

PRIMEFOCUS

Tri-Valley Stargazers



January 2021



Meeting Info:
**Galactic Archeology:
Uncovering the Construc-
tion of the Milky Way**

Who:
Dr. Matthew Shetrone

When:
January 15, 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.](#)

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January Virtual Meeting Using "Zoom"

Galactic Archeology: Uncovering the Construction of the Milky Way

Prof. Matthew Shetrone, Deputy Director for UC Observatories

The goal of Galactic Archeology is to reveal how galaxies are built by looking at the current visible evidence and inferring the past. This requires knowledge of some of the most difficult aspects of Astronomy: determining ages, distances for individual stars. Using the APOGEE survey and augmenting with the GAIA survey we are able to determine chemical composition, space velocities, distances and ages for hundreds of thousands of giant stars across all components of the Milky Way. I will focus on the APOGEE results for the halo and the disk and show how these spectra may reveal the origin stories for the Milky Way stellar components.

Matthew Shetrone completed his undergraduate degree in astronomy at The University of Texas at Austin. He then attended The University of California at Santa Cruz where he completed his Ph.D. in astronomy and astrophysics. From his experience with optical telescopes at McDonald Observatory as an undergraduate and at the Keck and Lick Observatories as a graduate student, Matthew was hooked on optical astronomy. Ph.D. in hand, he went south of the equator to the European Southern Observatory in La Silla, Chile. His interests include exploring extrasolar planets, massive galaxies, the early universe, and other phenomena. Like explorers and archeologists he enjoys forging into the darkest and least known areas of our world with the most cutting-edge tools available.

Matthew says there he was most impacted by his teacher Gale Cope. Matthew says Ms. Cope pushed him "to see the broader world outside of science: theater, art, athletics, nature, and culture. She wanted all of her students to be well-rounded people and active community leaders." Her influence on Matthew shines today as he loves to experience foreign cultures by traveling, and running on new trails or neighborhoods.

By far, Matt says his most gratifying moment in his astronomical career occurred when was as a graduate student. He worked for a couple of years to simulate the production of a particular element in the nucleosynthesis that occurs within stars. The existence of this element in stars had been proposed but never observed. Finally, after a year of hard work, Matt was granted time on the Shane three-meter telescope at Lick Observatory. On the first night, he had good weather and observed a spectrum of a star. Eureka! The spectrum showed that, as he predicted, this element was present in the star. "I knew at that moment that even though I would have three more long years of work to finish my thesis that it was going to be a success."

Matthew has returned to the University of California system as the Deputy Director for UC Observatories. Regarding his job, he says, "Only a daily basis I get to work with some of the most talented astronomers in the world and the largest and most well equipped telescopes in the world. Who could have a better job than mine?"

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
Jan. 15	Jan. 18	
Feb. 19	Feb. 22	Feb. 05
Mar. 19	Mar. 22	Mar. 05
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 12/14/20, our club's account balance is \$58,648.63. This includes contributions to the H2O Rebuild fund.

TVS Welcomes New Members

TVS welcomes new members Caleb Fowler, Jennifer Hoehn, Dwight Lanpher, and Scott Neith. 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 Sites Closed

In light of the state's and county's latest COVID-19 shelter-in-place orders (see <https://covid19.ca.gov/stay-home-except-for-essential-needs/#regional-stay-home-order>) instructing everyone to stay at home as much as possible, the Tri-Valley Stargazers Board of Directors has voted to immediately close our club observing sites at Hidden Hill Observatory and Del Valle Regional Park. The lock combinations will be changed soon and the sites will remain closed during the duration of the shelter-in-place order.

Members will be contacted via email when the site(s) are reopened. Also, see the TVS webpage for updates.

Outreach Star Party Schedule

Cancelled through January.

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

Calendar of Events

January 19, 9:00pm

What: An Evening Cruise into the Virgo Cluster

Who: Dr. Simon Steel, SETI Institute

Sponsor: Chabot Space and Science Center and SETI Institute

Online: <https://www.seti.org/event/evening-cruise-virgo-cluster> and <https://www.facebook.com/events/242704903951247>

In 2020, we took a cruise to the center of the Milky Way. In 2021, we leave the comfort of our home galaxy and head to the Times Square of the Universe – the Virgo Cluster. Along the way, we will visit a whole zoo of different galaxies, the biggest star factory in the cosmos, and nature's answer to the Death Star.

Dr. Simon Steel continues to moonlight as a galactic cruise director, but during the day serves as Director of Education and Public Outreach at the SETI Institute in Mountain View, California. As an astronomer, he studied distant galaxies, but

Header Image: The Milky Way in Cygnus imaged at H2O.
Credit K. Sperber

Calendar of Events (continued)

spends more time these days thinking about aliens and the search for life in the Universe.

