The LAS meeting this month will be a virtual one beginning at our usual time of 7 pm on Thursday, April 16th. You may join the meeting at 6:30 pm so you can check your connection and socialize prior to the main presentation.

The topic and name of the presenter have not yet been finalized as of this date (April 7).

In about a week you will be sent an email with instructions and links to join the video conferences. If you do not have a video camera or don’t wish to be seen you may just watch or attend with audio only. You may also join by telephone.

We will be using Zoom video conferencing software which supports most devices. The software maybe downloaded and installed on your computer or cellphone from links at URL https://zoom.us/download

Events in April
- All LAS public events this month have been canceled due to the Covid-19 flu pandemic.

LAS Officers and Board Members in 2020
- Bill Tschumy, President
- Stephen Garretson, Vice President
- Michelle Blom, Secretary
- Bruce Lamoreaux, Treasurer
- Board Members:
  - Mike Hotka, Gary Garzone,
  - Brian Kimball, Vern Raben
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About LAS

The Longmont Astronomical Society Newsletter ISSN 2641-8886 (web) and ISSN 2641-8908 (print) is published monthly by the Longmont Astronomical Society, P. O. Box 806, Longmont, Colorado. Newsletter Editor is Vern Raben. Our 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 location this year is Niwot Inn. 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.

In my last article, I briefly introduced robotic telescope networks and how they might be used to capture beautiful images of the universe or images that are of scientific interest. This month, I will introduce you to how to use the iTelescope network.

I used the iTelescope network (ITN) to capture images of variable stars, a topic for a future article. I still have an account with them and logged in to capture the screen images associated with this article.

To access the web interface to the ITN, use the URL https://go.itelescope.net/login.aspx. By clicking the Register a New Account choice (Figure 1), you can set up an account and then login to your account.

Once you are logged in, you can gain access to all the telescopes of the ITN. The Launchpad (Figure 2) is the main interface where you will access each telescope, create observing plans and schedule them for execution.

The ITN has five locations around the world, in both hemispheres. The location in Northern California is not shown in Figure 2. I used this telescope when it was part of the now obsolete Sierra Stars robotic telescope network. The “T” designation is a unique number for each telescope in the network and has no other meaning. You must access each telescope to find what kind of telescope it is and other details of the scope like aperture and focal length. You can examine the details of each ITN site to find its location, current weather and sky conditions, which can also be seen via a real-time all-sky camera.

Additional information presented on the Launchpad will display the current status of each telescope. The status messages are self-explanatory. There is an Offline status that is also displayed, indicating the telescope is not usable and is undergoing possible maintenance procedures. The In Use status message displays the name of the observing plan currently being executed by the telescope.

Each telescope's status text is a link to access the telescope’s control page. By clicking the status of telescope T11, you will login with your credentials and have access to a screen that resembles Figure 3.
the subsequent screens displayed. The menu choices that I used are:

- **Deep Sky** – This choice allows you to create an observing plan for a deep sky object. A deep sky object is one whose coordinates of Right Ascension (RA) and Declination (Dec) do not change from night to night. The telescope tracks on the object’s RA and Dec.

- **Comet/NEO** – This choice allows you to capture images of moving objects, or those whose RA and Dec change over a short period of time. The telescope tracks on the Comet or NEO (asteroid). If you take a series of images in one observing run, each image will have the comet or NEO centered in the image.

- **Make a Reservation** – This choice allows you to specify a specific date and time to start the execution of an observing plan. Clicking this choice will present you with a screen that resembles the one in Figure 7. If you have created a chained observing run, you will schedule the first observing plan of the chain, otherwise you will schedule a single observing plan with this choice.

- **My Observing Plans** – This choice displays the Observing Plan Management (OPM) screen as seen in Figure 5. The OPM allows you to view, display, edit and delete all the created observing plans for this telescope.

- **My Image Files** – This is where you will access your captured images and download them to your computer for further processing or analysis.

The other choices that seem useful are the **One Click Image** and **AAVSO VPhot** choices. If you observe this telescope’s status as Available on the Launchpad (Figure 2), you can use this **One Click Image** choice to immediately schedule an observing plan or image run to start execution in the scheduler. The **AAVSO VPhot** choice allows you to setup a login to your AAVSO user account and your variable star images will be immediately uploaded to AAVSO and then the magnitude of the variable star automatically reduced. When you login to your AAVSO account at a later time, you would be ready to submit your AAVSO report. I didn't use this option either because I wanted to control the movement of images from the ITN to my AAVSO account, then run VPhot manually on the images.

To create an observing plan, access the telescope you wish to use to capture your image(s) and click the Deep Sky menu choice. By clicking the **Deep Sky** menu choice, you will be presented with a screen that resembles the one in Figure 4. The Plan Name is a name that will allow you to reference it in the OPM screen (Figure 5) or to schedule the plan to execute (Figure 7).

