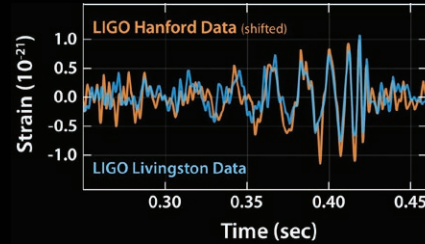


# PRIMEFOCUS

Tri-Valley Stargazers



March 2021



## Meeting Info: The Detection and Confirmation of Gravitational Waves

**Who:**  
Ted Blank

**When:**  
March 19, 2021  
Meeting at 7:30 p.m.  
Lecture at 8:00 p.m.

**Where:**  
Virtual Meeting using: Zoom\*  
See the April or May 2020 issue  
of PrimeFocus for info on getting  
connected using Zoom.

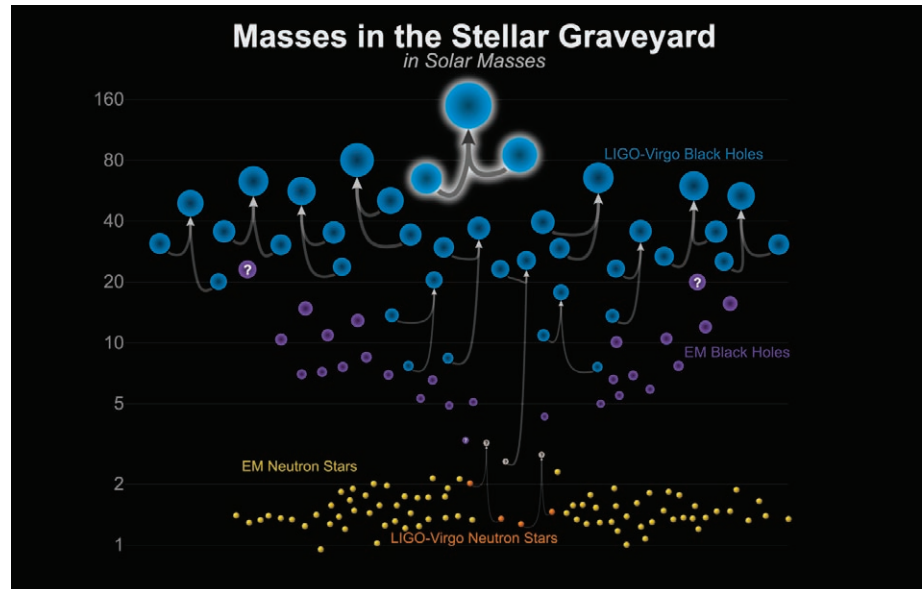
### Inside

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## March Virtual Meeting Using "Zoom"\*

### The Detection and Confirmation of Gravitational Waves Ted Blank, NASA /JPL Solar System Ambassador

Predicted in 1915 by Albert Einstein, gravitational waves are tiny oscillations in the actual fabric of space and time. It took a collaboration of scientists and universities more than fifty years to develop the technology to reliably isolate these faintest of signals from the cosmic background. Known as the LIGO project, in 2015 both existing LIGO observatories nearly simultaneously detected the gravitational waves emitted from the merging of two black holes more than a billion years ago. Join us to learn the inside scoop on just how this amazing feat was accomplished and how it led to its three main collaborators being awarded the 2017 Nobel Prize in Physics.



Caption: This graphic shows the masses of black holes detected through electromagnetic observations (purple), black holes measured by gravitational-wave observations (blue), neutron stars measured with electromagnetic observations (yellow), and neutron stars detected through gravitational waves (orange). Image credit: LIGO-Virgo/ Northwestern U. / Frank Elavsky & Aaron Geller. See: <https://www.ligo.caltech.edu/image/ligo20200902a>

Ted Blank is a past president of the New Hampshire Astronomical Society and a NASA/JPL Solar System Ambassador. He currently resides in Fountain Hills, Arizona where he enjoys organizing public skywatches and sidewalk astronomy (all of which are, sadly, on hold due to COVID). He is also an avid observer of asteroid occultations for the International Occultation Timing Association (IOTA).

