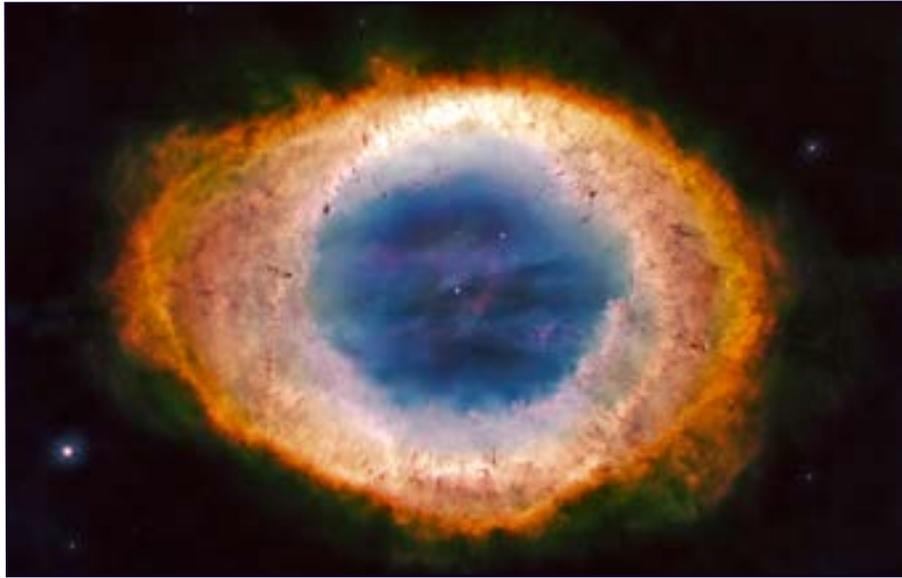


THE OBSERVER



M57: The Ring Nebula - APOD April 17, 2018

Credit: NASA, ESA, Hubble Archive; Composition: Giuseppe Donatiello

From the Desk of the President by Tom Mozdzen

Several members took trips to view the total solar eclipse this past July. We hear that the weather cooperated for the most part, so if you traveled to see that eclipse and have pictures and a story to show and tell, please consider making a short member presentation at the August meeting.

Since the summer monsoons are finally upon us, you might find yourself with some spare time. If you would like to share some of your astronomical interests or feats with your fellow club members, member presentations at the monthly meeting are the answer.

Make sure to check with me a day or two before the meeting to verify that we have time on the agenda. Member presentations are nominally five to ten minutes long.

The dates for the All Arizona Star Party are set for the nights of October 25th and 26th (Friday and Saturday nights) at Hovatter Field. See the newsletter for further details. Save the dates and make your plans, it is less than three months away, and time does seem to fly.

Once again, please think about throwing your hat into the ring by running for a vacant board or

UPCOMING EVENTS:

EVAC Star Party - August 3

EVAC Public Star Party - August 9

EVAC Meeting - August 16

EVAC Star Party - August 24

EVAC Star Party - August 31

Check out all of the upcoming club events in the Calendars on page 11.

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From the Desk of the President

Continued from page 1

officer position. We will have Secretary, Vice President, President, and three board member positions open. Officer terms are one year, while board member terms are for two years. Contact Tom if you would like to volunteer. We like to have the slate set by October as elections are in November.

Volunteer opportunities are available to help out at either the Gilbert Rotary Centennial Observatory (GRCO) which is led by Claude Haynes or with our outreach team which is led by Ken Milward. The outreach team is gearing up for the beginning of the busy season as schools are getting back to session and the requests for telescope visits are coming in. Each of our programs reach thousands of people every year, and rely solely upon EVAC volunteers.

Make sure you stay in touch with our club and your fellow astronomers by subscribing to the *evac-announce* and the *az-observing* mailing lists. *Evac-announce* will occasionally send you important news about the club. These emails may only originate from club officers and

the frequency of the emails is only about once per month. *Az-observing* is a two-way mailing forum list. Subscribers may send messages as well as receiver messages from all subscribers. See the EVAC [homepage](#) for details on how to subscribe. Also, we have the facebook pages for both [EVAC](#) and [GRCO](#) where members share astronomical news and thoughts.

