# The Bays Mountain Astronomy Club Newsletter

August 2022

Kingsport, TN

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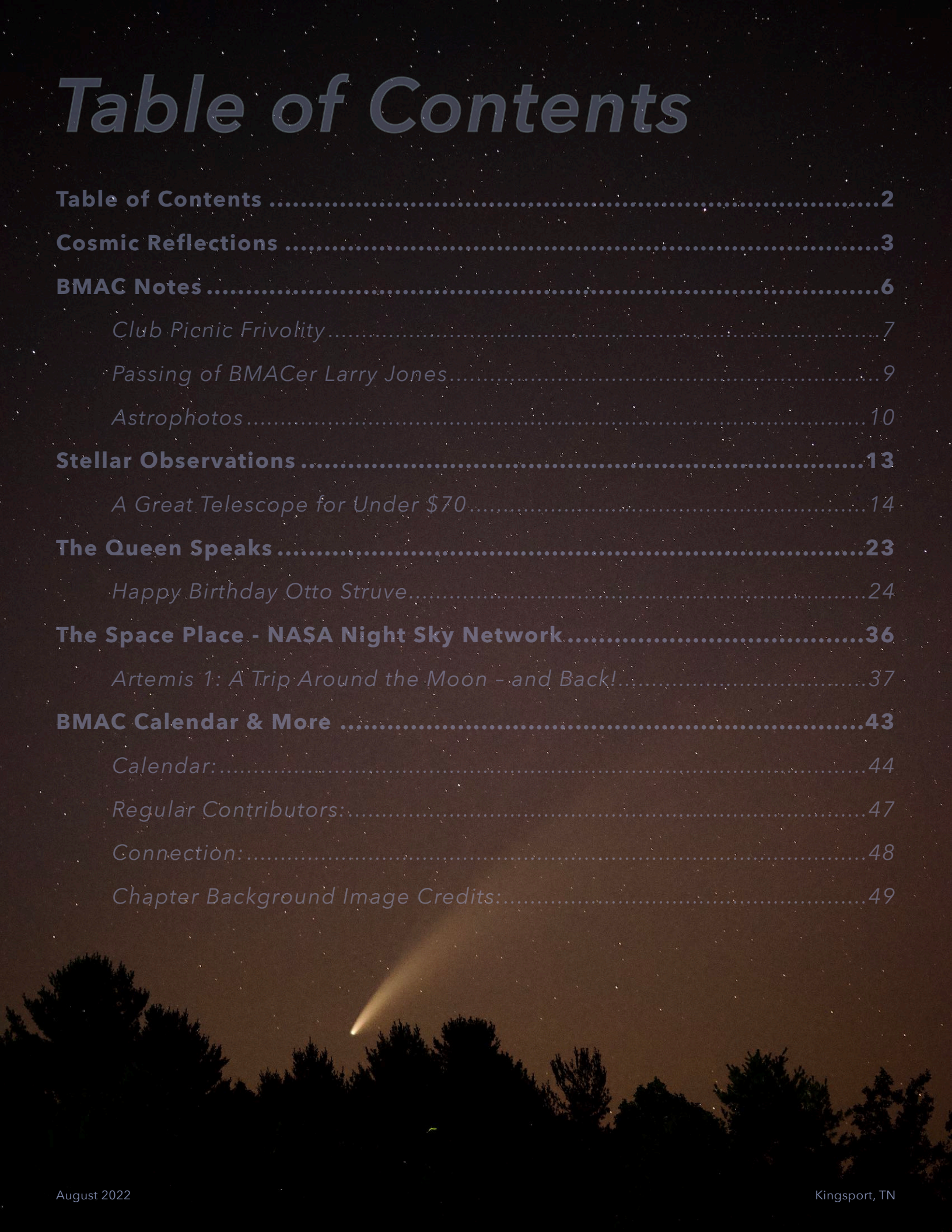


# Cosmic Reflections

## William Troxel - BMAC Chair

reetings fellow BMACer's. Wow, here we are in August 2022. The year is going by very fast!

I want to send out a big thank you to Dan for hosting the club at his home again this year for the annual club picnic. Like all the picnics, we had great food, good conversation and a very easy, pleasant afternoon. It was wonderful to see everyone that was able to come out. Again, thank you Dan for being our host!

I want to remind everyone that August is the month that we start thinking about getting your registration turned in for the upcoming StarFest. Please be watching for information from Adam about this upcoming big event that we host.

Our goal for the next meeting is to meet in the Discovery Theater classroom on the lower level of the Nature Center. I am still working on the details for this month's meeting. I will send them out as soon as I have them completed. We will still offer the Show-N-Tell and also I will be offering a "Challenge

meeting, I will ask you to share your answer and the person or persons that gets the correct answer will have bragging rights for the month and your picture in the newsletter.

Again, thank you to those of you who came out to the picnic and I hope you enjoyed the meeting.

Until next time, Clear Skies!

# BMAC Notes

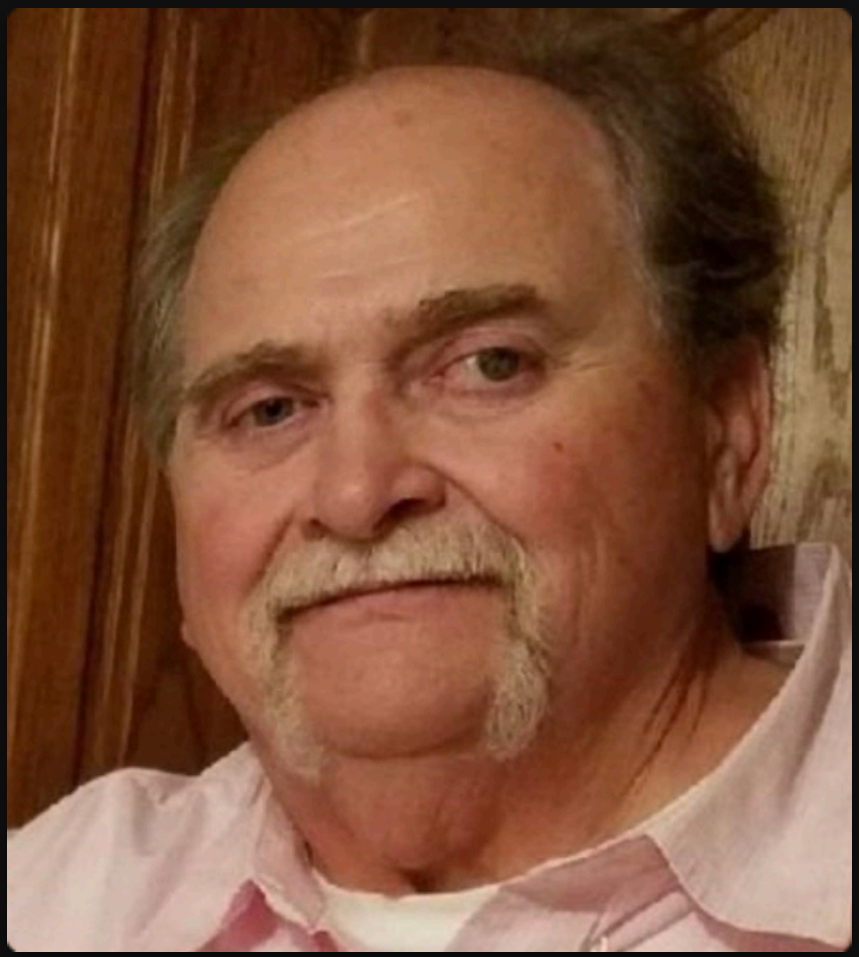
# *Club Picnic Frivolity*

While the amount of attendees was not as high as other years, this picnic gathering was still lots of fun with talking and relaxing. Both photos are from William Troxel.


WARNING

# *Passing of BMACer Larry Jones*

It was sad to hear about the passing of our fellow club member. Though a quiet gentleman, he was always a supporter of the club and its outreach to share the night sky. Among his many bright points, he always brought his incredible home-made baked beans to our club picnics. Here is a **link** to learn a little bit about him, written by his son.