## News & Notes

### 2021 TVS Meeting Dates

Below are the TVS meeting dates. The lecture meetings are on the third Friday of the month, with the Board meetings on the Monday following the lecture meeting.

| Lecture Meeting | Board Meeting | Prime Focus Deadline |
|-----------------|---------------|----------------------|
| Mar. 19         | Mar. 22       |                      |
| Apr. 16         | Apr. 19       | Apr. 02              |
| May 21          | May 24        | May 07               |
| Jun. 18         | Jun. 21       | Jun. 04              |
| Jul. 16         | Jul. 19       | Jul. 02              |
| Aug. 20         | Aug. 23       | Aug. 06              |
| Sep. 17         | Sep. 20       | Sep. 03              |
| Oct. 15         | Oct. 18       | Oct. 01              |
| Nov. 19         | Nov. 22       | Nov. 05              |
| Dec. 17         | Dec. 20       | Dec. 03              |

### Money Matters

As of the last Treasurer's Report on 2/22/21, our club's account balance is \$66,471.70. This includes contributions of \$44,579.27 to the H2O Rebuild fund.

### TVS Welcomes New Members

TVS welcomes new members James Huebner, Chris Irwin, Vic Pantaleon, Prabhu Pichai, Erick Ramon, and Niachi Ueno. Please say hello and chat with them during our Zoom meetings.

### Time to Renew Club Membership for 2021

Now is a great time to become part of TVS. Membership is open to anyone with an interest in astronomy. Amateurs and professionals are equally welcome; skilled amateurs comprise the majority of the membership. You do not have to own a telescope in order to be a member.

Those renewing their club membership are encouraged to do so by using the online application before the end of December. Normally our memberships are only good for the calendar year, but anyone joining after October 1st will be given a membership for the remainder of 2020 and all of 2021. The regular club membership remains a bargain at \$30. Student membership (full-time High School or College student) is only \$10! To become a key holder to H2O, you must be 18 or older. There is a one-time \$20 Key deposit and a \$10 annual access fee.

You can join TVS or renew your membership online at:

<http://www.trivalleystargazers.org/membership.shtml> After filling out the application form you are connected to the PayPal payment form. You do not need to have a PayPal account to pay online, since PayPal will accept credit cards. Everyone is encouraged to use the online application. Alternatively, you can mail in the Membership Application on

the last page of this newsletter along with a check to the Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551-2476. Note that TVS will not share your information with anyone. We only use the e-mail address to notify you when the newsletter becomes available.

All members agree to hold the Tri-Valley Stargazers, and any cooperating organizations or landowners, harmless from all claims of liability for any injury or loss sustained at a TVS function.

### H2O and Del Valle Observing Sites Reopened

The club is happy to announce that the Del Valle and Hidden Hill Observatory sites have reopened for observing by those who have paid their 2021 TVS Membership dues and are approved keyholders.

Due to the ongoing COVID-19 emergency, the following restrictions must be followed:

- \*The sites are open for individual use only by club members and immediate family; no guests or group events allowed
- \*You use each observing site at your own risk and agree to hold the club and the landowners free of all liability
- \*Do not use either observing site if you are not feeling well or suspect you were recently exposed to the virus
- \*Announce your intention to use either site on our groups.io group
- \*While at either site maintain social distancing of at least 15 feet (about a car's length)
- \*Bring hand sanitizer and use it before and after touching any locks or facilities
- \*Club members should not touch or look through each other's equipment. Focuser knobs and eyepieces can potentially spread the virus.
- \*H2O keyholders who wish to use the Quick Dome should first contact Ross Gaunt (secretary"at"trivalleystargazers.org) to reserve it for individual use for the day
- \*Note that these restrictions do not replace or negate any Alameda or Santa Clara County health orders in place at this time.

Ross Gaunt, our club secretary, emailed the updated lock combinations and usage instructions for each site to all H2O keyholders and all Del Valle registered users. If you are a H2O keyholder or Del Valle registered user and didn't get Ross's email, please let Ron (president"at"trivalleystargazers.org) or Ross know and we'll straighten it out.

H2O orientations will be scheduled as soon as reasonably possible for those who have paid the annual access fee but have not received their key.

## News and Notes (continued)

### Outreach Star Party Schedule

Cancelled through March.

Contact Eric Dueltgen if you are interested in participating in future events (outreach"at"trivalleystargazers.org).