By entering a known **Target** name in the next field and clicking the **Get coordinates** text, the RA and Dec are automatically selected and filled in the next fields.

The **Repeat images for this target** is a way to capture more images of the observing plan you will make. The available filters for the T11 telescope are the I, Luminance, Red, Green, Blue, Ha, SII, OIII, and Johnson-Cousins U, B, V and R filters. Other telescopes may have different filter combinations.

You must create an image for each filter you want to use, one per line, in the next set of fields following the banner “Use Qty Filter Duration Binning”. You have a lot of flexibility to capture the images you desire by the options available. I created this example for reference only and am not implying I know what I am doing when it comes to creating color images of the heavens.

I didn’t use the **Advanced Imaging Options**, so you will have to research these options on your own. The online
help is very good and will explain all about these options. Once I had the settings for my observing plan correct, I clicked the Create plan for later button. Once you do that, you will see the plan appear in the OPM, Figure 5. An example of the text contained in an observing plan can be seen in Figure 6. This plan was created to capture an image of a variable star, which is a deep sky object, so I used the interface described above to create the initial observing plan.

Let’s say I wanted to create an observing run with 2 variable stars in it. I would create an observing plan using the telescope’s Deep Sky choice for V1239 Her and a second observing plan for VVCep. The Plan Name of each plan uses a dash in between the variable star designation and the constellation name. Both plans showed up in the OPM.

I clicked the V1239 Her plan and downloaded it to my computer. Using Notepad, I opened the text file and added the #chain statement as seen in Figure 6. This linked the two separate observing plans into what I called an observing run. I uploaded this modified observing plan to the telescope’s OPM and then use the scheduler (Figure 7) to schedule the V1239-Her plan to execute the entire observing run, because V1239-Her is the first observing plan in the chain.

I determined the exposure times, which are in seconds, by experimentation. A variable star increases and decreases in magnitude over time, so I would monitor the light curves for each variable and take two images of the variable. This would ensure that I would have one good image of the variable’s brightness to analyze with AAVSO’s VPhot program. You can see that the #interval is 45, 60, so I will get one image of 45 seconds and then a second image of 60 seconds.

In the Deep Sky screen to create this observing plan (Figure 4), I used 2 of the lines to define each image, one image definition per line. I also specified the Johnson-Cousins V filter for each image as seen in the #filter statement.

I generally linked up to 5 variable stars in one observing run. All these stars were located close to each other in the sky, so I would minimize the slewing of the telescope.

By choosing the Make a Reservation menu choice from the telescope’s navigation menu, you are presented with a screen that resembles Figure 7. This is the one feature of the ITN that I don’t care for. Based on the image requests of your observing plan or total image requests of your observing run, you need to estimate the amount of time that the telescope needs to finish capturing all your images. This time includes all necessary slews to acquire the target(s), focusing time and when the shutter is actually open. If you underestimate this time, once your time block expires, you stop getting images. It is difficult enough to determine why
you didn’t get all your images. Other reasons you might not get a requested image is the target dropped below the telescope’s horizon or there is an error any statement in your chained observing plans.

To schedule an observing plan to execute, you choose the time you want it to start with your cursor and drag down from that start time to reserve a block of time you think it will take to capture all your images. Then you can select an observing plan to execute from your defined set of observing plans created for this telescope.

Once your images are captured, you can use the My Image Files menu choice on Figure 4 and download your images to your computer. Immediately inspect your images to ensure they are usable. There are things that can occur that makes the telescope lose focus or tracking during an exposure. Most of the time this is due to cirrus clouds passing in front of your object while the shutter was open. If any image is not usable, it is very easy to get a refund credit for the ruined image. This is one of the ITN benefits that worked well for me.

When you create an observing plan, it is unique to that telescope. If I had all my observing plans defined for the T11 telescope and its status became Offline, I would look at other telescopes in the ITN and find one that was similar or identical to the T11 telescope to use, say T18 in Spain. To transfer my observing plans to this new telescope, I would download all the observing plans from telescope T11 to my computer. I would verify that telescope T18 had the Johnson-Cousins V filter available. If it did not, I would edit each observing plan on my computer and change the #filter statement to the filter designation the T18 telescope used. Then I would upload all these observing plans to T18’s OPM and I would be ready to schedule these observing runs on that telescope.

The other benefit of the ITN I liked is that you only get charged for when the shutter is open and there are discounts available if the moon is above the horizon when you schedule an observing plan. With variable stars, I took advantage of this moon discount. Figure 8 shows the different plans that are available. I used the Plan-40, which gave me 40 minutes of imaging time per month. You are automatically renewed at your current Plan’s rate every 28 days. You also have the ability to purchase more shutter time, if you need more credits in a given month.
Figure 10 is a display that shows the cost of taking images with each telescope. This display is dependent on the plan you choose. The numbers displayed are for the No Plan and are the most expensive plan to capture images with. The higher the plan number (Plan-90 to Plan-1000), the cheaper it is to use each telescope.