Great strides are being made behind the scenes in the modernization of our web page. We are not finished yet, but work continues, even though it is not visible yet. Stay tuned.

Our August Speaker is Mike Alegria. He is the manager of the Multiple Mirror Telescope (MMT) on Mount Hopkins in the Santa Rita Mountains and will talk about the 40 year history of the MMT, including the future focus of its scientific goals.

See you at the August meeting

Tom Mozdzen

EVAC General Meeting Notes for July 2019

by Tom Polakis

The July meeting was attended by roughly 50 people. It opened with the usual introduction of officers, administrative officers, and Board members. President Tom Mozdzen mentioned that many Club positions will be open for 2020, and is looking for members to step into them. These positions include president, vice president, secretary and three Board members. The Gilbert Riparian Centennial Observatory continues to operate successfully due to the voluntary efforts of EVAC members. Additional volunteers are always needed. Contact Claude Haynes (azstargeazer@gmail.com) if you're interested. The All-Arizona Star Party is scheduled for October 25 and 26. See the EVAC site for more details.

Outreach Coordinator Ken Milward will be organizing club field trips in the near future. He surveyed the room to get a rough idea of interest in various destinations around Flagstaff and Tucson.

Since the meeting was held the day before the 50th anniversary of the historic Apollo 11 landing, we went around the room to have a dozen members give brief anecdotes about their personal experiences on the night of

the event. In related content, Tom Mozdzen ran a video assembled by ASU students that showed a simulation of Neil Armstrong's perspective during the landing.

Gary Deatsman will be moving out of the Valley soon, and is offering an original of a Percival Lowell book that he will auction off at the August meeting, with proceeds going to the club.

The main speaker was ASU professor Paul Scowen. He spoke about the Habitable Exoplanet Observatory (HabEx), for which he is the UV Spectrograph Instrument Science Lead. HabEx is one of four candidate missions for the Decadal Survey, whose proposal will be submitted in July. Its mission will be to directly image nearby exoplanets, with the capability of obtaining their spectra, which could potentially show signals associated with the presence of water.

The proposed telescope is a 4-meter off-axis design with a coronagraph in an Earth-Sun L2 halo orbit. Launched separately and placed at a distance from the telescope of 76,000 km will be a 72-meter diameter starshade, which is

which is used to occult starlight, isolating the light from planets at a wide range of wavelengths. This configuration will enable detection down to a 10^{-10} flux ratio with a resolution of 58 milliarcseconds. The telescope will also be configured for other programs beside exoplanet

detection.

After the meeting, four members and Dr. Scowen adjourned to the usual destination of the Union Grill and Tap.

The Backyard Astronomer

by Bill Dellings (August 2019)

North Rim Star Party Report

This past June my wife and I attended our 18th North Rim (NR) Grand Canyon Star Party. We find the North Rim experience more relaxing and pleasant even though it means a 400-mile one-way trip from our home in the East Valley compared to half that mileage to the South Rim (SR). The whole NR operation is a fraction of the area covered by the mass of hotels, buildings and crowds at the SR. At 8,000 feet, the NR is another 1,000 feet higher than the SR and more heavily forested. The sound of wind whistling through the tall ponderosa pines is most exhilarating and calls us back every year.

Saguaro Astronomy Club's Steve Dodder, an experienced amateur astronomer and humorist, acts as the coordinator between scheduling stargazers and working with park officials. Telescopes are set up on the terrace of the lodge which overlooks the canyon. You're only yards from the edge! Compared to the SR, space for equipment is quite limited on the terrace, accommodating perhaps a maximum of a dozen telescopes. I had brought my Celestron Evolution 8" which didn't take up much room compared to Dodder's 20" Dobsonian!