## Calendar of Events

### March 17, 8:00pm

**What:** Celebrating Stephen Hawking: How Black Holes are Not Quite Black

**Who:** Prof. Andrew Fraknoi, Retired, Foothill College

**Sponsor:** San Francisco Amateur Astronomers

**Online:** [https://www.youtube.com/channel/UChuBJGp\\_iJYZ11q\\_ayA-q3A](https://www.youtube.com/channel/UChuBJGp_iJYZ11q_ayA-q3A)

Scientists and science enthusiasts are still mourning the passing of Stephen Hawking, one of the great minds and spirits of our time. In this introductory talk, Fraknoi will briefly summarize Hawking's life, and talk about the importance of his scientific work. He'll focus particularly on Hawking's work merging the world of the big and heavy (described by Einstein's General Theory of Relativity) with the world of the small and light (described by quantum mechanics). Then he'll describe how this merger led to the idea of mini black holes, "Hawking Radiation," and the bizarre notion that black holes don't have to be fully black. No background in science or math will be required, but be prepared to have your mind boggled

For more information, see: <https://www.seti.org/event/celebrating-stephen-hawking-how-black-holes-are-not-quite-black>

### March 20, 27, April 3, 10, 9:00pm-10:30pm

**What:** Virtual Telescope Viewing

**Who:** Chabot Staff

**Sponsor:** Chabot Space and Science Center

**Online:** [https://www.youtube.com/channel/UCarFXs-04xmdHW\\_PVc7LWRg](https://www.youtube.com/channel/UCarFXs-04xmdHW_PVc7LWRg)

Each week, our astronomers will guide us through spectacular night sky viewing through Nellie, Chabot's most powerful telescope. Weather permitting we will be able to view objects live through the telescopes and our astronomers will be available for an open forum for all of your most pressing astronomy questions.

Nellie is a 36-inch reflector telescope, housed in a rolling roof observatory that allows access to 180 degrees of sky. This modern, research-quality telescope offers breathtaking views of the cosmos.

For more information, see: <https://chabot.space.org/events/events-listing/>

### March 24, 7:00pm

**What:** The search for Life on Mars with Perseverance

**Who:** Drs. E. Amador-French (JPL) and P. Sobron (SETI Institute)

**Sponsor:** SETI Institute

**Online:** REGISTRATION REQUIRED: <https://www.eventbrite.com/e/seti-talks-the-search-for-life-on-mars-with-perseverance-tickets-143224663825>

NASA, together with its partners, has landed a new robotic rover on Mars. Perseverance's safe landing is just the beginning of an ambitious effort to find past or even existing life on the Red Planet.

continued on p.4

#### Officers

##### **President:**

Ron Kane  
[president@trivalleystargazers.org](mailto:president@trivalleystargazers.org)

##### **Vice-President:**

Eric Dueltgen  
[vice\\_president@trivalleystargazers.org](mailto:vice_president@trivalleystargazers.org)

##### **Treasurer:**

John Forrest  
[treasurer@trivalleystargazers.org](mailto:treasurer@trivalleystargazers.org)

##### **Secretary:**

Ross Gaunt  
[secretary@trivalleystargazers.org](mailto:secretary@trivalleystargazers.org)

##### **Past President:**

Roland Albers  
[past\\_president@trivalleystargazers.org](mailto:past_president@trivalleystargazers.org)

#### Volunteer Positions

##### **Astronomical League Rep.:**

Dennis Beckley  
[alrep@trivalleystargazers.org](mailto:alrep@trivalleystargazers.org)

##### **Club Star Party Coordinator:**

Eric Dueltgen  
[coordinator@trivalleystargazers.org](mailto:coordinator@trivalleystargazers.org)

##### **Del Valle Coordinator:**

David Wright  
[delvalle@trivalleystargazers.org](mailto:delvalle@trivalleystargazers.org)

##### **Historian:**

Hilary Jones  
[historian@trivalleystargazers.org](mailto:historian@trivalleystargazers.org)

##### **Librarian:**

Ron Kane  
[librarian@trivalleystargazers.org](mailto:librarian@trivalleystargazers.org)

##### **Loaner Scope Manager:**

Ron Kane  
[telescopes@trivalleystargazers.org](mailto:telescopes@trivalleystargazers.org)

##### **Newsletter Editor:**

Ken Sperber  
[newsletter@trivalleystargazers.org](mailto:newsletter@trivalleystargazers.org)