January 20, 7:00pm

What: Birth of the New Giant Telescopes
Who: Dr. C. Dumas (TMT) and Dr. R. Bernstein (Carnegie Observatories, GMT)
Sponsor: SETI Institute
Online: REGISTRATION REQUIRED; <https://www.seti.org/event/seti-talks-birth-new-giant-telescopes>

The Arecibo Telescope may have tragically collapsed last year, but it doesn't mean the end of the era of giants in astronomy. Giant ground-based telescopes currently being built will get their first light this decade. The Extremely Large Telescope (ELT), the Thirty Meter Telescope (TMT), and the Giant Magellan Telescope (GMT) are revolutionary telescopes that will transform humanity's view and understanding of the universe. They will provide new observational opportunities in nearly every field of astronomy and astrophysics. These new instruments will observe in wavelengths ranging from the near-ultraviolet to the mid-infrared, allowing astronomers to address fundamental questions ranging from understanding star and planet formation to unraveling the history of galaxies and the development of large-scale structures in the universe.

We invited two astronomers whose careers are strongly related to two of these telescopes to discuss their potential and the status of these projects. Rebecca Bernstein is the Chief Scientist for GMT, a next-generation extremely large telescope with seven segmented mirrors that will be 25.4 meters in diameter, making its resolving power more than ten times that of the Hubble Space Telescope. Christophe Dumas is the

Observatory Scientist and Head of Operations at the TMT. With its 30 m prime mirror diameter, TMT will be three times as wide, with nine times more area, than the largest currently existing visible-light telescope in the world. Both giant telescope that will allow us to see deeper into space and observe cosmic objects with unprecedented sensitivity.

These scientists will discuss the need for large telescopes in today's modern astronomy, the challenge of building these telescopes and their enclosures, which are rotating buildings, twenty-two-stories tall, and the instruments for them, which are the size of a European flat. This conversation will include a description of the international consortium's role in providing political and financial support for the projects. They will also tell us what to expect from these giants and when they will be ready to open their eyes and observe the cosmos.

February 3, 7:00pm

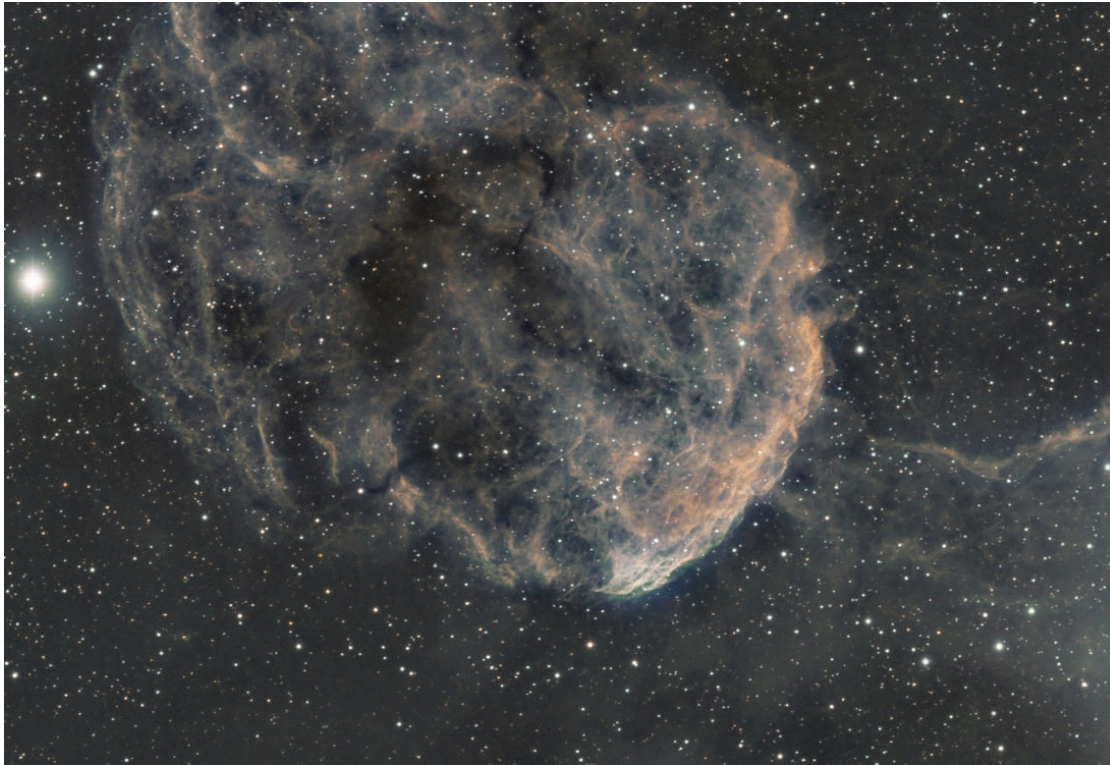
What: Cosmic Instability: How a Smooth Early Universe Grew into Everyone You Know
Who: Dr. John Mather
Sponsor: Foothill College Silicon Valley Astronomy Lecture Series
Online: <https://www.youtube.com/user/SVAstronomyLectures>

Dr. John Mather, Nobel-prize winner and Senior Project Scientist on the James Webb Space Telescope, will give a free, illustrated, non-technical talk on Cosmic Instability: How a Smooth Early Universe Grew into Everyone You Know.

