



# Roanoke Valley Astronomical Society

Amateur Astronomy News and Views  
In Southwestern Virginia



Volume 35—Number 12

December 2018

*RVAS November Meeting Report*

## Mapping the Milky Way

By **Mike Hutkin**, RVAS Secretary

The November meeting of RVAS was called to order by **President Michael Martin**, who welcomed the 16 members and two guests that ventured out on this cold, wet November evening.

Our guests, **Mike Shorter and his son, Jacob**, joined the RVAS at the meeting and were welcomed by all as our newest members. Grateful thanks were offered in recognition of veterans day to members in attendance that were veterans of our military.



*As the meeting gets underway, RVAS President Michael Martin and John Goss exchange some comments about the evening's activities.*

*Photo by Frank Baratta*



*Mike Shorter shares seeing Saturn during the South Roanoke County Library outreach. Mike, son Jacob (to the left) and family joined at the meeting.*

*Photo by Frank Baratta*

The next order of business was observing activities with several members offering their inputs.

**Michael Martin** kicked this section off by talking about his efforts to observe and identify constellations in the night sky. He began with Cassiopeia on November 11 and also talked about the Galileo Observing Club logbook he is using to track his efforts. The Astronomical League Galileo observing

*(Meeting Continued on page 2)*

(Meeting Continued from page 1)

program information can be found at [https://www.astroleague.org/al/obsclub/galileo\\_club/galileo\\_club.html](https://www.astroleague.org/al/obsclub/galileo_club/galileo_club.html). **Michael Good** spoke of his efforts using his home observatory to view the exo-solar planet in the planetary system WASP-80. New member **Mike Shorter** talked about how he and Jacob had attended the South Roanoke County Library outreach program and used a library telescope for their first observation of Saturn and its rings. (As a beginner I personally share their excitement as this has also been one of my most exciting observations in my short venture into astronomy as a hobby.)

**Rand Bowden** discussed his observations of the moon with **Ray Bradley** at Hollins library and Glenvar elementary school as part of the club's outreach activities. Finally, **Clem Elechi**, talked about his using the naked eye to observe the winter sky constellations as they come into view. This pointed out to this member that it's also rewarding no matter the size of your telescope to step back and just "look up" where there is so much to observe.

Next, **President Michael Martin** advised the members that the **Astronomical League Calendar** for 2019 is available from the League's website at a cost of \$13. Of note was the fact that images, pictures, and sketches included in this year's calendar were produced by **Astronomical League** members. Continuing the calendar discussion RVAS Treasurer **Larry Hill** told the group that the **As-**



*Known as an avid astrophotographer, Dr. Clem Elechi reminds his fellow RVAS members about the joys of naked eye observing*

*Photo by Frank Baratta*

**tronomy Magazine** calendar for 2019 would be available for sale at the December meeting.

The next agenda item was an interesting reminder of the 50<sup>th</sup> anniversary of the first moon landing July 20, 1969 led by **Immediate Past President of the Astronomical League and RVAS member John Goss**. John began with a quick LQOD (Lunar question of the day) which he has been sharing regularly to the club as the days count down to July 20, 2019. We were challenged to correctly pronounce **Mare** (mah-ray) in reference to **Apollo 11 Lunar Module, the Eagle, landing in Mare Tranquillitatis**. The focus of John's presentation, however, was

(Meeting Continued on page 3)

The Roanoke Valley Astronomical Society is a membership organization of amateur astronomers dedicated to the pursuit of observational and photographic astronomical activities. **Meetings are held at 7:30 p.m. on the third Monday of each month. See calendar on last page of newsletter for location. Meetings are open to the public.** Observing sessions are held one or two weekends a month at a dark-sky site. Yearly dues are: Individual, \$20.00; Senior Individual, \$18.00; Family, \$25.00; Senior Family, \$22.00; Student, \$10.00. Articles, quotes, etc. published in the newsletter do not necessarily reflect the views of the RVAS or its editor.

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RVAS web page: <http://rvasclub.org>

(Meeting Continued from page 2)

the **Lunar X** which is the intersection of three major lunar craters. The next best viewing opportunity to see the Lunar X occurs on December 14 and then again on January 13. We will find out in future observing reports how successful our members will be in finding the "X". Please refer to the diagram "Crater hop to the lunar X" at the end of these meeting minutes.