##### **Night Sky Network Rep.:**

Ross Gaunt  
[nnsn@trivalleystargazers.org](mailto:nnsn@trivalleystargazers.org)

##### **Observatory Director/Rebuild**

**Chairman:**  
Chuck Grant  
[observatory@trivalleystargazers.org](mailto:observatory@trivalleystargazers.org)

##### **Observing Program Coordinator:**

Ron Kane  
[awards@trivalleystargazers.org](mailto:awards@trivalleystargazers.org)

##### **Outreach Coordinator:**

Eric Dueltgen  
[outreach@trivalleystargazers.org](mailto:outreach@trivalleystargazers.org)

##### **Potluck Coordinator:**

OPEN  
[potluck@trivalleystargazers.org](mailto:potluck@trivalleystargazers.org)

##### **Program Coordinator:**

Dan Helmer  
[programs@trivalleystargazers.org](mailto:programs@trivalleystargazers.org)

##### **Publicity and Fundraising:**

Brian Blau  
[publicity@trivalleystargazers.org](mailto:publicity@trivalleystargazers.org)

##### **Refreshment Coordinator:**

Laurie Grefsheim

##### **Webmaster:**

Hilary Jones  
[webmaster@trivalleystargazers.org](mailto:webmaster@trivalleystargazers.org)

##### **Web & E-mail**

[www.trivalleystargazers.org](http://www.trivalleystargazers.org)  
[info@trivalleystargazers.org](mailto:info@trivalleystargazers.org)

##### **TVS E-Group**

To join the TVS e-group just send an e-mail message to the TVS e-mail address ([info@trivalleystargazers.org](mailto:info@trivalleystargazers.org)) asking to join the group. Make sure you specify the e-mail address you want to use to read and post to the group.



## TVS Member Astrophotos: Gert Gottschalk



Caption: Gert Gottschalk imaged Asteroids 1732 Heike and 2309 Mr. Spock on Feb. 6, 2021. Numerous other deepsky objects were also captured. This is a composite of 60 exposures of 30s each, taken with a 160mm, f/6.5 refractor using a ZWO ASI2600mc color camera. For more details, see the article on p.4, below.

### Calendar of Events (continued)

Perseverance carries scientific instruments such as cameras and lasers. Some instruments can analyze the chemical makeup of Martian rocks and identify potential signatures of fossilized microbial life that may have existed in the Jezero crater, an area once flooded with water and home to an ancient river delta.

Several rovers have landed on Mars since the 1990s. What do we expect for this new \$2.7 billion robotic explorer? How will Perseverance search for complex carbon-based molecules, remnants of past microbes? What can we expect from the experimental helicopter called Ingenuity? Will Perseverance find irrefutable proof of the existence of past or present life on Mars?

To answer these questions, we invited two scientists whose work is directly related with the rover or one of its instruments. Elena Amador-French is a science systems engineer at the Jet Propulsion Laboratory (JPL) and a Science Operation Coordinator for the Curiosity rover. Pablo Sobron is a planetary astronomer at SETI Institute and an expert on Raman spectroscopy, a technique used to detect organics on Mars.

For more information, see: <https://www.seti.org/event/seti-talks-search-life-mars-perseverance>

### TVS Member Astrophotos

Recently, TVS established an Astrophotography (AP) Discussion Group. This effort is coordinated by Ashish Joshi, with group meetings on the first Wednesday of each month at 7:30pm. The agenda typically consists of: Topic of the Month (usually a short presentation on an astroimaging project, post-processing, etc.), Show/Discuss Your Gear, Image of the Month, and Tips and Tricks. Those interested in joining the group can contact: [tvS-astroimaging+subscribe@groups.io](mailto:tvS-astroimaging+subscribe@groups.io)

As discussed in more detail below, during the March AP Group meeting, Gert Gottschalk discussed his recent asteroid imaging project and Brian Blau discussed his astrophotography equipment and presented some of his stunning images. The major take away from their work is that successful astrophotography can be done under the light polluted skies of Fremont and Oakland, respectively. So, if you have been reticent to get started in astrophotography due to local light pollution, their work suggests that it is time for you to get out your check book and join the fun!