For more information see: <https://foothill.edu/astronomy/> or phone 650-949-7888.

Officers	Volunteer Positions	Night Sky Network Rep.:	Refreshment Coordinator:
President: Ron Kane president@trivalleystargazers.org	Astronomical League Rep.: Dennis Beckley alrep@trivalleystargazers.org	Ross Gaunt nnsn@trivalleystargazers.org	Laurie Grefsheim
Vice-President: Eric Dueltgen vice_president@trivalleystargazers.org	Club Star Party Coordinator: Eric Dueltgen coordinator@trivalleystargazers.org	Observatory Director/Key Master: Chuck Grant observatory@trivalleystargazers.org	Webmaster: Hilary Jones webmaster@trivalleystargazers.org
Treasurer: John Forrest treasurer@trivalleystargazers.org	Del Valle Coordinator: David Wright delvalle@trivalleystargazers.org	Observing Program Coordinator: Ron Kane awards@trivalleystargazers.org	Web & E-mail www.trivalleystargazers.org info@trivalleystargazers.org
Secretary: Ross Gaunt secretary@trivalleystargazers.org	Historian: Hilary Jones historian@trivalleystargazers.org	Outreach Coordinator: Eric Dueltgen outreach@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) asking to join the group. Make sure you specify the e-mail address you want to use to read and post to the group.
Past President: Roland Albers past_president@trivalleystargazers.org	Librarian: Ron Kane librarian@trivalleystargazers.org	Potluck Coordinator: OPEN potluck@trivalleystargazers.org	
	Loaner Scope Manager: Ron Kane telescopes@trivalleystargazers.org	Program Coordinator: Dan Helmer programs@trivalleystargazers.org	
	Newsletter Editor: Ken Sperber newsletter@trivalleystargazers.org	Publicity Coordinator: Brian Blau publicity@trivalleystargazers.org	

TVS Member Astrophotos



Caption: Swaroop Shere imaged the Jellyfish Nebula using an Astrophysics AP130GT and a field flattener using a QSI 683wsg-8 camera. He used Astrodon H-alpha, OIII, and SII filters for a total exposure time of 15 hours over the course of 3 nights. The images were obtained from his remote observatory in Texas. He states "Excited to see these are so much better than from my old Newtonian. The OIII data seems weak, I might capture a few more OIII frames and add to this image."



Caption: Ashish Joshi imaged NGC6888, the Crescent Nebula, using a Williams Optics FLT-132 at f/7 using a ZWO ASI1294MC-Pro camera. This is a one-shot color camera and images were obtained using a CLS light pollution filter and an L-eNhanse filter that isolates H-alpha, H-Beta, and OIII emission. The total exposure time was 2 hours, and processing the data in Pixinsight took another 2 hours.

TVS Member Astrophotos (continued)



Caption: Images of M31 taken by Ashish Joshi. He states "I began my astrophotography journey in August 2019. The first object was the Andromeda Galaxy. I had no practical knowledge, and had an upgraded gear that I had never used for astrophotography. This first image was captured from Del Valle (top). In October 2020 I recaptured Andromeda from my backyard (bottom). What a difference it makes when you follow your peers' advice, tricks, and tips. I see images from Gert, Moe - and that is so inspiring to push for bettering yourself. A year into it - I am enjoying it, and learning the basics (light, focus, processing). Still long way to go."

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

All times are Pacific Standard Time

January

- 10 Sun Jupiter, Saturn, and Mercury form a triangle in the west-southwest. Use binoculars (Dusk)
- 11 Mon The crescent Moon and Venus are $\sim 4^\circ$ apart in the southeast (Dawn)
- 11 Mon Jupiter and Mercury are separated by $\sim 1.5^\circ$ in the west-southwest (Dusk)
- 12 Tue **New Moon (9:00pm)**
- 14 Thu Algol shines at minimum brightness for 2 hours centered on 11:12pm
- 17 Sun Algol shines at minimum brightness for 2 hours centered on 8:01pm
- 20 Wed **First-Quarter Moon (1:02pm)**
- 20 Wed Mars is $\sim 6^\circ$ from the Moon, with Uranus (visible in binoculars) 1.5° to the lower-left of Mars (Dusk)
- 23 Sat The Moon and Aldebaran are separated by $\sim 4^\circ$ (Evening)
- 26 Tue The Moon is in Gemini, $\sim 7^\circ$ from Pollux (Evening)
- 28 Thu **Full Moon (11:16am)**
- 29 Fri The Moon is $\sim 4^\circ$ away from Regulus in Leo (Evening)