# *Astrophotos*

There were two interesting celestial “events” that occurred recently. This first image is of the Tau Herculid Meteor “Storm” on May 31, 2022. It did not storm, by any means, but there were meteors, about a few per hour. I actually saw more sporadics than Tau Herculids!

*A bright Tau Herculid meteor. Taken with an 18mm lens and full-frame mirrorless camera. F/2.8, 2500 ISO & 15s. Image by Adam Thanz.*

This second image is the planetary arrangement this past June. Not quite an “alignment” in which you’d be seeing a clustering of celestial objects due to an alignment of these objects as seen from our line of sight. It was still very cool to see all the visible planets (those not needing a telescope to view) at one time. Mercury is not in the image as it is the lower left behind some trees. It was visible when it passed between some trees.

*The planetary arrangement on the morning of June 19, 2022. Venus is to the very lower left corner right next to a branch of the large pine tree. Jupiter is near dead center with Mars to its lower left. Saturn is almost to the edge in the upper right. The Moon is obvious. Taken with an 18mm lens and full-frame mirrorless camera. F/2.8, 1600 ISO & 2s. Image by Adam Thanz.*

# Stellar Observations

## Greg Penner

# *A Great Telescope for Under $70*

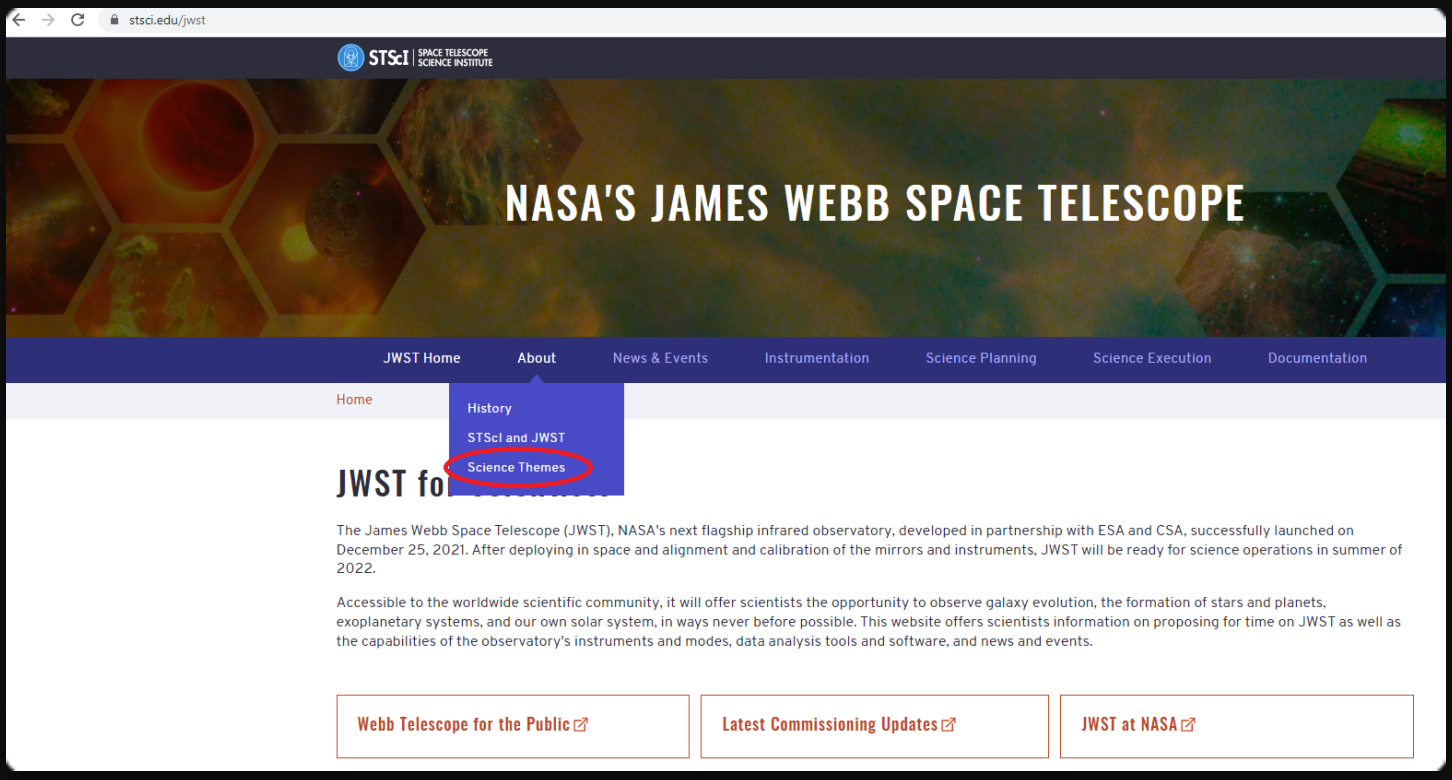
Would it be possible to own a great telescope, even the greatest telescope yet made, for less than $70? You might say that's a crazy question, but from a certain perspective it is true! The James Webb Space Telescope has a price tag of $10 billion. If you figure that every U.S. taxpayer (144 million of us according to a Google search) contributed towards that cost, then that comes to a one-time payment of $69.44 per person. Of course, this is an over simplified calculation, but the point is that we are all part owners of the world's greatest telescope! Viewing the latest gorgeous images is fun and inspiring, but if you want to feel more like an owner of this new groundbreaking (spacebreaking?) instrument of discovery, here are some ways to connect to the telescope operations and get the inside scoop like the part-owner you are!

The **JWST home page** is an excellent jumping-off point for exploring everything about the telescope, from its origin and

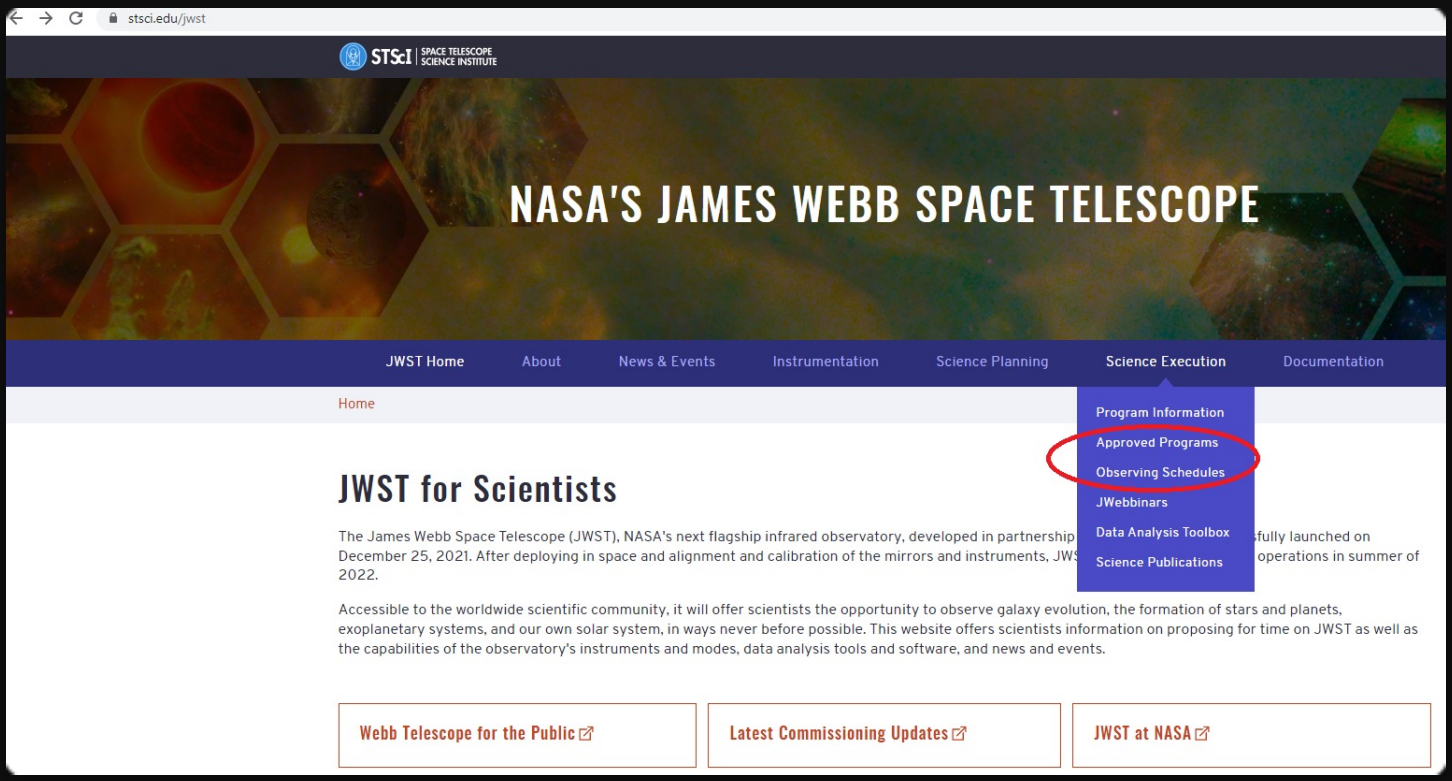
history to the current and future science exploration programs. Under the "About" tab on the home page select "Science Themes" to see that JWST's science focus will be to