During our five-night stay, we averaged about 8 telescopes set up each night. I had about 125 visitors peer into my telescope during each of the three nights that were clear. The Milky Way is always an astounding sight from this location. It's hard to believe that through most of human history, this sight at night was the norm. Conditions like this add inches to the aperture of your telescope. For example, using my 8" SCT at the NR, I see more

spiral arm structure in the galaxy M-51 than I do with my 11" SCT at home. The view of globular cluster M-13 in the 8" comes close to matching what I see at home in the 11". I also seem to have better luck splitting tight double stars at the NR, no doubt due to the higher altitude and possibly better seeing. I often split the AB pairs of Nu Scorpii (1.3") and Xi Scorpii (1.1") at the NR. Heck, why buy a bigger scope, just take what you have to a higher and darker site!

At any star party, there's usually one telescope I find special or unique. This year it was a TEC 140 refractor on a Panther 160 alt-az Go To mount. I've seen 140's there before, but the mount took my breath away. Google it and you'll see what I mean.

I had one minor mishap. Readers of this column may recall my infamous fall down the stairs carrying my CPC-11 in 2012 (EVAC Observer, August 2012). This time I fell going up the same stairs. I was walking in the dark after a session, carrying my eyepiece case and catalog case of references back to my room. I took my first step up, or thought I did, but my shoe hit the step instead, throwing me off balance. I had to release my grip on the eyepiece case to use that hand to break my fall. The case hit the ground flat remaining closed, thank goodness, as I continued my downward movement through curved space-time and impact. No harm done, just a few scratches on the case and a sore foot. It was still worth the trip.

Smith's Cloud

by Henry DeJonge IV (August 2019)

Introduction

This is a brief paper on Smith's Cloud which is one of many high velocity clouds, (HVCs) that are dancing about the Milky Way. It is a special HVC in that for Smith's cloud we know much more about its morphology, composition, and velocity, than most HVC's. Despite this wealth of information, it remains somewhat of an enigma and has spawned many interpretations about its origin and destination as we shall see. HVCs have and will continue to impact our galaxy both directly and indirectly. They are important in many aspects of both galactic and stellar evolution. If you would like to learn more about HVC's please see my articles for EVAC in July, August, September, and October of 2008.

Smith's Cloud

Smith's cloud is a very interesting high velocity cloud or HVC. Briefly HVCs are large clouds of mainly Hydrogen gas that are gravitationally bound to a galaxy, usually residing in the halo. They usually have velocities inconsistent with the galactic disk rotation, which means that they can come in or out in many directions and may not "go with the flow". Origins of HVCs include external clouds falling into our galaxy from the IGM, early galactic remnants, clouds from galactic fountains via SN explosions, and gas stolen from outside our galaxy such as from the LMC or SMC or even other members of the Local Group. They may have also originated from the bound galaxy they are moving about, in particular after a merger. Our Milky Way is thought to have at least hundreds of such HVC clouds roaming about, some of which are rapidly coming towards us from the LMC and SMC. There are of course many other clouds about and in the Milky Way such as intermediate velocity clouds and so on, however, HVCs in particular are believed to play a key role in star formation and galaxy evolution. We have also observed HVCs around other galaxies such as M31 and M33.

Smith's cloud, (aka WV 360, and HVC 040-15) was discovered in 1963 by astronomer Gail Smith via H radio emission, acquired its name in 1998, and is a well-known HVC that is interesting in a variety of ways. We know that Smith's cloud is interacting with our galactic disk gas from 21cm observations and its observed filamentary parallel streamers. It is believed to have already made at

least one pass thru the disk of the Milky Way about 70 million years ago and apparently has a relatively strong magnetic field of about 5-8 micro Gauss which helps hold it together and has enabled it to survive intact thru a galactic pass.