We then moved into the November program topic with **Frank Baratta** presenting *Mapping the Milky Way*. This began with a question that he has long considered - "When looking in some direction along the Milky Way, what—and where—am I actually seeing?" To begin, Frank took the audience back in time to the thinking and observations of our distant ancestors who had only an overall view of what was considered the Cosmos and was long before galaxies were even considered to exist. The ancient Egyptian and Hebrew thinkers had their "Vault of Heaven" concepts depicted in drawings and the old testament teachings of Genesis. We were brought forward in time through the sixth century BCE models of the cosmos, the teachings of Ptolemy, Copernicus, and Kepler, all of whom had not yet recognized the existence of galaxies. Not until the time of Galileo and Newton when telescopes came into existence did our predecessors begin to ob-



*Frank Baratta begins the evening's main program on the development in understanding our galaxy's structure and where various objects are located.*

*Photo by Carolyn Baratta*

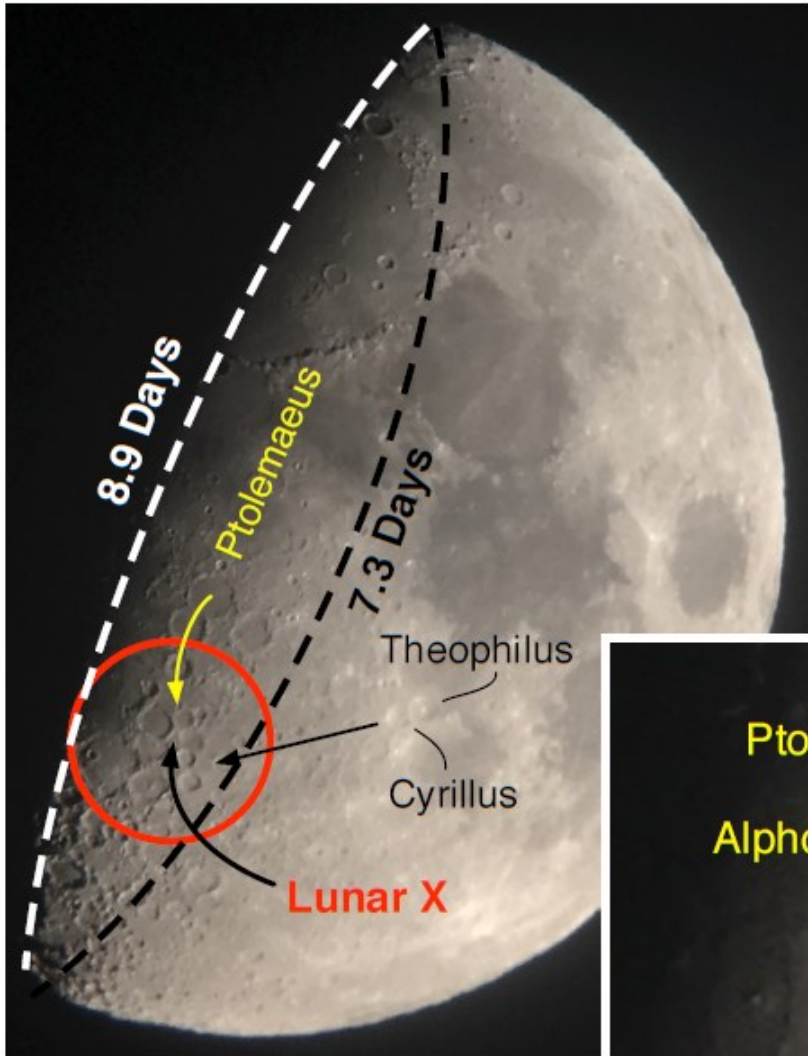
serve actual galaxies and form the concept of "Island Universes" and propose structures to the cosmos. Only as recently as the 1950's did efforts begin in earnest to actually map our own Milky Way as the spiral galaxy we have come to know. Having brought us to the point where galaxies were defined, Frank began a discussion of the types that have been identified and classified by their arm structure. This included Grand Design, Flocculent, and Multi-arm with pictures and examples of each. It was now time to move closer to home and to take a closer look at our own Milky Way and its basic structure. Frank took the audience on a visual tour through the galaxy in a top down view spreading it out to show the major arms, lesser arms, and the inner region also showing the position of our sun and us. From this vantage point we had a variety of views depending on our own position on earth. Frank then brought into view some familiar and some not so familiar galactic messier and other objects, expressing his thanks to **Dan Chrisman** for introducing him to the Sky Safari app which was used in producing parts of this presentation. The outstanding discussion was finished with a question and answer period. We sincerely thank Frank for his efforts.

Next on the agenda was an outreach update by **Member at Large, Ray Bradley**. During the prior month the outreach program included three library sessions addressing the topic of the 50<sup>th</sup> moon landing anniversary, with two including observing sessions. Upcoming is the scheduled outreach event on November 27 STEM night at West Salem elementary school. Ray requested that any interested members contact him to provide support for these important events.

Finally, **John Goss** returned to present his summary of the 2018 NIGHTFALL star party held at the Palm Canyon hotel and RV resort in Borrego Springs California November 1 - 4. John shared his adventures at this event as well as pictures of the area and skies.