> ...provide cutting edge observations that will delve into the mysteries of the first objects to form in the early Universe, the assembly of galaxies, the birth of stars and planetary systems, planetary systems and the origins of life, and much more.

The goals of each of these themes is explained in more detail, and a description is provided for how the JWST is equipped to meet those goals. The tabs "News & Events," "Instrumentation" and "Science Planning" all contain information that is useful for astronomers who wish to propose observing programs utilizing the JWST. Much of this info may be somewhat beyond the understanding of amateur astronomers and hobbyists, but it is interesting to scan through nonetheless.

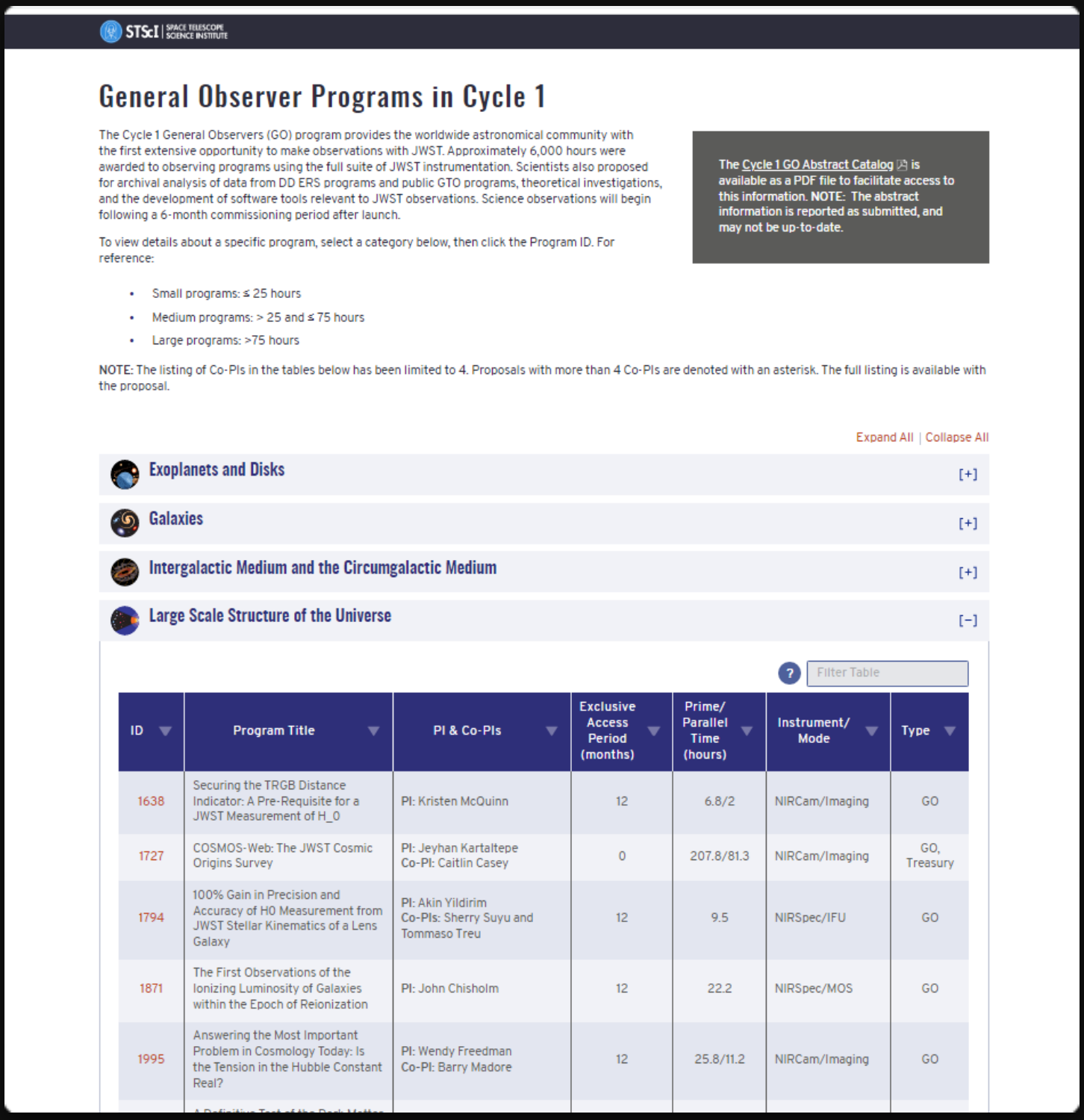



*JWST Home page highlighting the "About" dropdown to find the Science Themes.*




*JWST Home page highlighting the "Science Execution" tab.*

The area that I found fascinating is under the "Science Execution" tab. Click on the "Science Execution" tab, then select "Approved Programs" which takes you to a page of various categories of observing programs planned for the telescope. Some of these planned observing programs sound like they will make future headlines in the astronomy community. I clicked on the category "Cycle 1 GO" which stands for General Observer programs. This takes you to a page with numerous types of observing programs such as "Exoplanets and Disks," "Galaxies" and "Solar System Astronomy." I clicked on the category "Large Scale Structure of the Universe" because it sounded pretty ambitious. There are nine observing programs listed under this category, but the one that really caught my eye was "Answering the Most Important Problem in Cosmology Today: Is the Tension in the Hubble Constant Real?"



STScI | SPACE TELESCOPE SCIENCE INSTITUTE

# General Observer Programs in Cycle 1

The Cycle 1 General Observers (GO) program provides the worldwide astronomical community with the first extensive opportunity to make observations with JWST. Approximately 6,000 hours were awarded to observing programs using the full suite of JWST instrumentation. Scientists also proposed for archival analysis of data from DD ERS programs and public GTO programs, theoretical investigations, and the development of software tools relevant to JWST observations. Science observations will begin following a 6-month commissioning period after launch.

To view details about a specific program, select a category below, then click the Program ID. For reference:

- Small programs: ≤ 25 hours
- Medium programs: > 25 and ≤ 75 hours
- Large programs: >75 hours

The Cycle 1 GO Abstract Catalog is available as a PDF file to facilitate access to this information. **NOTE:** The abstract information is reported as submitted, and may not be up-to-date.

**NOTE:** The listing of Co-PIs in the tables below has been limited to 4. Proposals with more than 4 Co-PIs are denoted with an asterisk. The full listing is available with the proposal.