It is a relatively large HVC with a minimum mass of at least several million solar masses in both H and ionized gas, and it possesses a relatively high abundance of metals compared to most HVCs. This is particularly noticeable in the form of a high Sulphur content-which to an astronomer is a metal and usually an indication, (byproduct) of an older stellar population. However, like most HVCs it does not seem to contain any detectable stars. This begs the question, where are (were) the stars?

As for its motion, it appears to be approaching our disk directly at about 73 km/s with an overall velocity of about 296 km/s. Currently it is about 12.5 kpc from our sun and about 3 kpc below the galactic plane and located in the constellation Aquila. The apparent diameter is about 11 degrees and the cloud is thought to be about 3 kpc long and 1 kpc wide. Its overall shape has a resemblance to a comet with a bright dense head and a long more diffuse tail. In other aspects Smith's cloud is estimated to have a mean density of around $1.29 \times 10^{-25} \text{ g cm}^{-3}$ compared to the mean ISM density of $10^{-24} \text{ g cm}^{-3}$, thus even though it contains millions of solar masses of material it is extremely spread out.

In caution, our interpretation of its true velocity come primarily from its morphology, (the head points towards the galactic plane) and interestingly enough some astronomers believe that Smith's cloud may be a DM streamer that is moving away from our disk! Thus, one can see that despite the numbers there is still some debate as to exactly where this HVC is going and where it has come from. Based upon the assumption that it is approaching our galactic plane however, it should collide in about 30 million years from now.

The original thought was that Smith's cloud was just an extension of our galactic gas layers, however later analysis prompted ideas such as Smith's cloud is a dwarf galaxy remnant, a dark matter dwarf galaxy remnant, a gas ejection from the Milky Way galactic disk, or a captured IGM dark matter cloud. The high metal content could

White Dwarf Cooling

Continued from page 4

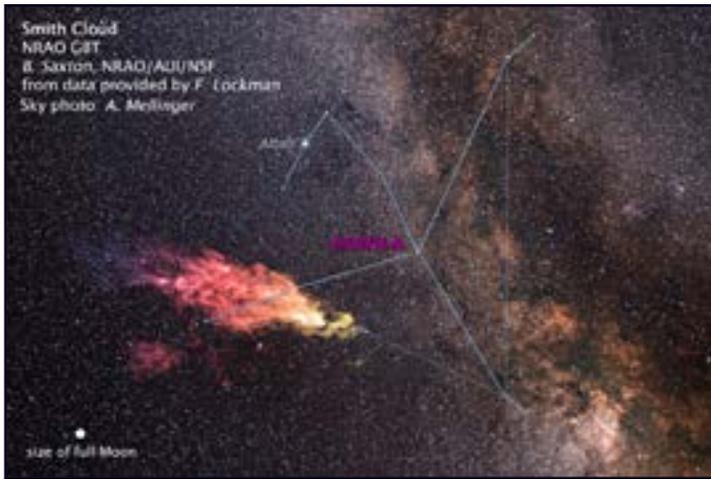


Figure 1. Location and radio image of Smith's cloud

have been collected when it passed thru the outer spiral arms of our galaxy about 70 million years ago, since the metal content in those stars is very similar to the metal content of the Smith cloud. However, the initial metal content of the cloud may have been vastly different, and initial low metallicity would usually be an indication of an extragalactic origin. On the other hand, initially being composed up of primarily DM could explain how it acquired much of its baryonic matter. Regardless of its origin, most astronomers believe that the data on Smith's cloud is indicative of definite past interactions with our galactic disk.