Michael Martin closed the meeting with a reminder of the December 17 winter social to be held as the RVAS December meeting. The November meeting was then adjourned.

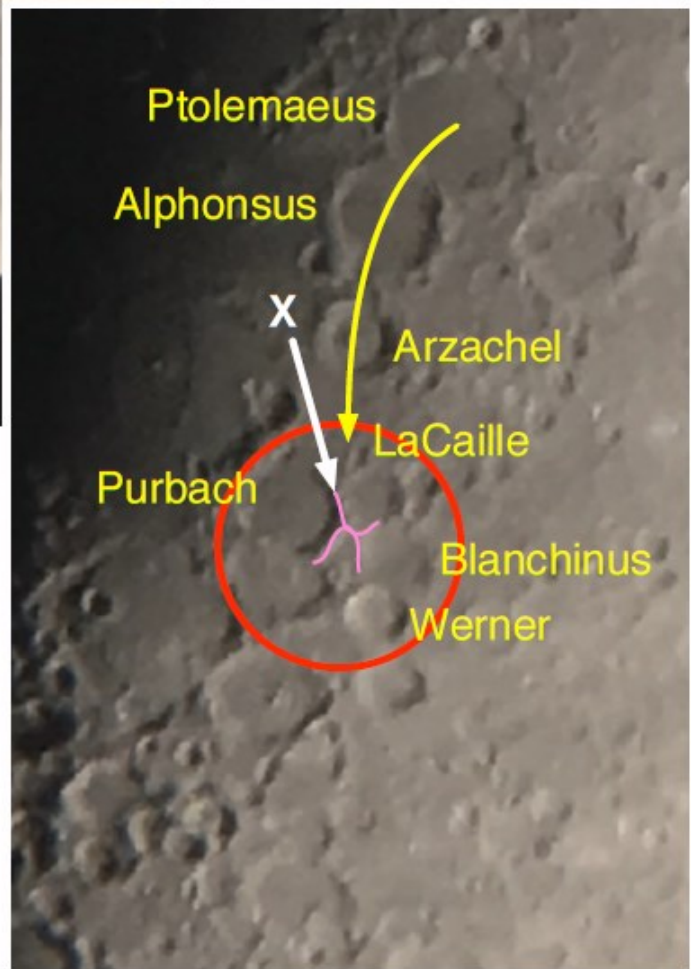
# Crater hop to the LUNAR X



1. Find the prominent crater Theophilus at the NW edge of Mare Nectaris.
2. Draw a line from it through Cyrillus.
3. Continue that line 3-4 times the width of the Theo-Cyr craters.
4. It should end in the Werner-Blanchinus region.

OR...

1. Start with the three craters Ptolemaeus, Alphonsus, and Arzachel.
2. Continue their gentle arc to La Caille, Blanchinus, and Werner.



**Lunar days to try: 7.8 – 8.3**

Next opportunities:

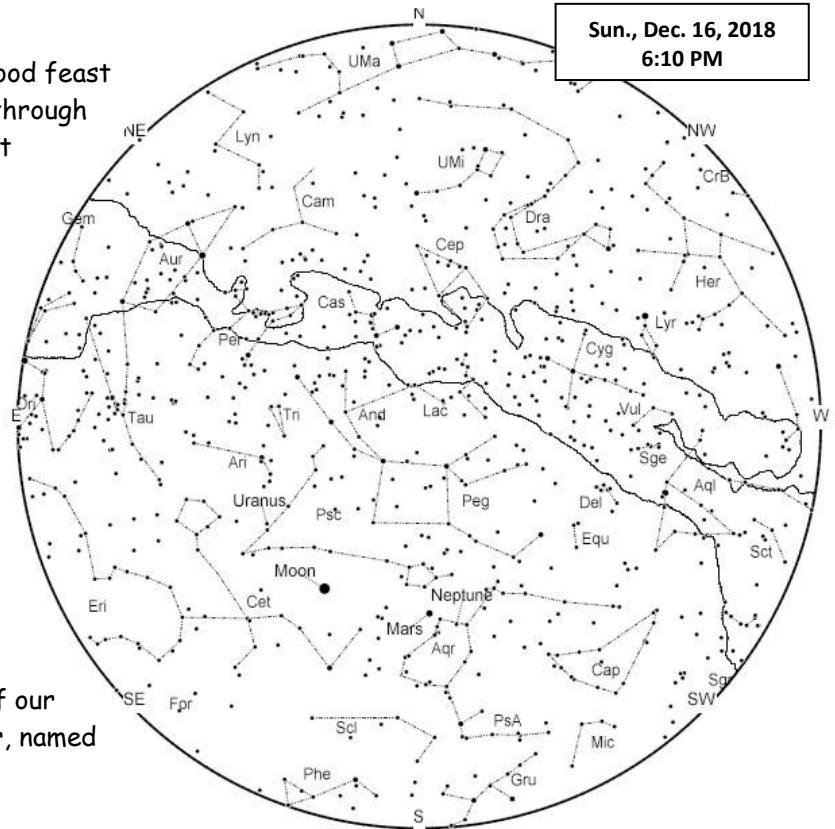
- Dec 14;  
8 p.m. until moonset  
at 11:50 p.m. (7.8 days)
- Jan 13;  
6 p.m. until moonset  
at 12:30 a.m. (8.1 days)
- Feb. 12;  
6:30 p.m. until moonset  
at 1:24 a.m., (8.1 days)