Gert: Asteroids 1732 Heike and 2309 Mr. Spock (p. 4 image)

After the discovery of the first asteroid Ceres (now classified as dwarf planet) by Guiseppe Piazzi on January 1, 1901, quite a few similar objects were found and it became clear that a new object class was starting to be populated. Many new objects were found and at first the general agreement in the astronomy community was to assign female mythological names. But soon the objects outnumbered the female fig-

## TVS Member Astrophotos: Brian Blau



Caption: Brian Blau images using an Explore Scientific ED 127mm APO refractor with a ZWO ASI1600mm-Pro cooled camera (top). Image of IC1848, the Soul Nebula, that Brian took from his patio in Oakland (bottom). This is a narrowband image consisting of 65 H-alpha, 60 OIII, and 60 SII subexposures, each being of 240s duration at -20C. For more details, see the article that begins on p.5.

ures of Greek mythology and general female names were used. Today male names are being used as well. With thousands of names to chose from, it is quite possible that there is a friend's or relative's name on a asteroid. This is true for my brother in law's wife Heike, and as a little astronomical treat I set out to image the rock in space. After framing the exposure

in Stellarium, the added bonus was the nearby asteroid 2309 Mr. Spock in the same field of view (see image on p.4).

The asteroid 1732 Heike was discovered March 9, 1943 by Astronomer Karl Reinmuth at Heidelberg Observatory in Germany. It was named after Heike Neckel, the granddaughter

continued on p.6



# What's Up By Ken Sperber (adapted from S&T)

All times are Pacific Daylight Time

## March

- 18 Thu The crescent Moon, Aldebaran, Mars, and the Pleiades form a parallelogram (Dusk)
- 19 Fri The crescent Moon, Aldebaran, and Mars form a triangle (Dusk)
- 21 Sun **First-Quarter Moon (7:40am)**
- 22 Mon The Moon is in Gemini,  $\sim 5^\circ$  from Pollux (Dusk)
- 23 Tue The Moon is in Cancer,  $\sim 2^\circ$  from the Beehive Cluster, M44 (All Night)
- 24 Wed Algol shines at minimum brightness for 2 hours centered on 7:55pm
- 25 Thu The Moon is in Leo,  $\sim 4^\circ$  from Regulus (Evening)
- 28 Sun **Full Moon (11:48am)**

## April

- 4 Sun **Last-Quarter Moon (3:02am)**
- 5 Mon The crescent Moon, Saturn, and Jupiter line up above the southeastern horizon (Dawn)
- 6 Tue The Moon is  $\sim 5^\circ$  below Saturn, with Jupiter to their left, forming a triangle (Dawn)
- 7 Wed The Moon is  $\sim 5^\circ$  below Jupiter, with Saturn to their upper right (Dawn)
- 11 Sun **New Moon (7:31pm)**
- 15 Thu The crescent Moon is  $\sim 5^\circ$  to the right of Aldebaran (Dusk)
- 16 Fri The crescent Moon is situated between the horns of Taurus, the Bull, with Mars  $\sim 5^\circ$  above (Dusk)
- 17 Sat The Moon hovers  $\sim 5^\circ$  above Mars (Dusk)

of astronomer Alfred Bohrmann at the same institute. The Heidelberg group of astronomers discovered 9 asteroids in total and published more than 700 observations of the minor planets. (source wikipedia)

For the image on p.4, 60 exposures of 30sec were taken with a 160mm F6.5 refractor and the ASI2600MC CMOS color camera on Feb. 6, 2021. Calibration with darks and flats was done in PixInsight with the stacking, plate solving, and identification of the asteroids performed in Astop. I can highly recommend Astop for processing and analyzing images with asteroids.

To get started with asteroids, many planetarium programs like Stellarium or Sky Safari have options to display asteroids. Also a good resource is the website <http://astro.vanbuitenen.nl/asteroids> that shows opposition times of asteroids for the current year.

[Brian Blau: Equipment and IC1848 \(p. 5 images\)](#)

While I travel to dark sites to do astrophotography when time permits, most of my imaging is done from my back deck under the light polluted sky of Oakland.