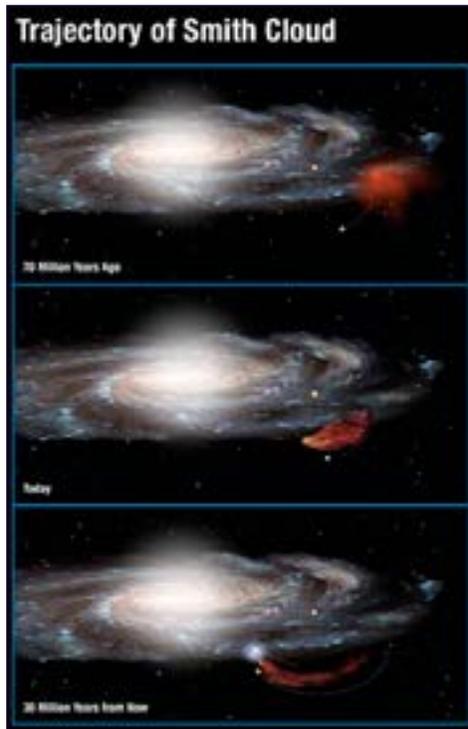


Figure 2. Modeled trajectory of Smith's cloud.

In general, HVCs are considered an important factor in galactic star formation rates and it is believed that a galaxy of our size and type has at least hundreds or more likely thousands of HVCs in its halo. These past and present HVC interactions with our galaxy are enhancing the stellar formation rate and by accretion adding about 0.1 solar mass per year to our disk mass. Imagine this over millions and billions of years!

Summary and Future

In summary despite all the observations we have to date, Smith's cloud has probably raised more questions about galaxies, HVC interactions, HVC origins and evolution than were answered. It still leaves open such basic questions as to where Smith's cloud came from and where it is going, as it still is uncertain as whether it is moving towards us or away from us! In particular we are just beginning to model the magnetic fields in such large and complex clouds with galaxies, and still have a long way to go in understanding the internal gas motions, (gas mixing) and evolution of HVCs as well. Maybe further study of its magnetic field can help us determine its true proper motion.

The most likely scenario to date is that the Smith's cloud is a long lived, large elongated gas streamer, which is extending to the galactic disk, while held together via a DM halo, which may have formed after a sub halo transit.

In the future, if the mass of this cloud is about a million or so solar masses it is predicted that it will have a minimal effect on the stellar formation rate when it collides with our disk, however if it has a mass towards the higher end of the estimates, which is about 10 million solar masses, then it could cause a locally dramatic increase in star formation for an estimated 5 million years. This localized region of starburst activity should be readily observable in about 30 million years-keep your telescopes ready!

Find Out What's Happening – Join EVAC-Announce List

If you would like to receive email announcements about EVAC meetings and activities, please join the EVAC–Announce mailing list. Click on the link below to subscribe. Enter your full email address in the box titled User Options and press OK. You will receive a confirmation email. Your privacy is respected by EVAC and we will never sell your email address, or use it for non-club relevant solicitations. This mailing list is designed for communication from EVAC, and does not enable users to respond to the message. If you wish to contact club officers, please use the list on the Contact-Us tab. To subscribe to the EVAC–Announce mail group click: <http://www.freelists.org/list/evac-announce>. To unsubscribe use the same link, enter your email address and select Unsubscribe from the “Choose An Action” list. Another list that may be of interest is AZ-Observering. To subscribe click <http://www.freelists.org/list/az-observing>.

EVAC also has a Facebook Group where members may share ideas, photos, and Astronomy related information. To join: [EVAC Facebook Group](#).

The Gilbert Rotary Centennial Observatory (GRCO) also has a Facebook Group where members may share ideas, photos, and Astronomy related information. To visit, please click on [Gilbert Rotary Centennial Observatory - GRCO](#).

Looking for that perfect weekend activity?

Why not resolve to getting involved?