# What's Up Highlights

December 1 - 31, 2018

## This Month:

The holiday season—seemingly one great food feast that began on Thanksgiving and continues through New Year's—is in full swing this month. But the sky also offers a feast for those who brave the deepening cold. As darkness arrives, the stars of fall hold center stage, with those of late summer setting in the west and those of winter rising in the east. Soon the brilliant Winter Hexagon centered on Orion will take command. Yet other wonders beckon, not least the annual Geminid meteors, this year graced with an early setting Moon. A week later comes the Winter Solstice, when for a moment the Sun is lowest in the sky for our Hemisphere and immediately begins its upward climb that ends at the Summer Solstice. Both part of our gyroscopic planet's journey around our star, named "Sol" by the ancient Latins.



## December Celestial Events:

- Mon., 3<sup>rd</sup> - Mars at east quadrature - Mars to Earth line perpendicular to Earth to Sun line.
- Tues., 4<sup>th</sup>, 6:00 a.m. - 8% illum. Moon 1.5° SSW of asteroid 1 Ceres, about 17° high in ESE.
- Fri., 7<sup>th</sup> - Mag. 0.1 Mars about  $\frac{1}{4}$ ° NE of mag. 7.9 Neptune, 45° high due south as twilight ends.
- Wed., 12<sup>th</sup> - Moon at apogee; 63.53 Earth-radii from Earth.
- Thurs./Fri. 13<sup>th</sup>/14<sup>th</sup> - Peak of the Geminid Meteor Shower; favorable conditions as the waxing crescent Moon sets at 10:53 p.m. on the 13<sup>th</sup>; can reach 100 meteors/hr under dark skies.
- Sat., 15<sup>th</sup> - Mercury at greatest elongation west; 8° high in ESE as dawn arrives.
- Fri., 21<sup>st</sup> - Winter Solstice; day with least amount of daylight for Northern Hemisphere.
- Mon., 24<sup>th</sup> - Moon at perigee; 56.61 Earth-radii from Earth (10.9% closer than on the 12<sup>th</sup>).
- Tues., 25<sup>th</sup> - The Equation of Time is 0 (solar and civil time in sync).

## Sunset and Twilight:

Sunset Range: 5:02 p.m. (Dec. 1<sup>st</sup>) to 5:12 p.m. (Dec. 31<sup>st</sup>)

Twilight Ends: 6:35 p.m. (Dec. 1<sup>st</sup>) to 6:46 p.m. (Dec. 31<sup>st</sup>)

## Weekend Observing Opportunities:

Nov. 30<sup>th</sup>/Dec. 1<sup>st</sup>

Dec. 7<sup>th</sup>/8<sup>th</sup>

Dec. 28<sup>th</sup>/29<sup>th</sup>

## Moon Phases:

Fri., 7<sup>th</sup> - New Moon

Sat., 15<sup>th</sup> - First Quarter

Sat., 22<sup>nd</sup> - Full Moon

Sat., 29<sup>th</sup> - Last Quarter

# Spooky Action

By Ray Bradley

For the third year, RVAS members participated in the Science Museum of Western Virginia's "Science Spooktacular". And, we were in good company. The costumed staff of the museum's Education Department hosted the event and made sure that all participating organizations had everything needed to run their activities. Members of the 501<sup>st</sup> Legion of Vader's Fist roamed the floors of the museum in their Star Wars costumes handing out candy to the leagues of kids running between activity stations. Visitors enjoyed mysterious phenomenon of unseen forces exhibited by the Virginia Tech Physics department. William Byrd's advance placement Physics students showed excited youths how to make curious potions with unnatural properties. And, mechanical beasts were brought to life by the Roanoke Robotics and Maker's Club of Southwest Virginia.

RVAS members **Ray Bradley** and **Darien Bradley** exhibited several astronomical activities to thrill dozens of young, bedecked characters who gravitated into their sphere of influence. Darien used the Moon Phase model to teach his young audience how to know when the full moon will transform ordinary people into ravenous werewolves. Meanwhile, Ray used the club's Constellation Model and Planetary Board Game to show curious visitors how to properly align the stars and planets to reveal the mystical connections among the astral plane. Rolls of Smarties were awarded to the accomplished apprentices of our spooky arts.