Astrophotography in Oakland has unique challenges, light pollution is one but also is the ever-present bay fog. When conditions are good, which isn't often, I've been able to capture some great images. As seen in the top image on p.5, I use an Explore Scientific 127mm apochromatic telescope that has

a focal ratio of f/7.5 and focal length of 952mm. Monochrome images are taken using a ZWO ASI1600mm Pro cooled camera with an 8-position filter wheel. For luminance images I use a Baader UV/IR cut filter, RGB channels are collected using ZWO filters, and Astronomik 6nm narrowband filters are used to isolate emission from H-alpha, OIII, and SII. I've setup my rig for automation in as many places as possible and use a ZWO Electronic Automatic Focuser to help keep images sharp when switching filters, when the temperature changes, and after meridian flips. For guiding I use an Off-Axis Guider with a ZWO ASI290mm camera. This equipment sits on a Sky-Watcher EQ6R-Pro equatorial mount with a Polemaster polar alignment camera. For a reliable and secure network I control the system through a wired ethernet hub and powered USB connections. The image sequencing automation is run on an Intel NUC headless PC. Power is supplied via a homemade 12v/23amp distribution box that connects to a battery or utility power.

The image of IC1848, the Soul Nebula (p.5, bottom), was made with the rig described above. It means with a bit of persistence and some basic astrophotography equipment its actually possible to image deep sky objects under heavy light and fog polluted skies. Using the 6nm bandpass of the H-alpha, OIII, and SII filters cuts out the inherent light pollution, and a bit of weather planning helps avoid the effects of "Karl" ([https://en.wikipedia.org/wiki/San\\_Francisco\\_fog](https://en.wikipedia.org/wiki/San_Francisco_fog)).

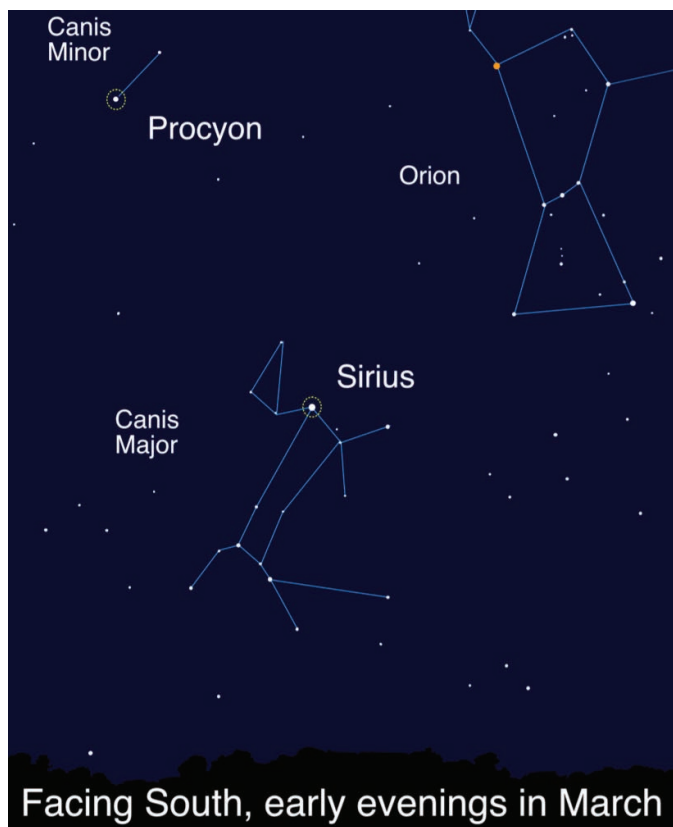


## Taking the Dog Stars for a Springtime Walk: Sirius and Procyon

By David Prosper

March skies feature many dazzling stars and constellations, glimmering high in the night, but two of the brightest stars are the focus of our attention this month: Sirius and Procyon, the dog stars!

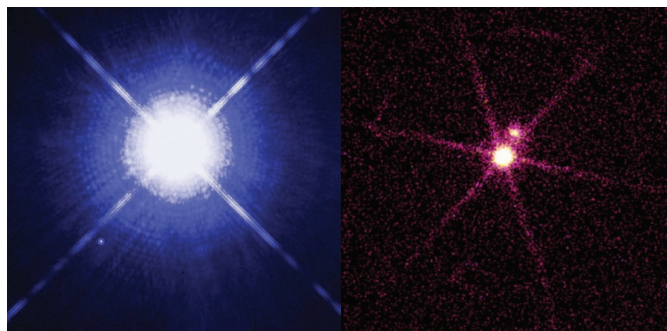
Sirius is the brightest star in the nighttime sky, in large part because it is one of the closest stars to our solar system at 8.6 light years away. Compared to our Sun, Sirius possesses twice the mass and is much younger. Sirius is estimated to be several hundred million years old, just a fraction of the Sun's 4.6 billion years. Near Sirius - around the width of a hand with fingers splayed out, held away at arm's length - you'll find Procyon, the 8th brightest star in the night sky. Procyon is another one of our Sun's closest neighbors, though a little farther away than Sirius, 11.5 light years away. While less massive than Sirius, it is much older and unusually luminous for a star of its type, leading astronomers to suspect that it may "soon" - at some point millions of years from now - swell into a giant star as it nears the end of its stellar life.