Contact Claude Haynes to join the staff at GRCO

Email: grco@evaconline.org



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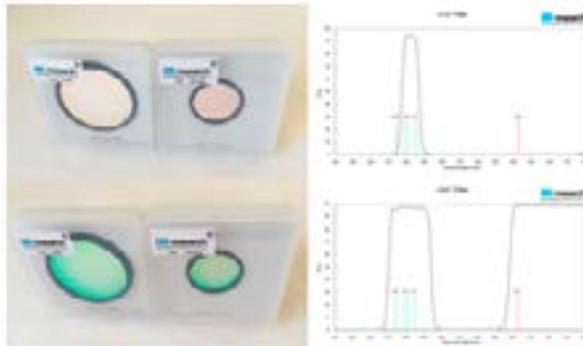
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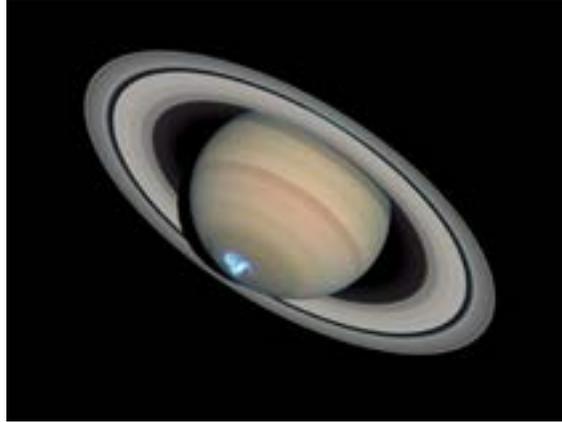
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For Sale

Starter Telescope kit with Upgrades

Orion 90 mm mak cas w tabletop base
Orion EQ-1 adjustable tripod mount + adapter
Sirius plossl 25 mm eye piece
Sirius plossl 10.0 mm eye piece
EZ finder II
Finder scope 6x30
90 deg Star diagonal
Correct image diagonal

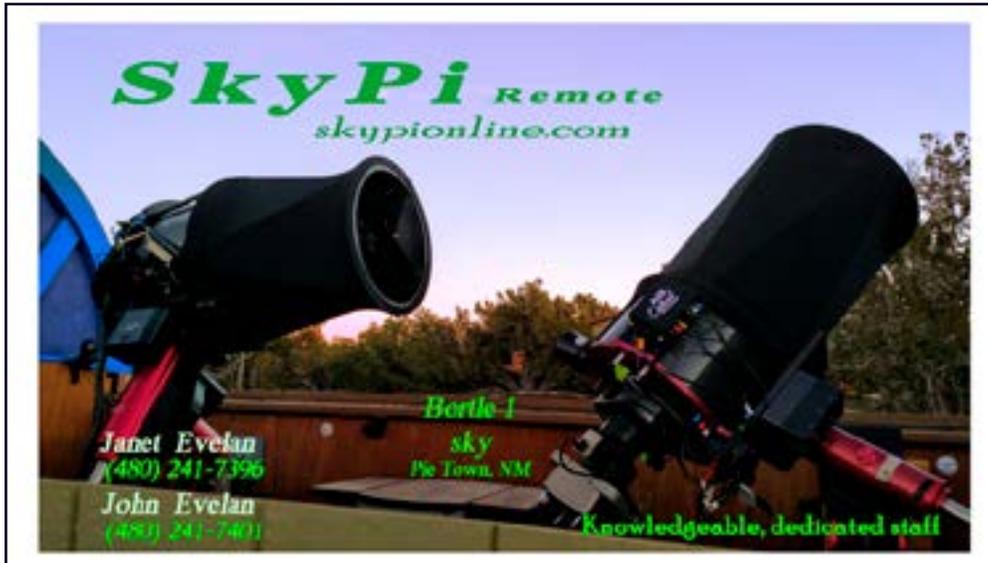
Perfect, light weight telescope for home, traveling, kids, or adults. Comes with 2 mounts, tabletop and tripod w/ equatorial mount. It has 2 eyepieces, and 2 finder scopes, 2 diagonals: star and correct image.

This was purchased in the Fall of 2015 by an EVAC member and sold it to me 2 years later. It is in perfect condition. I added a carrying case to hold the scope and eye pieces. Over the past three years I have had many health issues with lengthy hospital stays. This has reduced my ability to use the telescope as often as I had wanted to.

For Sale: Complete for \$200.

[David Smith](#)

Classified Ads



The darkest, most Pristine, sky in the continental U.S. !