The candy-filled crowd waned after five hours of continual fun as we concluded another successful "Science Spooktacular". We thank the entire staff of the museum for the opportunity to share a moment of science with the community!



*Dressed as Halo's Master Chief, Darien demonstrates how the sun creates the lunar phases as seen from Earth*

*Photo by Sarah VanZeLe*



*In his mad scientist outfit, Ray enjoys teaching the curious about constellations*

*Photo by Sarah VanZeLe*

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EDITOR: JAMES S. EDGAR  
THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

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<https://store.astroleague.org>**

**Monday, December 17, 2018, 7:30 PM**

**Classroom B, 3<sup>rd</sup> Floor, Center on Church  
20 E. Church Avenue, downtown Roanoke**

## **RVAS Annual Winter Solstice Social**

It's the holiday season! Time again for members and friends to gather for an evening of fun, food and fellowship. The RVAS is providing the beverages. Members are asked to bring a treat or two to share. Our 7<sup>th</sup> annual end-of-year slideshow of members caught in the act at Society events and activities headlines our gathering. But we're leaving plenty of "open mic" time for anyone who'd like to show their latest astro-photos, astro-gizmos or short videos, do short talks or otherwise add to the evening's enjoyment. We'll also have a What's Up sky summary, maybe a game or two, and who knows what else. And reserved Deep Space Mysteries Calendars and remaining unsold copies will be available for \$7.50 (check or exact cash, please).

We're hoping to see everyone at our Winter Solstice Social, especially members who haven't been to a meeting or other activity for a while. So, plan your treats, collect your show-and-tells, circle December 17<sup>th</sup> on your calendar and be sure to join us!

# RVAS from the Past

By Bill Dillon

## RVAS 25 Years Ago

The Newsletter from December 1993 included an article reporting the November 20<sup>th</sup> RVAS "Computers in Astronomy" workshop to have been a success. About 20 people attended the event held at the Roanoke Valley Governor's School and coordinated by members Fred Hoffman and Ray Greenman. Invited speakers included Col David duPuy of VMI's physics and astronomy department and Larry Bohlayer of Celestial Products, Inc. Topics included CCD image processing, as well as planetarium and sky charting software. After a hearty lunch, workshop participants spent the afternoon "playing" with the various programs and software.

RVAS members' expectations were high for the December Geminids meteor shower to light up the Holiday Season. With peak projected to be at 6 p.m. EST on December 13<sup>th</sup>, and a "New Moon" night, **all that was needed was for the weather to cooperate.** (What could go wrong? Check back in January's "RVAS from the Past" to find out.)

The December RVAS meeting was scheduled to feature an "astro-video" by David Thomas titled *A Brief Tour of the Moon*. As reported, David used a method called "afocal eyepiece projection" on his 8" Schmidt Cassegrain telescope with a clock drive to produce his 16-minute video.

## RVAS 10 Years Ago

A photo-colorful Newsletter jam-packed with great articles greeted RVAS members in December 2008. No less than eight Club members showcased their journalistic skills with articles ranging from Starry Night skygazing at Blue Ridge Vineyards (Paul Cafrey), to time-delay integration imaging techniques (Michael Good), to a small scope equipment review (Gary Hatfield).