In capturing images of the variable stars I monitored, with 5 to 7 variables star observing plans chained together, with each observing plan taking 2 or 3 images of different exposure lengths or filter combinations, I usually was charged about $7 for that observing run. I found this fee very reasonable. The Plan-40 gave me enough shutter time so that I could capture the images of my variable stars every 2 weeks. The ITN worked very well for me in this respect.

One of the nice features that ITN has is the ability to schedule observing blocks of time in the future. Once you have your account, you can see all the reservations for a particular telescope that others have made. Most of these reservations are just a week out, so that makes it difficult to find a block of time to schedule your observing plan if you wanted it to run tomorrow night.

But if you can schedule your observing plans to execute more than a week in the future, the scheduler is pretty free of reservations. For me, I wanted to execute my observing runs every 2 weeks. I would reserve an hour block of time, which was sufficient to complete my chained set of observing plans. This is why I scheduled all my variable stars close together, so as to minimize the slewing time in the block of time I reserved. I would then use the scheduler to schedule my observing runs for the next 2 months.

What Figure 9 is showing is the total amount of time blocks that can be scheduled at one time, based on the observing plan you selected. With my Plan-40, I can schedule eight, one hour blocks of time in the future to capture my variable stars. I had two observing runs I would schedule every other week. By scheduling 2 months in advance, the schedule was wide open and I could pick any time to schedule my hour blocks. I could take advantage of moon discounts before the other users of the ITN scheduled their time blocks.

This is a brief overview for using the ITN to capture images of the night sky. I find it a cost effective way to gain access to research grade telescopes without having to purchase this equipment myself. The customer support was very responsive and they were able to answer all my questions the online help didn’t.

My current imaging efforts are capturing Near Earth Objects (NEO) asteroids. They are something called moving targets. The ITN is not conducive to capturing the images of asteroids I need. I use a different robotic telescope network to capture my asteroid images, which I will discuss further in the next article of this series.
M 88 Virgo cluster
by Gary Garzone

M 51
by Gary Garzone
Andromeda Galaxy by Martin Butley
Super Nova in NGC 2146 by Martin Butley
The April 8 Astronomy Day star party at Flanders Park was a great success with around 50 people attending. Pam Wheaton gave a short talk on mythology and constellation.

The Astronomical League announced winners of the "National Young Astronomer Award. LAS member Pam Wheaton, came in third place.

The next few weeks will be very exciting with observations of comet Austin, the launch of the Hubble Space Telescope, and the club’s activities planned for National Astronomy Day on Saturday, April 28th.

The club will have displays in front of the information booth near the center of Twin Peaks Mall. If weather holds we will have scopes set up for solar viewing. There will also be a star party in the evening at Dawson Park.

## Solar System Highlights for April

**Mercury**
Mercury is not visible this month.

**Venus**
Venus is prominent in the western sky after sunset. It increases in brightness from magnitude -4.4 to -4.5 this month; its disk increases in size from 26 to 40 arc sec.

**Mars**
Mars is visible in the morning sky in constellation Capricornus. It brightens from +0.8 to +0.4 magnitude this month; its apparent disk increases from 6.5 to 7.4 arc sec across.

**Jupiter**
Jupiter is visible in the morning sky in constellation Sagittarius. It is magnitude -2.2 to -2.4 in brightness and disk increases from 37 to 41 arc sec across.

**Saturn**
Saturn is visible in the morning sky in constellation Capricornus. It is magnitude 0.7 in brightness and disk is 16 arc sec across.

**Uranus**
Uranus is not visible in April.

**Neptune**
Neptune is not visible in April.

- Full Moon: Apr 1 at 7:49 pm
- Third Qtr: Apr 14 at 3:57 pm
- New Moon: Apr 22 at 7:27 pm
- First Qtr: Apr 30 at 3:45 pm
Comet C/2019 Y4 (ATLAS) recently reported to be magnitude +6.9 in brightness. It is predicted to brighten to magnitude -1 in early June. Unfortunately there are reports this morning (April 7) that it may have disintegrated.

It was discovered by the University of Hawaii’s Asteroid Terrestrial Impact Last Alert System (ATLAS) last Dec. 5th. The two telescopes used by the ATLAS system were built by DFM Engineering in Longmont.
Comet C/2019 Y1 (ATLAS) is now about magnitude +8.3. It is currently moving through constellation Cassiopeia.

It was discovered by the University of Hawaii’s Asteroid Terrestrial Impact Last Alert System (ATLAS) on Dec. 19th, 2019. The two telescopes used by the ATLAS system were built by DFM Engineering in Longmont.
Comet C/2017 T2 PanSTARRS is now about magnitude 8.6. It will be at perihelion in early May 2020. The Panoramic Survey Telescope and Rapid Response System (PANSTARRS) is located at the Haleakala Observatory in Hawaii.