Expand All | Collapse All

**Exoplanets and Disks** [+]

**Galaxies** [+]

**Intergalactic Medium and the Circumgalactic Medium** [+]

**Large Scale Structure of the Universe** [−]

Filter Table

| ID | Program Title | PI & Co-PIs | Exclusive Access Period (months) | Prime/ Parallel Time (hours) | Instrument/ Mode | Type |
|---|---|---|---|---|---|---|
| 1638 | Securing the TRGB Distance Indicator: A Pre-Requisite for a JWST Measurement of H_0 | PI: Kristen McQuinn | 12 | 6.8/2 | NIRCam/Imaging | GO |
| 1727 | COSMOS-Web: The JWST Cosmic Origins Survey | PI: Jeyhan Kartaltepe<br>Co-PI: Caitlin Casey | 0 | 207.8/81.3 | NIRCam/Imaging | GO, Treasury |
| 1794 | 100% Gain in Precision and Accuracy of H0 Measurement from JWST Stellar Kinematics of a Lens Galaxy | PI: Akin Yildirim<br>Co-PIs: Sherry Suyu and Tommaso Treu | 12 | 9.5 | NIRSpec/IFU | GO |
| 1871 | The First Observations of the Ionizing Luminosity of Galaxies within the Epoch of Reionization | PI: John Chisholm | 12 | 22.2 | NIRSpec/MOS | GO |
| 1995 | Answering the Most Important Problem in Cosmology Today: Is the Tension in the Hubble Constant Real? | PI: Wendy Freedman<br>Co-PI: Barry Madore | 12 | 25.8/11.2 | NIRCam/Imaging | GO |

*JWST General Observing Programs in Cycle 1.*

I really appreciate that this information is publicly available just by clicking on this very user-friendly website. I then clicked on the program I.D. number and it leads to another page where you can finally click on "Public PDF" and now you can actually see who the investigators are and read what the observing program is about in detail. In this case, you will see that the Principal Investigator is Dr. Wendy Freedman, who is a leader in the area of measuring the Hubble Constant (check out her Wikipedia page). The abstract which describes the observing program states

> With its unequalled light-gathering power in space, its infrared sensitivity and high angular resolution, JWST is uniquely poised to provide the most accurate local measurement of the Hubble constant yet to date.

This program will be observing a list of 10 galaxies described thus

> we propose to measure the distances to half of the current sample of SHoES galaxies that calibrate the Type Ia supernova distance scale using three

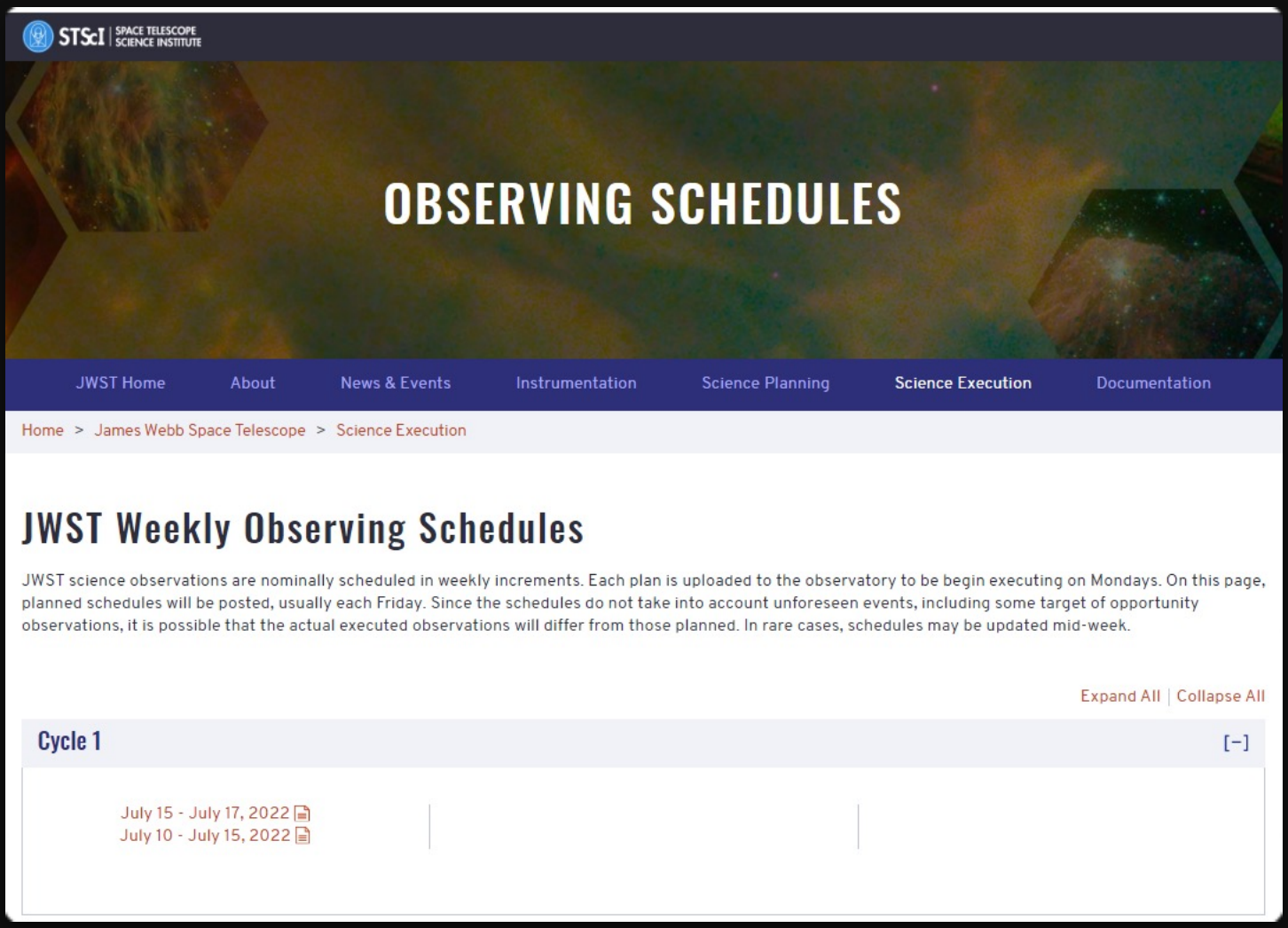
> independent methods in the same galaxies: this will be the first time such a test has been carried out.

I don't understand all of this, but it sounds like a great use of the JWST. The abstract concludes with

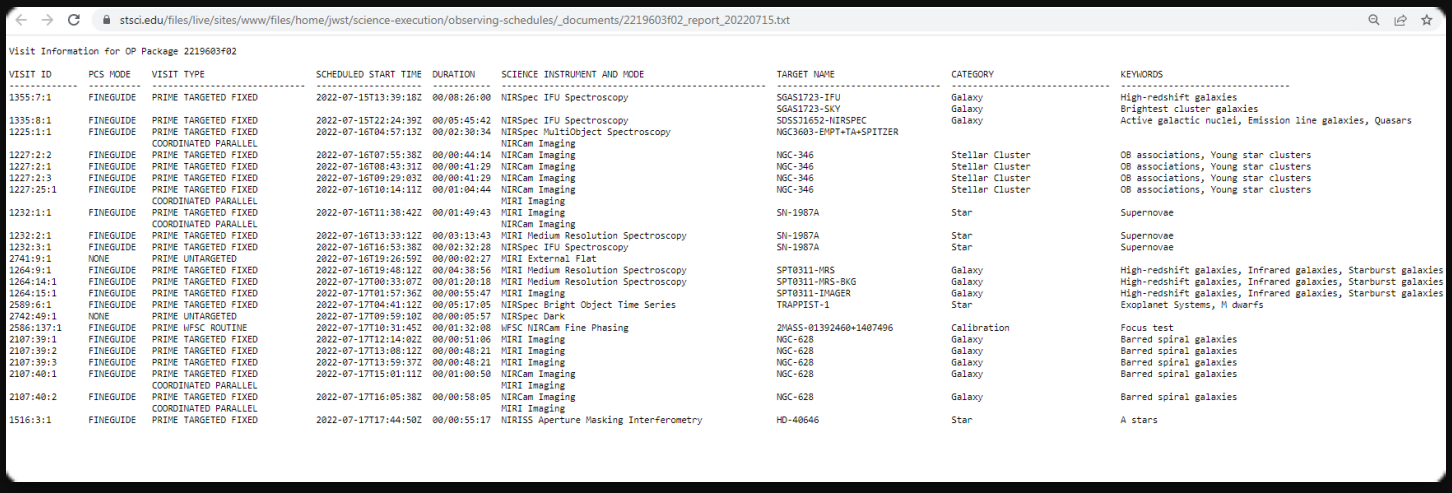
> As part of its legacy, HST resolved the factor-of-two debate in the Hubble constant, but even with two additional decades of progress, outstanding uncertainties still remain. A legacy of JWST will be the resolution of the current tension, and a robust answer to this question: "Is there new physics required beyond the standard model?