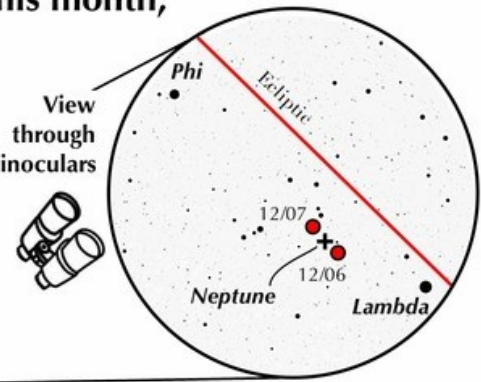
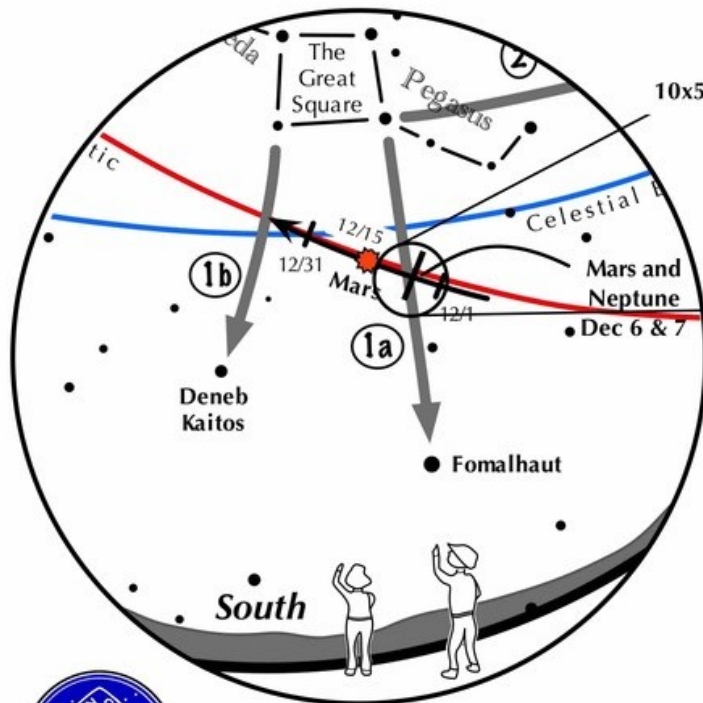
There was a personal-experience article by Roger Pommerenke, taken from his "First Observing Report" written 35 years earlier in 1973, and how starlight guided him in Africa. Dave Thomas wrote of the third largest Moon crater, Clavius. The article included a photo and referred to the inclusion of Clavius in the movie *2001: A Space Odyssey*.

There was an article by Randy Sowden encouraging members to include a little instructional or informational "show and tell" at monthly Club meetings. And there of course was Frank Baratta's Astro-Quiz and his Calendar of Events. All of this along with an article by "The Pulsar Boys", three students from James River High School, Trent Jolin, David Bordett and Casey Thompson, who participated in a NSF funded project at Green Bank studying pulsars (ergo The Pulsar Boys).

The December 2008 edition of our Newsletter clearly demonstrates the great diversity of articles and overall quality product which results from multiple-member participation in its content.



If you can observe only one celestial event this month, consider this one:



### The Scene: Mars Passing Faint Neptune

On December 6 and 7, bright Mars passes faint Neptune, making the 8th planet relatively easy to find with steadily held binoculars – if the sky is clear and dark. Look for Mars at 7:30 p.m. just below the Great Square of Pegasus in the south-southwest.

- Neptune lies immediately to the upper left of Mars on Dec. 6. It will be very faint and to the left of a star of similar brightness. Mars, Neptune and the star will form a small, fat isosceles triangle.
- Neptune lies just to the lower right of Mars on Dec. 7. As the nights proceed, Mars moves proportionally farther away from Neptune.



South-Southwest 7:30 p.m.  
on Dec. 6 and 7

## 2019 Deep Space Mysteries Wall Calendars

The RVAS has Astronomy Magazine's Deep Space Mysteries Wall Calendar for sale to members at the deeply discounted price of \$7.50 each. Regularly \$12.99, the RVAS bought 18 copies of the calendar to sell, first-come-first-served.

Filled with dramatic images of nebulae, spiral galaxies, planets, star-forming regions, and other deep space



mysteries, each month details planet visibility, meteor showers, conjunctions, and other observing opportunities, as well moon phases and major astronomical events. It's a storehouse of information you'll refer to throughout the year.



We're continuing to take members' advance orders and will have any unsold for sale at the December 17<sup>th</sup>

meeting—our annual "Winter Solstice Social." Order by replying to [info@rvasclub.org](mailto:info@rvasclub.org) or calling the RVAS Message Line, 540-774-5651, and giving your name and the number of calendars you'd like (limit of three per member). Bring your check (made to RVAS) or exact cash to the meeting.

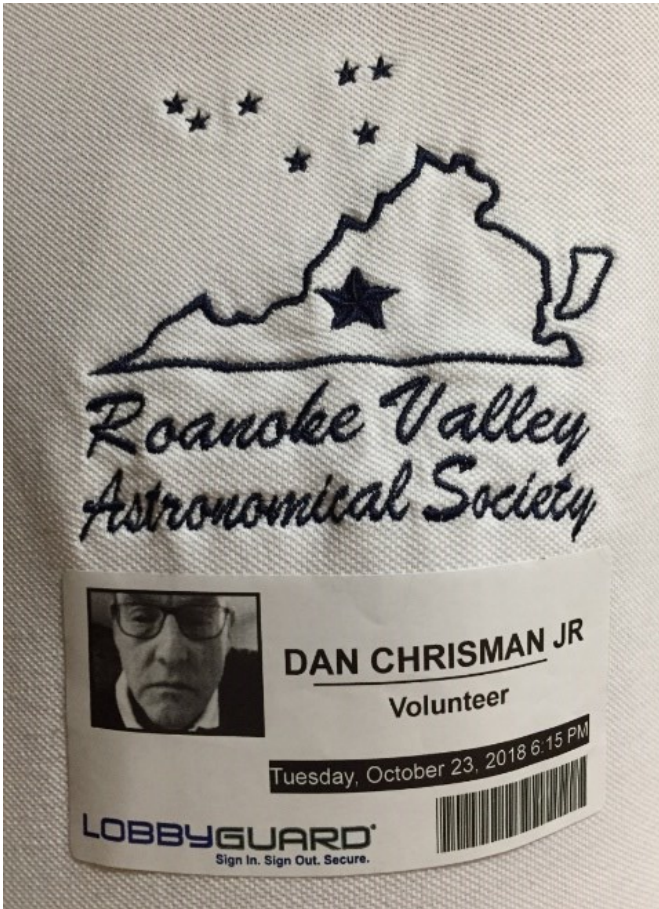
We only purchased 18 calendars and when they're gone, they're gone! Don't delay. Order today!

