Twinkle, twinkle, little star... Let's face it, astronomers are at odds with poets and songwriters on this one. The quaint and often lovingly mentioned twinkling of stars in the night sky is very unhelpful in astronomy, whether you are star-hopping to find that elusive binary or trying to image a bright nebula. Earth's atmosphere is a complex mix of interacting fluid forces, responding constantly to a collection of forces from incoming solar radiation to features in the landscape. Whatever the causes, the result is turbulence. And whether reflected from the surface of a planet or directly from stars, light pasting through our turbulent atmosphere bounces around.

Our July speaker is LAS member Steve Albers. Steve has studied atmospheric turbulence extensively, including work at NOAA and now with SPIRE Global. Steve will help us understand the ins and outs of these phenomena. Note: as of today (July 5) the location of the meeting is unknown and will be announced shortly?

Notes from the President: Bill Tschumy

I just returned from 4 great days and nights at the Rocky Mountain Star Stare (RMSS). This event is put on every June by the Colorado Springs Astronomical Society. They do a fantastic job and it just gets better each year. It is held on 35 acres of land they own near Gardner, CO (west of Walsenberg) at 7600 ft elevation. I heard they had around 330 people pre-registered this year.

The weather forecast for this star party wasn’t great but I went anyway. It ended up being clear every night and the skies were magnificent. There is a lesson to be learned here. Forecasts (especially for clouds) are notoriously bad. Unless the forecast is for 100% clouds and rain, it is often worth giving it a chance. The last two days were predicting clouds for the both nights, but it cleared off anyway. So now I’m happy but exhausted from 4 straight nights of excellent observing.

Two other club members were there with me. Our usual site was already taken so we set up in the relatively unused southwest field. It was a nice choice – private and quiet. There may have been other members there that I did not see. If so, sorry we missed you.

I encourage all of you to try to attend RMSS next year. If you have never been to a large regional star party, you could also try the Okie-Tex Star Party which happens in the early Fall (Sept 21-29th this year). It is another well done event under dark skies.

Next Meeting July 18

“Seeing, Transparency, and Light in the Night Sky”
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About LAS

The Longmont Astronomical Society Newsletter ISSN 2641-8886 (web) - ISSN 2641-8908 (print) is published monthly by the Longmont Astronomical Society, P. O. Box 806, Longmont, Colorado. Newsletter Editor is Vern Raben. Website URL is https://www.longmontastro.org.

The Longmont Astronomical Society is a 501 c(3), non-profit corporation which was established in 1987. Our main goal is to promote local amateur astronomy. This is accomplished through regular monthly meetings, star parties and public observing sessions.

Regular meetings are held every month (except December) on the third Thursday. The current location is at the First Evangelical Lutheran Church, 3rd Avenue and Terry Street, Longmont, CO. Meetings are open to the public and begin at 7:00 PM.

A broad spectrum of topics are covered at the meetings and include such things as deep sky observing, planetary imaging, narrow band imaging, equipment discussions and demonstrations just to name a few. These subjects are presented by both club members as well as special guests who are professional astronomers or experts in a particular field.

Solar System Highlights

**Moon**
- New Moon: July 2 at 1:16 pm
- First quarter: July 8 at 4:56 am
- Full moon: July 16 at 3:39 am
- Third quarter: July 24 at 7:19 pm
- New moon: July 31 at 9:13 pm

**Mercury**
Not visible with naked eye in bright evening twilight. Maybe try spotting it with binoculars 3 degrees (half of a binocular field) below the moon on July 5th?

**Venus**
Not visible. Conjunction with the Sun on Aug 14.

**Mars**
Not visible with naked eye in bright evening twilight. Maybe try spotting it with binoculars just below limb of the moon on July 4th?

**Jupiter**
- Jupiter is in the constellation Ophiuchus. It is magnitude -2.6 in brightness. The disk decreases from 45 to 43 arc sec across this month.
- Assuming a longitude of 212 degrees, the Great Red Spot will transit the center of Jupiter’s disk at the following times:

<table>
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<th>Time</th>
<th>Altitude</th>
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<tbody>
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<td>20°</td>
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<tr>
<td>July 1</td>
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<td>26°</td>
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<tr>
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<td>July 13</td>
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<td>July 15</td>
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<tr>
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<td>12:11 am</td>
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<tr>
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<tr>
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<td>11:19 pm</td>
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</tr>
<tr>
<td>July 30</td>
<td>8:49 pm</td>
<td>29°</td>
</tr>
<tr>
<td>August 1</td>
<td>10:27 pm</td>
<td>27°</td>
</tr>
</tbody>
</table>

**Saturn**
- Saturn is in constellation Sagittarius this month. It is +0.1 magnitude in brightness and its disk is 18 arc sec across. Saturn is at opposition with Earth on July 9 around 11 am MDT.

**Uranus**
This month it is in constellation Aries; the disk appears to be 3.5 arc sec across and the planet is +5.8 magnitude in brightness.

**Neptune**
Neptune is in the constellation Aquarius. It brightens from +7.9 to +7.8 this month; the disk is 2.3 arc sec across.