Wow! The results from these observations sure do sound like a future headline to me.

One final "clickable" bit of information of interest to amateur astronomers that is publicly available under the "Science Execution" tab is the JWST Weekly Observing Schedules.




*JWST Weekly Observing Schedules in Cycle 1.*



stsci.edu/files/live/sites/www/files/home/jwst/science-execution/observing-schedules/_documents/2219603f02_report_20220715.txt

Visit Information for OP Package 2219603f02

| VISIT ID | PCS MODE | VISIT TYPE | SCHEDULED START TIME | DURATION | SCIENCE INSTRUMENT AND MODE | TARGET NAME | CATEGORY | KEYWORDS |
|---|---|---|---|---|---|---|---|---|
| 1355:7:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-15T13:39:18Z | 00/08:26:00 | NIRSpec IFU Spectroscopy | SGAS1723-IFU | Galaxy | High-redshift galaxies |
| | | | | | | SGAS1723-SKY | Galaxy | Brightest cluster galaxies |
| 1335:8:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-15T22:24:39Z | 00/05:45:42 | NIRSpec IFU Spectroscopy | SDSSJ1652-NIRSPEC | Galaxy | Active galactic nuclei, Emission line galaxies, Quasars |
| 1225:1:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-16T04:57:13Z | 00/02:30:34 | NIRSpec MultiObject Spectroscopy | NGC3603-EMPT+TA+SPITZER | | |
| | | COORDINATED PARALLEL | | | NIRCam Imaging | | | |
| 1227:2:2 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-16T07:55:38Z | 00/00:44:14 | NIRCam Imaging | NGC-346 | Stellar Cluster | OB associations, Young star clusters |
| 1227:2:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-16T08:43:31Z | 00/00:41:29 | NIRCam Imaging | NGC-346 | Stellar Cluster | OB associations, Young star clusters |
| 1227:2:3 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-16T09:29:03Z | 00/00:41:29 | NIRCam Imaging | NGC-346 | Stellar Cluster | OB associations, Young star clusters |
| 1227:25:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-16T10:14:11Z | 00/01:04:44 | NIRCam Imaging | NGC-346 | Stellar Cluster | OB associations, Young star clusters |
| | | COORDINATED PARALLEL | | | MIRI Imaging | | | |
| 1232:1:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-16T11:38:42Z | 00/01:49:43 | MIRI Imaging | SN-1987A | Star | Supernovae |
| | | COORDINATED PARALLEL | | | NIRCam Imaging | | | |
| 1232:2:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-16T13:33:12Z | 00/03:13:43 | MIRI Medium Resolution Spectroscopy | SN-1987A | Star | Supernovae |
| 1232:3:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-16T16:53:38Z | 00/02:32:28 | NIRSpec IFU Spectroscopy | SN-1987A | Star | Supernovae |
| 2741:9:1 | NONE | PRIME UNTARGETED | 2022-07-16T19:26:59Z | 00/00:02:27 | MIRI External Flat | | | |
| 1264:9:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-16T19:48:12Z | 00/04:38:56 | MIRI Medium Resolution Spectroscopy | SPT0311-MRS | Galaxy | High-redshift galaxies, Infrared galaxies, Starburst galaxies |
| 1264:14:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-17T00:33:07Z | 00/01:20:18 | MIRI Medium Resolution Spectroscopy | SPT0311-MRS-BKG | Galaxy | High-redshift galaxies, Infrared galaxies, Starburst galaxies |
| 1264:15:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-17T01:57:36Z | 00/00:55:47 | MIRI Imaging | SPT0311-IMAGER | Galaxy | High-redshift galaxies, Infrared galaxies, Starburst galaxies |
| 2589:6:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-17T04:41:12Z | 00/05:17:05 | NIRSpec Bright Object Time Series | TRAPPIST-1 | Star | Exoplanet Systems, M dwarfs |
| 2742:49:1 | NONE | PRIME UNTARGETED | 2022-07-17T09:59:10Z | 00/00:05:57 | NIRSpec Dark | | | |
| 2586:137:1 | FINEGUIDE | PRIME WFSC ROUTINE | 2022-07-17T10:31:45Z | 00/01:32:08 | WFSC NIRCam Fine Phasing | 2MASS-01392460+1407496 | Calibration | Focus test |
| 2107:39:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-17T12:14:02Z | 00/00:51:06 | MIRI Imaging | NGC-628 | Galaxy | Barred spiral galaxies |
| 2107:39:2 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-17T13:08:12Z | 00/00:48:21 | MIRI Imaging | NGC-628 | Galaxy | Barred spiral galaxies |
| 2107:39:3 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-17T13:59:37Z | 00/00:48:21 | MIRI Imaging | NGC-628 | Galaxy | Barred spiral galaxies |
| 2107:40:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-17T15:01:11Z | 00/01:00:50 | NIRCam Imaging | NGC-628 | Galaxy | Barred spiral galaxies |
| | | COORDINATED PARALLEL | | | MIRI Imaging | | | |
| 2107:40:2 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-17T16:05:38Z | 00/00:58:05 | NIRCam Imaging | NGC-628 | Galaxy | Barred spiral galaxies |
| | | COORDINATED PARALLEL | | | MIRI Imaging | | | |
| 1516:3:1 | FINEGUIDE | PRIME TARGETED FIXED | 2022-07-17T17:44:50Z | 00/00:55:17 | NIRISS Aperture Masking Interferometry | HD-40646 | Star | A stars |

*JWST Detailed Schedule showing targets and observation times.*

Here you can see the detailed observing schedule for the telescope. For example, right now as I am writing this article on July 15th, "our" telescope is observing a high-redshift galaxy called SGAS1723-IFU as part of a program called "Targeting Extremely Magnified Panchromatic Lensed Arcs and Their Extended Star Formation." Again, I don't really understand that, but I really do feel like part of the JWST team when I can read about what our telescope is observing and why. I'm going to try to coordinate a time to make observations with my own telescope simultaneously with the JWST's observation of an object just because I think that would be pretty cool.

I'm glad our new telescope is hard at work and our brilliant astronomical community is making such good use of it. I look forward to hearing and seeing the amazing results in the months and years to come!

# The Queen Speaks

## Robin Byrne

# *Happy Birthday Otto Struve*

This month we celebrate the life of a man who came from a long line of astronomers, and still managed to make his own important contributions to the field. Otto Struve was born August 12, 1897 in Kharkiv, Ukraine (which was part of Russia at the time). Among the astronomers in his family were: his father Ludwig, grandfather Otto Willhelm, great-grandfather Friedrich Georg and uncle Karl Hermann. With such a legacy, it's not surprising that Otto began his astronomical career at an early age. As young as eight years old, Otto would go to the Kharkov University Observatory to make observations with his father, who was the director of the observatory. By the age of ten, he was trusted to make his own observations.

Otto was home-schooled up to the age of twelve, when he began attending a public school, where his mathematical talents stood out. Otto graduated in 1914, at the age of 17. For the next year, he pursued his own astronomical observations,

including an observation of a total solar eclipse on August 21st of that year, which would be the basis of his Masters thesis five years later. In 1915, Otto began his college career at Kharkov University, majoring in mathematics and astronomy.