Caption: Sirius and Procyon, the loyal hunting dogs of nearby Orion the Hunter! What other stories can you imagine for these stars? Learn about "Legends in the Sky" and create your own with this activity: <https://bit.ly/legendsinthesky> Image created with assistance from Stellarium.

Sirius and Procyon are nicknamed the "Dog Stars," an apt name as they are the brightest stars in their respective constellations - Canis Major and Canis Minor - whose names translate to "Big Dog" and "Little Dog." Not everyone sees them as canine companions. As two of the brightest stars in the sky, they feature prominently in the sky stories of cultures around the world. Sirius also captures the imaginations of people today: when rising or setting near the horizon, its brilliance mixes with our atmosphere's turbulence, causing the star's light to shimmer with wildly flickering color. This vivid, eerie sight was an indication to ancient peoples of changes in the seasons, and even triggers UFO reports in the modern era!

Both of these bright stars have unseen companions: tiny, dense white dwarf stars, the remnants of supermassive companion stars. Interestingly, both of these dim companions were inferred from careful studies of their parent stars' movements in the 1800s, before they were ever directly observed! They are a challenging observation, even with a large telescope, since their parent stars are so very bright that their light overwhelms the much dimmer light of their tiny companions. The white dwarf stars, just like their parent stars, have differences: Sirius B is younger, brighter, and more energetic than Procyon B. Careful observations of these nearby systems over hundreds of years have helped advance the fields of: astrometry, the precise measurement of stars; stellar evolution; and astroseismology, the study of the internal structure of stars via their oscillations. Discover more about our stellar neighborhood at [nasa.gov](http://nasa.gov)!



Caption: Sirius A and B imaged by two different space telescopes, revealing dramatically different views! Hubble's image (left) shows Sirius A shining brightly in visible light, with diminutive Sirius B a tiny dot. However, in Chandra's image (right) tiny Sirius B is dramatically brighter in X-rays! The "Universe in a Different Light" activity highlights more surprising views of some familiar objects: <http://bit.ly/different-light-nsn> NASA, ESA, H. Bond (STScI), and M. Barstow (University of Leicester) (left); NASA/SAO/CXC (right)

This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.gov](http://nightsky.jpl.nasa.gov) to find local clubs, events, stargazing info and more.



Tri-Valley Stargazers  
P.O. Box 2476  
Livermore, CA 94551  
[www.trivalleystargazers.org](http://www.trivalleystargazers.org)

## Tri-Valley Stargazers Membership Application

### Contact information:

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Street Address: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

Email Address: \_\_\_\_\_

Status (select one): \_\_\_\_\_ New member \_\_\_\_\_ Renewing or returning member

**Membership category** (select one): Membership term is for one calendar year, January through December.

Note: NEW/Renewal memberships initiated after October 1, 2020 will be good through 2021!!!

\_\_\_\_\_ Student member (\$10). Must be a full-time high-school or college student.

\_\_\_\_\_ Regular member (\$30).

**Hidden Hill Observatory Access** (optional): Must be 18 or older.

\_\_\_\_\_ One-time key deposit (\$20). This is a refundable deposit for a key to H2O. New key holders must first hear an orientation lecture and sign a usage agreement form before using the observing site.

\_\_\_\_\_ Annual access fee (\$10). You must also be a key holder to access the site.

**Donation** (optional):

\_\_\_\_\_ Tax-deductible contribution to Tri-Valley Stargazers

**Total enclosed:** \$ \_\_\_\_\_

Member agrees to hold Tri-Valley Stargazers, and any cooperating organizations or landowners, harmless from all claims of liability for any injury or loss sustained at a TVS function. TVS will not share information with anyone except as detailed in our Privacy Policy (<http://www.trivalleystargazers.org/privacy.shtml>).

Mail this completed form along with a check to: Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551.