At the site: Bathroom facilities, running water, 5 pads w110v, wifi, acres of grassy camp sites.

From the site: Very Large Array 42mi E, The Astronomical Lyceum 55mi E, MRO Observatory 80mi E

IC 405

**Insight Observatory
16" ATEO 1 Telescope**

[SkyPi Remote Observatory](#)



For sale Meade LXD75 8-inch Telescope with accessories - \$1250: [LXD75](#)

Bill Musik: bmusik@cox.net

For sale: a classic LX200 8" telescope with field tripod.
\$1,000. 00 cash and carry. No eye pieces with scope.



Frank Pino. f.pino@mchsi.

Upcoming Meetings

August 16

September 20

October 18

November 15

December 20

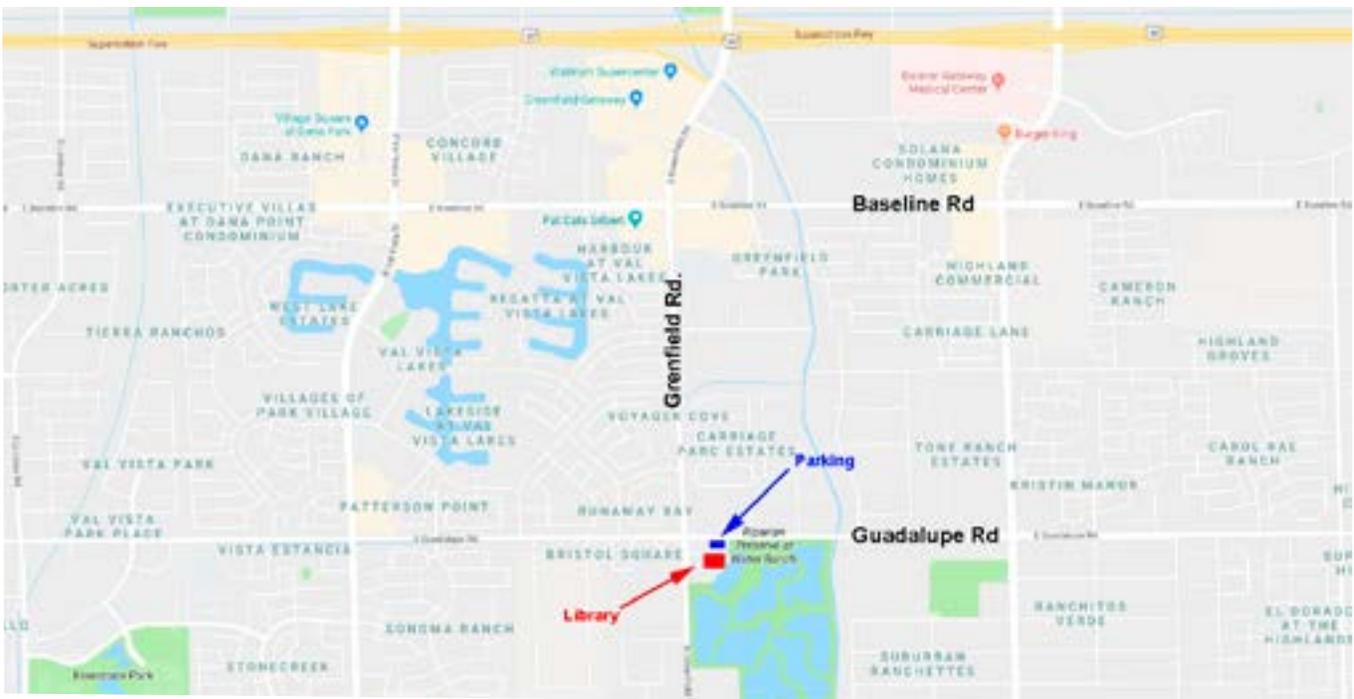
January 17

February 21

The monthly general meeting is your chance to find out what other club members are up to, learn about upcoming club events and listen to presentations by professional and well-known amateur astronomers.