With World War I raging through Europe, Otto decided, after one semester of college, to join the war effort. He went to St. Petersburg to attend artillery school. After a year of training, he was sent to the Turkish front. A year later, the war was drawing to a close, and Otto returned home.

Struve completed the remainder of his college course work in only one year, and pledged to remain at the university to continue his astronomical studies.

However, in 1919, with the Russian Revolution in full swing, Struve once again felt the call to serve. His family supported the Tsar, so Struve fought against the Bolsheviks. During his time in the army, Struve caught diphtheria, scarlet fever, typhoid fever, rheumatic fever, and was wounded in action. As it became

obvious that the Bolsheviks would win, Struve joined thousands of others who fled the country to safety. His family remained in Russia, though through various tragedies, only his mother and one of his sisters survived. Struve eventually made his way to Turkey, where he began looking for work.

Struve's life in Turkey was very difficult. He took whatever jobs were available, including working as a lumberjack, living in a tent with five other men and eating at soup kitchens. Struve wrote to his uncle for help, not knowing his uncle had died. But his aunt contacted some of her late husband's colleagues to try to help Otto find work as an astronomer. Ultimately, Edwin B. Frost, the director of Yerkes Observatory, was contacted with a request for help. Without knowing much about Otto at all, but being well aware of the Struve family's reputation, Frost hired Otto sight unseen. After many months of red tape, a long voyage at sea, and a number of days on a train, Otto Struve arrived for his new job in Chicago on October 10, 1921. Not wanting to arrive in his old Russian uniform (the only clothes he had), Struve stopped at a flea market in New York to get

something to wear. He made his first appearance at Yerkes wearing a green jacket, purple pants and orange shoes.

By the end of the year, Struve was officially working as a stellar spectroscopy assistant at Yerkes, while also taking classes at the University of Chicago. The observatory was in a slump, and Struve was the only regular student, so his “class work” involved doing readings on his own, getting practice with the equipment, and informal discussions with the professors. Five months later, Struve made his first astronomical discovery: he found that Gamma Ursa Majoris was a variable star with a regular pulsation rate. Within the year, he had also discovered two asteroids.

In December 1923, Struve defended his doctoral thesis, which was on short period binary stars. Struve immediately was hired by the University of Chicago as an instructor beginning the following month, eventually rising through the ranks as assistant professor, and ultimately becoming full professor in 1932.

In 1924, Struve's sister died, leaving his mother alone in Russia. With his help, Struve's mother immigrated to America in 1925. She moved in with Otto, even helping him with reducing the data from his observations. That same year, Otto married Mary Martha Lanning, who was a secretary at Yerkes. All three lived together up until Otto's death, while Otto and Mary never had any children. Two years after his marriage, Otto Struve officially became an American citizen.

Struve continued relentlessly pursuing his astronomical work. In 1925, he observed the spectra of a variety of stars, noticing an absorption line due to calcium. The stars were too hot to have calcium, which led Struve to propose the calcium was in material between the stars. This was the first observational evidence for the interstellar medium. Meanwhile, Struve spent much of his time studying binary star systems, especially ones that had unusual qualities, such as evidence for mass transfer or strange eclipse patterns.

In 1932, Struve became director of the Yerkes Observatory. At the same time, the University of Texas had received an endowment to build an observatory, but didn't have any astronomers on staff. A partnership was established with Yerkes, leading to Struve overseeing the construction of the McDonald Observatory. Even before the observatory was completed, Yerkes astronomers were using the location to do observations with their own equipment, which led to discovering more characteristics of the interstellar medium.

Struve proved himself to be a very accomplished, though demanding administrator. As director of Yerkes, he was also in charge of the Astronomy Department at the University of Chicago. What had been a program in decline quickly began to grow under Struve's leadership. He closely observed his staff to document who was making a contribution to the department and who was dead weight. Almost ruthlessly, Struve got rid of people, and replaced them with some of the brightest minds of the era, including: Subrahmanyan Chandrasekhar, Gerard Kuiper, Jan Oort and Bengt Strömgren. Struve's recruiting

methods met with some resistance, since most of the people he hired were not American citizens. This especially rankled during the Depression, with cries of foreigners taking jobs from Americans. Struve fought for and justified the hiring of each of these individuals.

In the 1930s, Struve's research focused on how various characteristics of stars affect the spectral lines that are observed. He studied the relationship between a star's rotation rate, the star's temperature, the relative abundance of elements in a star, the electric fields generated by a star, and turbulence in the star's atmosphere, with how they all can cause spectral lines to get wider. At the same time, he continued to study the evidence for the interstellar medium (ISM). In 1938, Struve detected the signature for hydrogen in the ISM. This major discovery would tie in with his later work in radio astronomy.

The assembly of such a strong group of astronomers on the faculty at the University of Chicago had some repercussions. As their reputations grew, the astronomers were less likely to

follow all of the directives given by Struve. Becoming more and more dissatisfied, in 1947 Struve resigned from Yerkes and moved to California to become director of the Leuschner Observatory and chairman of the astronomy department at Berkeley.

During the 1950s, Struve devoted his observations to a special class of stars in the Beta Canis Majoris class. These are stars with a spectral type in the range of B0 to B3 that are giants, sub giants, or bright giants. Because these stages are so short-lived, there are only a few dozen such stars known. Struve was particularly interested in observing how their brightness and spectrum change in a very short amount of time (within hours) and their very complicated light curves. It is thought that these stars go through a variety of pulsations which depend on a combination of their mass and rotation rate.

*Otto Struve. Image from The University of Chicago, The Department of Astronomy and Astrophysics.*

Also during the 1950s, Struve became a strong advocate for radio astronomy. In 1952, he became the first director of the National Radio Astronomy Observatory (NRAO) at the University of Virginia. He held this position for the next ten years. In 1959, he also took the role of first director for the NRAO in Green Bank, West Virginia. In this position, Struve had an opportunity to pursue one of his more controversial interests - the search for intelligent life in the Universe. He used his position to support Frank Drake's use of NRAO telescopes as part of Drake's Project Ozma program to look for radio signals from intelligent civilizations. Struve's reasoning for believing in life elsewhere stemmed from his study of the rotation rate of stars. Many stars, including our Sun, rotate slower than expected from the physics of how stars form. It is thought that the reason has to do with having a planetary system, which effectively causes a drag that slows the star's rotation rate. Struve found many slow-rotating stars, which led to his belief that there were planetary systems around most stars, so why not intelligent life, too? While we still don't have any proof of life elsewhere, his conclusion that most

stars have planets has definitely seen more and more confirmation over the years.

Throughout his career, Struve was a prolific publisher of articles, both in professional journals and in popular magazines, such as Sky and Telescope, for which he wrote over 150 articles alone. He felt it was important to share the discoveries made in the astronomical community with the public.

Starting in 1958, Struve's health began to decline. It began with a bad fall, which had resulted in several broken bones and the need for a body cast. A recurrence of hepatitis (which he had suffered from back in Russia and Turkey), led to cirrhosis of the liver. The damage to his liver ultimately resulted in Struve being hospitalized in 1963, where he died on April 6th of that year. Although he is gone, Struve's name lives on in the form of asteroids named in his and his family's honor, a crater on the Moon, and the 82-inch telescope at McDonald Observatory.