February

- 3 Wed The Moon is in Virgo, $\sim 6.5^\circ$ from Spica (Dawn)
- 4 Thu **Last-Quarter Moon (9:37am)**
- 6 Sat The Moon is $\sim 4^\circ$ from Antares (Dawn)
- 6 Sat Algol shines at minimum brightness for 2 hours centered on 9:46pm
- 9 Tue Algol shines at minimum brightness for 2 hours centered on 6:35pm
- 11 Thu **New Moon (11:06am)**
- 18 Thu The crescent Moon and Mars are about $\sim 3.5^\circ$ apart (Dusk)
- 19 Fri **First-Quarter Moon (10:47am)**
- 19 Fri The Moon is in Taurus, situated between the Hyades and the Pleiades with Mars to their right (Dusk)
- 23 Tue The Moon is in Gemini, $\sim 4^\circ$ from Pollux (Evening)
- 24 Wed The Moon is in Cancer, $\sim 2^\circ$ from the Beehive Cluster, M44 (Evening)
- 25 Thu Jupiter, Mercury, and Saturn form a triangle in the east-southeast (Dawn)
- 26 Fri The Moon is in Leo, $\sim 7^\circ$ from Regulus (Evening)
- 27 Sat **Full Moon (12:17am)**
- 27 Sat Algol shines at minimum brightness for 2 hours centered on 11:31pm



Check Your Sky's Quality with Orion!

By David Prosper

Have you ever wondered how many stars you can see at night? From a perfect dark sky location, free from any light pollution, a person with excellent vision may observe a few thousand stars in the sky at one time! Sadly, most people don't enjoy pristine dark skies – and knowing your sky's brightness will help you navigate the night sky.

The brightness of planets and stars is measured in terms of apparent magnitude, or how bright they appear from Earth. Most visible stars range in brightness from 1st to 6th magnitude, with the lower number being brighter. A star at magnitude 1 appears 100 times brighter than a star at magnitude 6. A few stars and planets shine even brighter than first magnitude, like brilliant Sirius at -1.46 magnitude, or Venus, which can shine brighter than -4 magnitude! Very bright planets and stars can still be seen from bright cities with lots of light pollution. Given perfect skies, an observer may be able to see stars as dim as 6.5 magnitude, but such fantastic conditions are very rare; in much of the world, human-made light pollution drastically limits what people can see at night.

Your sky's limiting magnitude is, simply enough, the measure of the dimmest stars you can see when looking straight up. So, if the dimmest star you can see from your backyard is magnitude 5, then your limiting magnitude is 5. Easy, right? But why would you want to know your limiting magnitude? It can help you plan your observing! For example, if you have a bright sky and your limiting magnitude is at 3, watching a meteor shower or looking for dimmer stars and objects

may be a wasted effort. But if your sky is dark and the limit is 5, you should be able to see meteors and the Milky Way. Knowing this figure can help you measure light pollution in your area and determine if it's getting better or worse over time. And regardless of location, be it backyard, balcony, or dark sky park, light pollution is a concern to all stargazers!

How do you figure out the limiting magnitude in your area? While you can use smartphone apps or dedicated devices like a Sky Quality Meter, you can also use your own eyes and charts of bright constellations! The Night Sky Network offers a free printable Dark Sky Wheel, featuring the stars of Orion on one side and Scorpius on the other, here: bit.ly/darksky-wheel. Each wheel contains six "wedges" showing the stars of the constellation, limited from 1-6 magnitude. Find the wedge containing the faintest stars you can see from your area; you now know your limiting magnitude! For maximum accuracy, use the wheel when the constellation is high in the sky well after sunset. Compare the difference when the Moon is at full phase, versus new. Before you start, let your eyes adjust for twenty minutes to ensure your night vision is at its best. A red light can help preserve your night vision while comparing stars in the printout.

Did you have fun? Contribute to science with monthly observing programs from *Globe at Night's* website (globeatnight.org), and check out the latest NASA's science on the stars you can - and can't - see, at nasa.gov

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 to find local clubs, events, stargazing info and more.



Caption: The Dark Sky Wheel, showing the constellation Orion at six different limiting magnitudes (right), and a photo of Orion (left). What is the limiting magnitude of the photo? For most observing locations, the Orion side works best on evenings from January-March, and the Scorpius side from June-August.



Tri-Valley Stargazers
P.O. Box 2476
Livermore, CA 94551
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.