April...turns back to its more normal west-to-east motion against the background stars (stationary on/about July 1). The *top arrow* shows its expected position on June 14...



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... "The Rest of the Story:"



Bernie Young and (behind 'scope) Sturgis student Nate Pappalardo during "Mars" activities on July 25.



Hank Ricci Adjusting His Camera atop the 16"

Blessed with good weather, the team met at the Schmidt to study this phenomenon from June 16th (top left arrow), to the beginning of end of retrograde on June 23rd (top right arrow), to the return to west-to-east motion on July 6th (lower right arrow), and continuation west-to-east on its normal course (July 13th, lower left arrow.)

Hank Ricci took a remarkable series of twelve photos on the dates indicated, each showing Mars against the background stars (*see page 7*). The twelve shots were digitally combined (stacked) using Nebulosity software.

6/16, 6/17, 6/18, 6/19, 6,20, 6/23, 6/25, 6/27, 6/30, 7/2, 7/6 and 7/13



Individual shots were taken with a Pentax K-X DSLR with a 50mm focal length lens at f/4, 4 seconds each and ISO800. Most shots were taken with camera piggybacked on the 16 inch Meade at the observatory. Bernie fabricated a fixture and mounted it on the telescope that can accommodate several cameras.

Please see the bottom of page 7 for Hank's full image including the stationary background stars!

UPCOMING PROJECT:

Saturn is well placed in the southern night sky for Cape Cod in August. There will be an opportunity this month to observe the ringed planet, currently in east-to-west retrograde motion against the background stars since the spring, make its turn back to normal west-to-east motion at a date in mid August. With luck, by month's end, we will have some spectacular photos of this "turn". Mars, on its current west-to-east faster track, adds to the plot by passing "under" Saturn while it is turning during August.

CCAS Stuff !!!!

Did you know that you can buy merchandise such as bumper stickers, tote bags, and tee shirts bearing the logo of the Cape Cod Astronomical Society online?



GO TO

<http://www.cafepress.com/capeastronomy>

browse, and place your order!

One of My Favorite Things...



A group of Girl Scouts from Cape Cod's Camp Favorite visited The Schmidt in the spring.

Apparently they enjoyed the experience and their views of the night sky!

Good job, Joel, and staff!



Telescope for Sale:



Andrew Gostanian Jr. of the South Shore Astronomy Society and Marshfield requested that we put this notice of telescope for sale in *First Light*. Please contact him at drewgost@gmail.com or 617-365-4511 if you are interested.

Orion Schmidt-Cassegrain 11" telescope (OTA made by Celestron) on an Atlas EQ-G equatorial GoTo mount; Starry Night Blue Star adapter for wireless connection to PC; Celestron accessory kit, DC Dew Zapper, 11 inch SCT Baader Filter (for viewing the sun); green laser beam, Scope Buggy, telescope cover , various eyepieces, etc. Very used. Brand new condition, Asking \$2799.00

Hank Ricci's Original Image of the end of Mars 2016 Retrograde with starry background



Cape Cod Astronomical Society

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Vice President	Mike Hunter	5083643370(cell)
Secretary	Gus Romano	7819294770
Treasurer	Peter Kurtz	5082550415
Observatory Director	Joel Burnett	5082217380
<i>First Light</i> Editor	Peter Kurtz	5082550415

info@CCAS.ws

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

* Mike Hunter will serve until Jim retires from WHOI later this year.

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), and 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/> [If you are not a registered user yet of *Sky and Telescope* online, going to this website will result in arriving at a screen asking you to become a registered user. No need to be a subscriber to either the print or online editions of the magazine. For future access to the S&T website, you will be prompted to enter your user ID and password.]
 - 5) Here is the web address for Astronomy Magazine's "The Sky This Month" online for August: <http://www.astronomy.com/magazine/sky-this-month/2016/06/are-eight-planets-enough>
 - 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) The Retrograde Motion Chart is taken from a Skymania article found at: http://www.skymania.com/wp/wp-content/uploads/2007/09/path_mars_2016_1.jpg
 - 8) The schematic explaining the "mechanics" behind apparent retrograde motion was taken from an *Earthsky* article at <http://earthsky.org/?p=235532> Click on "About" at the top of the website page to learn more about the *Earthsky* team and their work. *Earthsky* credits Wikipedia User Rursus for this schematic.
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