**Meteor Showers**
The Alpha Capricornids meteor shower is active from July 3 through August 15. The meteor shower peaks on night of July 29 and 30th. Usually about 5 an hour may be seen from a dark site. Radiant is at RA 20:28 and Decl. -10.2°. This meteor shower is notable for the number of bright fireballs it produces.

Assuming a longitude of 212 degrees, the Great Red Spot will transit the center of Jupiter’s disk at the following times:

**Jupiter**

**Saturn**

**Uranus**

**Neptune**

**Meteor Showers**

**Mercury**

**Venus**

**Mars**

**Jupiter**

**Saturn**

**Uranus**

**Neptune**

**Meteor Showers**
Location of the Apollo 11 Landing Site (July 8, 9pm)

“Tranquility Base”, Apollo 11 landing site
A pair of craters named Hercules and Atlas are very noticeable this evening in the north. These craters are a study in contrast. Hercules on the left is more recent; its rim is sharp and well defined. Atlas on the right appears worn and more damaged by impacts.

Fracastorius crater is quite prominent tonight; it is located in the southern part of Mare Nectarius. Sunrise is just reaching its most prominent satellite crater “D” on the southwest wall. The rim of the crater brightly lit but the floor is still in darkness.

Fracastorius was filled with lava from Mare Nectaris. The northern wall was completely covered after the area subsided from weight of that ancient lava. No central peak is visible. You may be able to see a rille crossing Fracastorius just south of its center.

Crater Janssen located on the Moon’s southeastern limb is about 125 miles in diameter. The entire crater is heavily worn and ill defined with somewhat hexagonal shape.

The prominent crater Fabricus lies within the limb of Janssen.

The large prominent curved rille in the southern part is called Rimmae Janssen.
July 6th at 9:00 pm (4 days and 7 hours after new)
Comet C/2017 T2 (PanSTARRS) is in the constellation Taurus. It is magnitude +8 in brightness. The comet’s coma is about 7 arc min across. The best time to view it is about 4:20 am this month.

Comet 29P Schwassman-Wachmann is predicted to brighten slightly from magnitude +9.8 at the first of the month to magnitude +9.6 by end of the month. The coma increases in size from 7.7 arc min to 8.5 arc min.
Comets

**C/2018 R3 (Lemmon)**

Comet C/2018 R3 (Lemmon) is currently in constellation Lynx. It is magnitude +10.5 to +10.8 in brightness. However, it is very low and difficult now; it will be much worse by mid month. The coma size is 2.3 arc min across.

**C/2018 W2 (Africano)**

Comet C/2018 W2 (Africano) begins the month in constellation Cameropardalis at magnitude +12.8 and brightens to +11.5 by the end of the month. It is predicted to be magnitude +9 by October. It was discovered by B. M. Africano with Mount Lemmon Survey and H. Groeller with the Catalina Sky Survey.
Navigating the mid July night sky: Simply start with what you know or with what you can easily find.

1. Extend a line north from the two stars at the tip of the Big Dipper’s bowl. It passes by Polaris, the North Star.
2. Follow the arc of the Dipper’s handle. It first intersects Arcturus, the brightest star in the July evening sky, then continues to Spica.
3. Arcturus, Spica, and Denebola form a large equilateral triangle.
4. To the northeast of Arcturus shines another star of similar brightness, Vega. Draw a line from Arcturus to Vega. It first meets “The Northern Crown,” then the “Keystone of Hercules.” A dark sky is needed to see these two dim stellar configurations.
5. High in the East lies the Summer Triangle stars of Vega, Altair, and Deneb.

Binocular Highlights:
A: Between Denebola and the tip of the Big Dipper’s handle, lie the stars of the Coma Berenices Star Cluster.
B: Between the bright stars Antares and Altair, hides an area containing many star clusters and nebulae.
C: On the western side of the Keystone glows the Great Hercules Cluster, containing nearly 1 million stars.
D: 40% of the way between Altair and Vega, twinkles the “Coathanger,” a group of stars outlining a coathanger.
E: Sweep along the Milky Way for an astounding number of faint glows and dark bays, including the Great Rift.

Astronomical League  www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.
If you can observe only one celestial event this month, consider this one: See how the moon appeared on the night of the Apollo 11 landing

Look to the south-southwestern sky...
- 75 minutes after sunset.
- On July 8, 2019, the moon is positioned in nearly the same spot in the sky as it was on July 20, 1969.
- On July 20, 1969, the moon’s phase was 6.5 days, or 1 day shy of first quarter. On July 8, 2019, the phase is 6.3 days.
- On July 20, 1969, Jupiter shone just to the moon’s right.
- On July 20, 1969, Uranus was in conjunction with Jupiter, lying 30 minutes south of the giant planet. Both planets would have been in the same telescope field of view. It would have surely been an attraction to star gazers, if the moon landing wasn’t tabou to take place.
- On July 20, 1969, Mars was low in the south in Scorpion, shining brighter than Arcturus, but dimmer than Jupiter.
- During the moon walk, the moon had already set for East Coasters, while it was visible in the southwest for West Coasters.
- July 20, 1969 was a Sunday.