# An Outreach with Grizzlies

By Ray Bradley and Dan Chrisman

The site for our October 23<sup>rd</sup> astronomy outreach was Glenvar Elementary school, nestled between Poor Mountain and Fort Lewis Mountain. To enter the "Home of the Grizzlies", the Lobby Guard® unit photographed one's visage, scanned one's driver's license, queried a background-check database, and printed one's Photo ID badge.

Being buzzed through, one was welcomed by first-year principal **Mr. Matthew (Matt) Johnson**. Standing next to Principal Johnson was **Dr. Ken**



*Dan Chrisman passes the Security Checkpoint.*

*Photo by Dan Chrisman*



*Ray Bradley enjoys another session of the planetary game with a curious student and her mother.*

*Photo by Dan Chrisman*

**Nicely**, recently promoted to Superintendent of Roanoke County Public Schools.

Although this was Glenvar Elementary School's inaugural "STEM Night" PTA meeting, RVAS participated at Matt Johnson's 2016 Mountain View Elementary and 2018 Masons Cove Elementary "STEM Night" PTA meetings.

Dan arrived in the multi-purpose room where Outreach Director **Ray Bradley** had set up several astronomy games pulled from his red canvas wagon. **Rand Bowden** arrived shortly thereafter and set up his Orion 10" Dobsonian reflector just outside the door. Tonight's primary target would be a full moon, bubbling up from the horizon.

Beginning at 6:30 pm, Principal Johnson organized three thirty-minute periods, partitioned by grade: 2<sup>nd</sup>/3<sup>rd</sup>, 4<sup>th</sup>/5<sup>th</sup> and finally K/1<sup>st</sup>. Typical of most STEM nights, this format ensured a fast pace, non-stop flow of curious minds throughout the evening.

From the start of the first rotation, excited stu-

*(Outreach Continued on page 11)*



Following **Rand Bowden's** advice of "cover one eye with your hand", a student views his first full moon through a telescope while others wait their turn.

Photo by **Dan Chrisman**

dents quickly poured into the room and approached our activity tables. Ray started visitors with the Planetary Board game that teaches the names of the planets in our solar system in order from the sun and shows their relative size using planetary models made from various spherical objects. After completing the Planetary Board game, students

built a 3-D model of the Orion constellation while learning how these patterns in our sky are formed from very distant and differing stars.

Dan ran the planetary weight scales for the evening and squeezed in answers on the nearby library telescope. Before leaving our indoor activities, we offered everyone the handouts about our club and amateur astronomy in general. Then, we directed them towards Rand. We engaged about forty students and parents during the event.

One week later, we received a thank-you note from Principal Johnson, sharing the following:

"I had many, many parents letting me know how much they appreciated the event. I even had one 5<sup>th</sup> Grade mom let me know that when it came to the last rotation when they were to be in the cafeteria for pizza, they skipped the pizza and visited more stations instead! When we get kids more interested in STEM than pizza, we are doing something right!"

Club members, you are welcome to join our next outreach with Grizzlies (capsaicin unnecessary).

## Get Connected!

Want to be more in touch with other RVAS members? Join the RVAS Yahoo Group! Share last-minute observing plans, articles, ideas, astrophotos—you name it. You'll need to have or create a Yahoo email address. Click the link below. Once logged in, provide the information requested, including your real name since the group is only for members and those invited. You'll receive an acknowledgement from the moderator.

[https://groups.yahoo.com/neo/groups/RVAS\\_Club/info](https://groups.yahoo.com/neo/groups/RVAS_Club/info)

For assistance, call the RVAS Message Line (540-774-5651). We'll have you connected in no time!