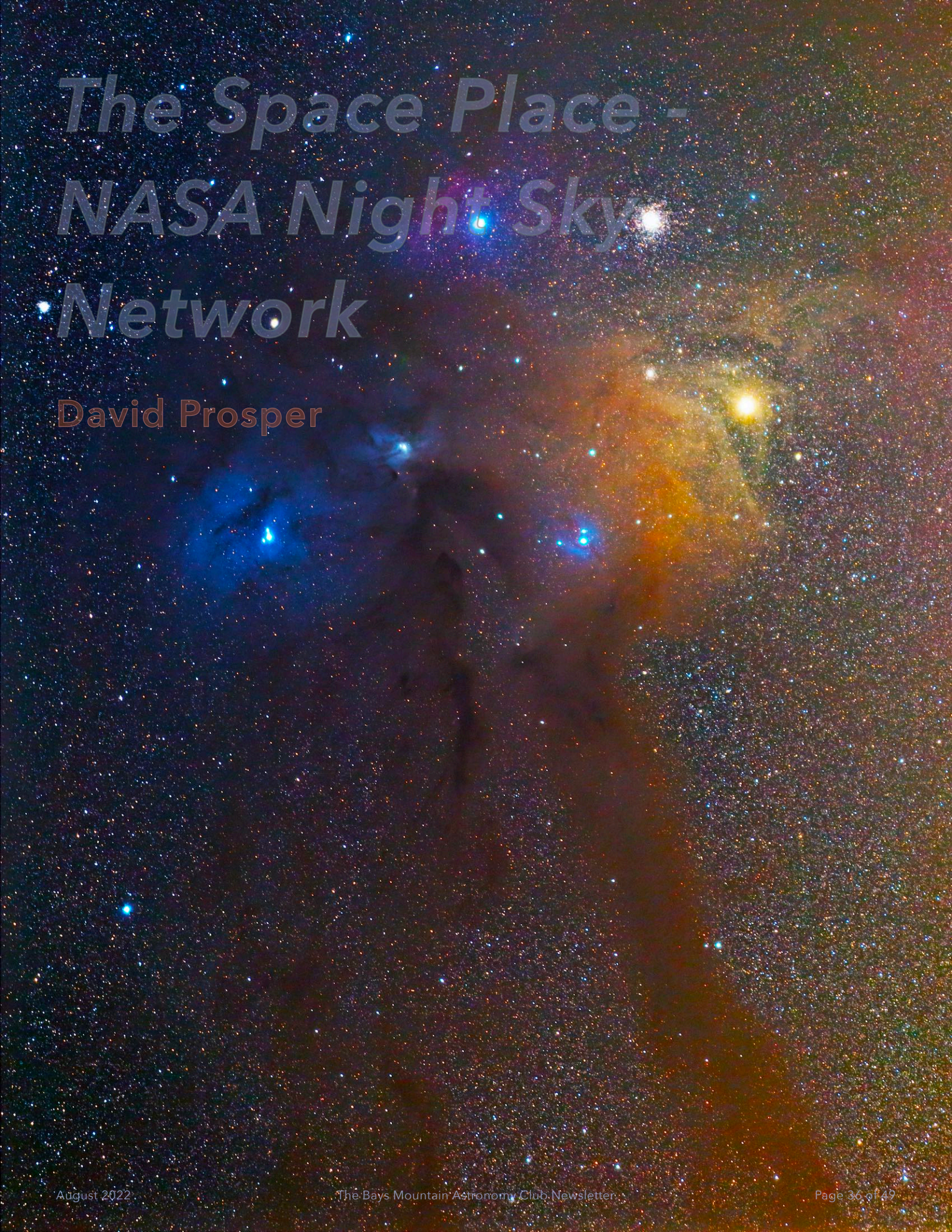
Otto Struve truly lived up to the reputation passed down from his family. His contributions to astronomy are widespread and significant. It also feels appropriate to honor this native of Ukraine at a time when his birthplace is experiencing so much devastation. Whether you're observing some binary stars, admiring gas clouds in the interstellar medium, or even performing some radio astronomy observations, take a moment to thank this month's honoree - Otto Struve.

## *References:*


Otto Struve - Wikipedia

"Otto Struve" by Kevin Krisciunas; National Academy of Sciences. 1992. Biographical Memoirs: Volume 61. Washington, DC: The National Academies Press. doi: 10.17226/2037.

Otto Struve American Astronomer - Encyclopedia Britannica



# The Space Place - NASA Night Sky Network

David Prosper

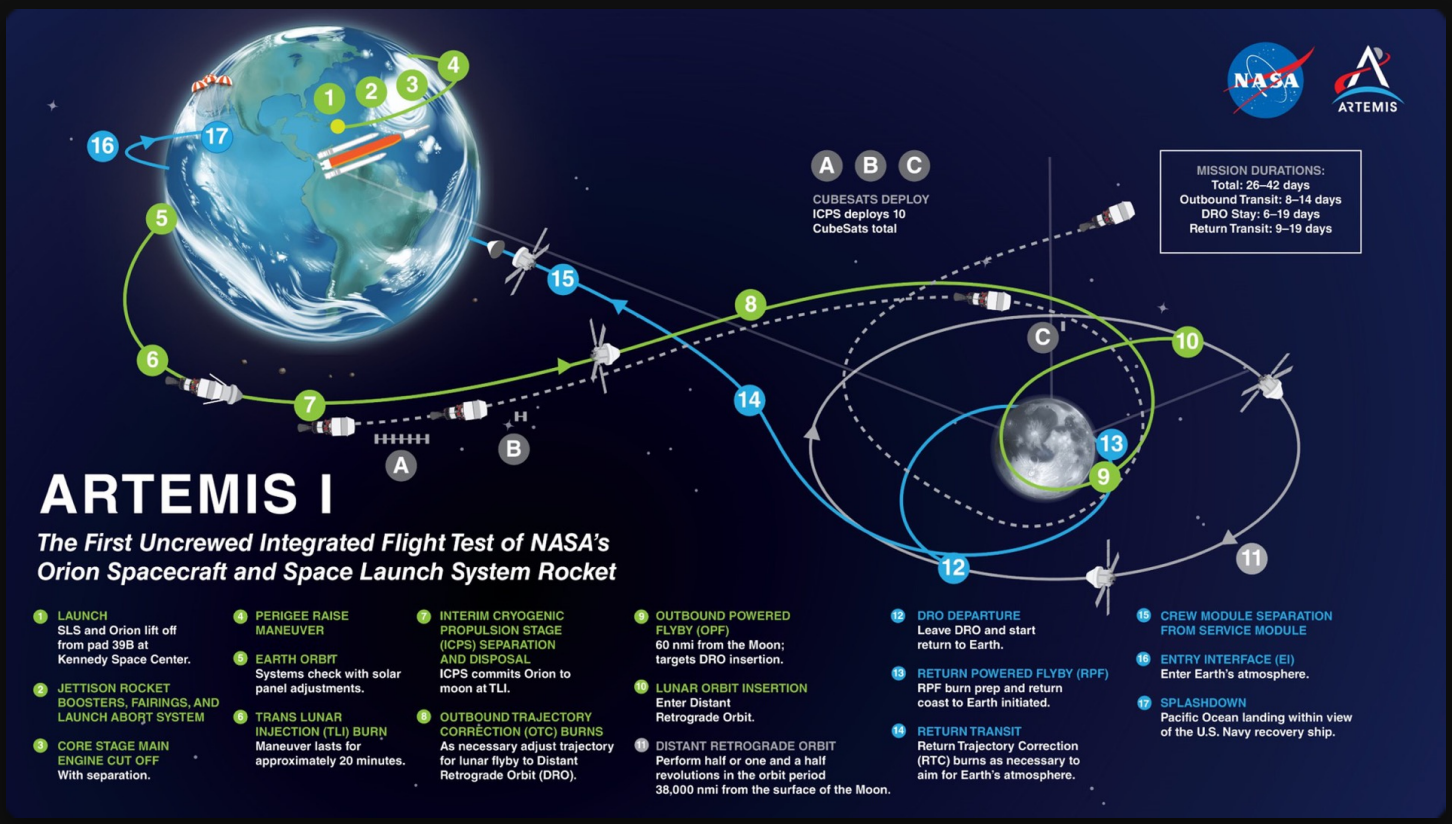
# *Artemis 1: A Trip Around the Moon – and Back!*

We are returning to the Moon - and beyond! Later this summer, NASA's Artemis 1 mission will launch the first uncrewed flight test of both the Space Launch System (SLS) and Orion spacecraft on a multi-week mission. Orion will journey thousands of miles beyond the Moon, briefly entering a retrograde lunar orbit before heading back to a splashdown on Earth.