From Our Newsletter Archives

July 2009
The July 16, 2009 meeting is in the Community Room at Front Range Community College. The speaker will be Allen Jeeter. He is a professional photographer and an amateur astronomer who is interested in imaging the night sky. Rather than investing large sums of money on expensive mounts, telescopes, and cameras, Allen has taken a less expensive approach. Learn how Allen produces his impressive astrophotos using affordable gear.

Next month the FRCC will probably be closed as they are between summer and fall semesters. Also the annual Fox Park Star party starts the same day as our meeting, so not many of us would make it even if we could get in the building. We will have an informal LAS “meeting” at 7 pm Friday, Aug. 21st, up at Fox Park, somewhere near Gary’s RV in the north part of the east observing field.

July 1999
The July 15, 1999 meeting was held at Roosevelt Park. The speaker was Jim Crane. Jim spoke of his involvement with the QuikSCAT Satellite, a radar that will be used for weather predictions. He worked on the satellite from when it left Boulder to California from where it was launched on June 19, 1999.

July 1989
There was no newsletter published for July 1989.
Dr. Egeland opened his talk with a short review of stellar types along an RH-like diagram while explaining that most popular focus is on a star's death... the nova, super novae, and compact objects of degenerate matter that remain. But Dr Egeland would argue that the day to day dynamism in a star's magnetic field is a far richer bed for research and investigation... and by that provide benefit to mankind as we better understand the star that keeps us alive.

Dr. Egeland shared some amazing video loops of the solar disk, sunspots, and corona in many different wavelengths, and by this pressed the point of our observational coverage of the sun and the information that different wavelengths would present.

What is responsible for all this dynamism? And sun spots in particular? The solar body as a sphere is a huge dynamo; one that rotates at different rates at different latitudes and depths. So while the rotating core is generating the Sun's magnetic field, the varying rates of rotation cause these intense magnetic field lines to interact, join, and form loops from which the entry and exit points of the interacting lines is at or forms a sun spot by inhibiting hot gas flow from below and surrounding regions. That spot becomes a little 'stagnant' and cools (sun spots really are not dark, they’re simply ~ 2000K degrees cooler than the surrounding region).

Dr. Egeland spent time describing ‘solar minimums’, those times when sunspot activity is vastly reduced or absent, i.e. the Maunder minimum and others that interrupt the Sun’s normal 11 year sunspot cycle.

Dr. Egeland says that there are options for amateurs to participate in solar spectroscopy, sharing again how valuable spectroscopy is for a variety of examinations of the sun and stars to better understand their operable dynamo.

In his closing, Dr. Egeland expressed his simple desire for a model that would clearly explain the...
entirety of solar observations in a consistent manner.

Please consider these two online resources for access to Dr. Ege-land’s papers and research. https://staff.ucar.edu/users/ege-land

http://rickyegeland.com/

Business Meeting

Finance Report by Marty Butley

• Marty reviewed club financials and membership.
• “Anonymous” donation from Daniel J Enders $200 for room expenses
• “Storm Trooper Award” presented to Tally and Bill Tschumy for their commitment to the club, star parties, and specifically, outlasting stormy weather in the latest outing.
• Received a book to review - please see Bill to volunteer
• Vern - Paper newsletter is available for $4

Prior Business: Meeting location

• FRCC classroom guaranteed or Community Room (unsure of access but great set up)
• ‘Astronomy on Tap’ location in Gunbarrel - please attend as we consider the same room as new meeting space. Their next meeting is next Tuesday, tickets on the web site but are free, LAS website has links to ‘Astronomy on Tap’ website.

No new business, meeting adjourned.
“Sun in Calcium K” by Brian Kimball

“Sun in H-Alpha” by Brian Kimball

“Active Solar Region in H-Alpha” by Brian Kimball
"Sharpless 2-86" by M. J. Post
Liftoff on July 11, 1969 at 7:32 am MDT

“Columbia spacecraft photographed from Eagle” NASA

“Eagle in lunar orbit photographed from Columbia” NASA
50 years ago on July 16 of this month two astronauts from the United States left their foot prints on the surface of the Earth’s moon. That accomplishment required an enormous effort from 400,000 engineers, scientists, and technicians from more than 20,000 companies and universities. When President Kennedy announced the goal of landing on the moon before congress on May 25, 1961 the technology, hardware, and technical workforce needed did not yet exist. The technical challenges were enormous. The decisions to solve a multitude of problems were innovative, creative, and often elegant. Many, many people spent countless overtime hours to meet the challenge. Eight years later on July 16, 1969 at 2:18 pm MDT that goal was accomplished when Neil Armstrong radioed “Houston, Tranquility Base here. The Eagle has landed.”
On June 27 NASA announced that a dual quadcopter drone will be sent to Saturn’s moon Titan to take scientific measurements. It will study Titan’s atmosphere, surface conditions, surface composition, and perform seismic studies.

It will fly about a kilometer or so each Titan day (about 16 Earth days). It should cover several hundred kilometers during its 2 year mission.

Dragonfly will launch in 2026 and land on Titan in 2034.