Our meetings are held on the third Friday of each month at the Southeast Regional Library in Gilbert. The library is located at 775 N. Greenfield Road; on the southeast corner of Greenfield and Guadalupe Roads. Meetings begin at 7:30 pm.

Visitors are always welcome!



Southeast Regional Library
775 N. Greenfield Road
Gilbert, Az. 85234



AUGUST 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

August 3 - EVAC Star Party

August 24 - EVAC Star Party

August 9 - Public Star Party

August 31 - EVAC Star Party

August 16 - EVAC Monthly Meeting

SEPTEMBER 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

September 13 - Public Star Party

September 21 - EVAC Star Party

September 20 - EVAC Monthly Meeting

September 28 - EVAC Star Party

East Valley Astronomy Club -- 2019 Membership Form

Please complete this form and return it to the club Treasurer at the next meeting or mail it to EVAC, PO Box 2202, Mesa, Az, 85214-2202. Please include a check or money order made payable to EVAC for the appropriate amount.

IMPORTANT: All memberships expire on December 31 of each year.

Select one of the following:	
<input type="checkbox"/> New Member	<input type="checkbox"/> Renewal
<input type="checkbox"/> Change of Address	
New Member Dues (dues are prorated, select according to the month you are joining the club):	
<input type="checkbox"/> \$30.00 Individual January through March	<input type="checkbox"/> \$22.50 Individual April through June
<input type="checkbox"/> \$35.00 Family January through March	<input type="checkbox"/> \$26.25 Family April through June
<input type="checkbox"/> \$15.00 Individual July through September	<input type="checkbox"/> \$37.50 Individual October through December
<input type="checkbox"/> \$17.50 Family July through September	<input type="checkbox"/> \$43.75 Family October through December
<i>Includes dues for the following year</i>	

Renewal (current members only):
<input type="checkbox"/> \$30.00 Individual <input type="checkbox"/> \$35.00 Family

Name Badges:
<input type="checkbox"/> \$10.00 Each (including postage) Quantity: _____
Name to imprint: _____

Total amount enclosed:

Please make check or money order payable to EVAC

Payment was remitted separately using PayPal Payment was remitted separately using my financial institution's online bill payment feature

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Address: Email:

City, State, Zip:

The Observer is the official publication of the East Valley Astronomy Club. It is published monthly and made available electronically as an Adobe PDF document the first week of the month.

<input type="checkbox"/> General Observing <input type="checkbox"/> Cosmology <input type="checkbox"/> Lunar Observing <input type="checkbox"/> Telescope Making <input type="checkbox"/> Planetary Observing <input type="checkbox"/> Astrophotography <input type="checkbox"/> Deep Sky Observing <input type="checkbox"/> Other	
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Would you be interested in attending a beginner's workshop? Yes No

How did you discover East Valley Astronomy Club?

To join via Paypal: http://evaonline.org/join_evac.htm	Joining the club implies you agree to the liability waiver. http://evaonline.org/join-liability_release_form.htm
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The Observer is the official publication of the East Valley Astronomy Club. It is published monthly and made available electronically as an Adobe PDF document the first week of the month. Please send your contributions, tips, suggestions and comments to the Editor at: news@evaonline.org. Contributions may be edited. The views and opinions expressed in this newsletter do not necessarily represent those of the East Valley Astronomy Club, the publisher or editor.

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PO Box 2202
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Observing Program Coordinator: Wayne Thomas

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Newsletter Editor: Marty Pieczonka

Webmaster: Marty Pieczonka

SkyWatch Coordinator: Claude Haynes

Observatory Manager: Claude Haynes

FIRST QUARTER MOON ON AUGUST 7 AT 13:31

FULL MOON ON AUGUST 15 AT 08:29

LAST QUARTER MOON ON AUGUST 23 AT 10:56

NEW MOON ON AUGUST 30 AT 06:37