The massive rocket will launch from Launch Complex 39B at the Kennedy Space Center in Florida. The location's technical capabilities, along with its storied history, mark it as a perfect spot to launch our return to the Moon. The complex's first mission was Apollo 10 in 1968, which appropriately also served as a test for a heavy-lift launch vehicle (the Saturn V rocket) and lunar spacecraft: the Apollo Command and Service Modules joined with the Lunar Module. The Apollo 10 mission profile included testing the Lunar Module while in orbit around the

Moon before returning to the Earth. In its “Block-1” configuration, Artemis-1’s SLS rocket will take off with 8.8 million pounds of maximum thrust, even greater than the 7.6 millions pounds of thrust generated by the legendary Saturn V, making it the most powerful rocket in the world!

***Image 1: Artemis 1 Mission Map***




*Follow along as Artemis 1 journeys to the Moon and back! A larger version of this infographic is available from **NASA**.*

Artemis-1 will serve not only as a test of the SLS and the Orion hardware, but also as a test of the integration of ground systems and support personnel that will ensure the success of this and future Artemis missions. While uncrewed, Artemis-1 will still have passengers of a sort: two human torso models designed to test radiation levels during the mission and "Commander Moonikin Campos," a mannequin named by the public. The specialized mannequin will also monitor radiation levels, along with vibration and acceleration data from inside its mission uniform: the Orion Crew Survival Suit, the spacesuit that future Artemis astronauts will wear. The "Moonikin" is named after Arturo Campos, a NASA electrical engineer who played an essential role in bringing Apollo 13's crew back to Earth after a near-fatal disaster in space.

The mission also contains other valuable cargo for its journey around the Moon and back, including CubeSats, several space science badges from the Girl Scouts and microchips etched with 30,000 names of workers who made the Artemis-1 mission possible. A total of 10 CubeSats will be deployed from the

Orion Stage Adapter, the ring that connects the Orion spacecraft to the SLS, at several segments along the mission's path to the Moon. The power of SLS allows engineers to attach many secondary "ride-along" mission hardware like these CubeSats, whose various missions will study plasma propulsion, radiation effects on microorganisms, solar sails, Earth's radiation environment, space weather and of course, missions to study the Moon and even the Orion spacecraft and its Interim Cryogenic Propulsion Stage (ICPS)!

## *Image 2: Moon Over Artemis 1*


*Full Moon over Artemis-1 on July 14, 2022, as the integrated Space Launch System and Orion spacecraft await testing.* ***Photo credit: NASA/Cory Huston.***

If you want to explore more of the science and stories behind both our Moon and our history of lunar exploration, the Night Sky Network's Apollo 11 at 50 Toolkit covers a ton of regolith: bit.ly/nsnmoon! NASA also works with people and organizations around the world coordinating International Observe the Moon Night, with **2022's edition** scheduled for Saturday, October 1. Of course, you can follow the **latest news and updates** on Artemis-1 and our return to the Moon.

## *This article is distributed by NASA Night Sky Network*

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit **nightsky** to find local clubs, events, and more!

# BMAC Calendar & More

# *Calendar:*

## MAC Meetings:

- Friday, August 5, 2022 - 7p - TBD.
- Friday, September 2, 2022 - 7p - TBD
- Friday, October 7, 2022 - 7p - Discovery Theater - Topic TBA.
- Friday, December 2, 2022 - 7p - Discovery Theater - Topic TBA.

## SunWatch:

- **Cancelled until further notice. Soon to return.**
- Every clear Saturday & Sunday - 3p-3:30p - March-October - On the Dam
  - View the Sun safely with a white-light & Hα view if clear.; Free.
  - You must have completed the Park Volunteer Program in order to help with the public program. If you have, and have been trained, please show up at least 30 minutes prior to the official start time.

## StarWatch:

- October 1 & 8, 2022 - 7:30p
- October 15, 22, 29 & November 5, 2022 - 7p
- November 12, 19 & 26, 2022 - 6p
  - View the night sky with large telescopes at the observatories. If poor weather, an alternate live tour of the night sky will be held in the planetarium theater.; Free.
  - You must have completed the Park Volunteer Program in order to help with the public program. If you have, and have been trained, please show up at least 30 minutes prior to the official start time.

## pecial Events:

- **StarFest 2022 - November 4, 5 & 6, 2022**
  - Our 37th annual astronomy convention / star gathering for the Southeast United States. Three days of astronomy fun, 5 meals, 4 keynote speakers, unique T-shirt, and more!
  - **Pre-registration by Oct. 14, 2022 with full payment is mandatory for attendance. Sorry, no walk-ins nor "visits."**
  - MeadowView Marriott special hotel rate.
  - StarFest Link

# *Regular Contributors:*

*William Troxel*

*Robin Byrne*

*Greg Penner*

*Adam Thanz*

William is the current chair of the club. He enjoys everything to do with astronomy, including sharing this exciting and interesting hobby with anyone that will listen! He has been a member since 2010.

Robin Byrne has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

Greg Penner is a semi-retired architect living in the Tri-Cities area since 2018. He has enjoyed astronomy since childhood when he received a “department store telescope” and viewed Saturn for the first time. He has been a member since 2018.

Adam Thanz has been the BMAC Newsletter Editor for all but a small number of issues since 1992. He is the Planetarium Director at Bays Mountain Park and an astronomy adjunct instructor at NSCC since 2000.

# Connection:

## Bays Mountain Astronomy Club:

- 853 Bays Mountain Park Road; Kingsport, TN 37650
- (423) 229-9447 - Park Site - Club Site
- Newsletter edited by Adam Thanz

## Dues:

- Dues are highly supplemented by the Bays Mountain Park Association and volunteerism by the club. As such, our dues are kept at an extremely low cost.
- $16 / person / year
- $6 / each additional family member
- Note: if you are a Park Association member (which incurs a separate, additional fee), then a 50% reduction in BMAC dues are applied.
- Dues can be paid in many ways. The easiest way is to pay via the CivicRec online portal. If you are a current member, please log in with your e-mail address and reset your password if you have not already done so. You can then update your membership. Here's the direct link. If you want to add family members, then add them via the internal link. You can also pay by mail, over the phone or in person at the gift shop.

# *Chapter Background Image Credits:*

- **Cover image of Southern Milky Way by Adam Thanz.**
  - *Sony A7ii with Zeiss Batis 2.8/18 lens, f/2.8, 8 sec., ISO 6,400, August 9, 2020.*
- **Table of Contents image of Comet NEOWISE (C/2020 F3) by Adam Thanz**
  - *Sony A7ii with Sony FE 2.8/90 Macro G OSS lens, f/2.8, 8 sec., ISO 4,000, July 15, 2020.*
- **Cosmic Reflections image of the Summer Triangle area of the Milky Way by William Troxel.**
  - *Image captured July 23, 2016.*
- **BMAC Notes painting of the Moon with moon glow by Christa Cartwright.**
  - *Painting based on a photograph of the Moon Christa captured July 2020.*
- **Stellar Observations image of Crescent Nebula by David Reagan.**
  - *This image was taken with a 140mm refractor in his suburban backyard using an AstroPhysics 900 mount, 8.7 hours of 5 minute Ha and OIII subexposures, combined in AstroPixelProcessor as an HOO image and processed in Lightroom and Photoshop. Image captured in 2022.*
- **The Queen Speaks image of a solar halo by Robin Byrne.**
  - *iPhone 7, June 8, 2020.*
- **The Space Place - NASA Night Sky Network image of the Rho Ophiuchi cloud complex by Brandon Stroupe.**
  - *Canon 6D with Canon 2.8/70-200mm lens, f/2.8 @200mm, 20 x 120 sec. exposures, ISO 1,000, stacked in Deepsky Stacker, processed in Adobe Photoshop CC, Skywatcher Star Adventure mount, September 19, 2015.*
- **BMAC Calendar & More image of the Moon by Greg Penner.**
  - *iPhone shooting through a 9mm eyepiece and 12.5" Truss Tube Dobsonian @212x.*
- **All background images used with permission by their authors.**