# West Salem STEM Night

By Ray Bradley, Dan Chrisman, and Mike Hutkin

Since 2014, RVAS members have participated in six Science, Technology, Engineering, and Mathematics (STEM) nights hosted by the West Salem Elementary School's PTA. On 27 November 2018, **Dan Chrisman, Ray Bradley, and Mike Hutkin** continued this great tradition with astronomical activities for the +300 students and family members to enjoy. Dan holds the record for having attended all six events. At the other end of the spectrum, Mike volunteered for his first, and hopefully not last, STEM night. Ray, in between with four West Salem STEM nights under his belt, traces his origins as the club's Outreach Coordinator to the school.

He relays: "I'll never forget that first event for me at West Salem ES in 2016. A few months earlier at Mountain View ES, I assisted **Dan** with observing at their STEM night. Having gained a better understanding of what goes on at these events and wanting to do more, I prepared an elaborate slide show filled with amazing astronomical



*Dan shows a young student how to use a library telescope during a full moon.*

*Photo by Mike Hutkin*



*A student plays the Planetary Board Game.*

*Photo by Mike Hutkin*

pictures and a Stellarium software demonstration for the upcoming STEM night at West Salem ES. While some parents at that event found all my hard work interesting, very few students did. From that experience, I learned a valuable lesson. Kids don't want simply to "SEE" something interesting - they want to "DO" something interesting. I realized that in order to capture a young person's attention long enough to teach an astronomical concept, I needed more **hands-on** activities like the club's trusty astronomical scales calibrated to the gravity of various solar system objects and used at practically all outreach events.

My first idea for an activity came from Rand Bowden's planetary cards that he used to time how quickly students could put the planets in order from the sun. With the addition of scale model planets and a wooden board, the Planetary Board Game was created.

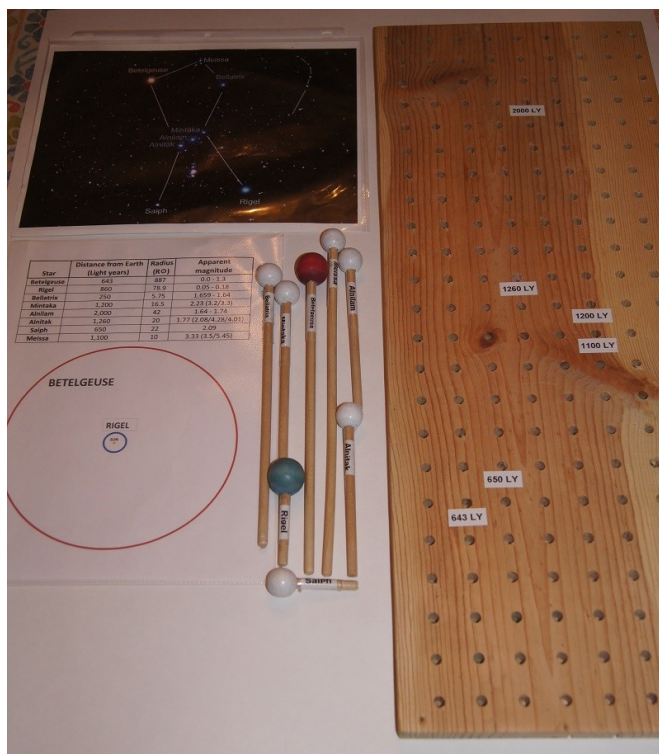
*(STEM Continued on page 13)*



*Planetary Board Game.*

*Photo by Ray Bradley*

To play the game, you start with the planetary cards, asking the player to place them on the board in order from the sun. For students who don't remember the order of planets, we use the mnemonic "My Very Excellent Mother Just Served Us Nachos." Parents love this teaching aid, too! After the cards are properly placed, the player is then asked to imagine shrinking the entire solar system down so that the sun is the size of the gameboard and the planets to the size of the eight planetary models in the kit. The player must then place the scale model of each planet in the magnetized gravity well in front of the matching card. We give



*Orion constellation board game.*

*Photo by Ray Bradley*

hints when needed and use the time to explain some basic features of each planet.

My next idea came from a photograph **Dan Chrisman** sent me of a 3-D model of the constellation Orion he saw at the 2017 Astronomical League conference.

The trick was to evolve this static model into a hands-on activity. The solution came to me while rummaging through scrap material in my workshop. Use wooden balls to represent the stars in the constellation. Glue the stars atop dowel pins cut to length to give the Y-axis. Use a pegboard as a template to drill holes into a wooden plank for the X-axis and Z-axis. Label the holes in the pegboard for the relative distances between stars as viewed from Earth. And voila! You have a hands-on activity to explain what a constellation really looks like in space.

Players place the star-topped dowel pins in their proper holes using a chart with the distance to each star from Earth. Looking down on the completed model shows the stars as they would appear from a spaceship flying among them. The "aha" mo-



*3D Orion constellation model.*

*Photo by Dan Chrisman*



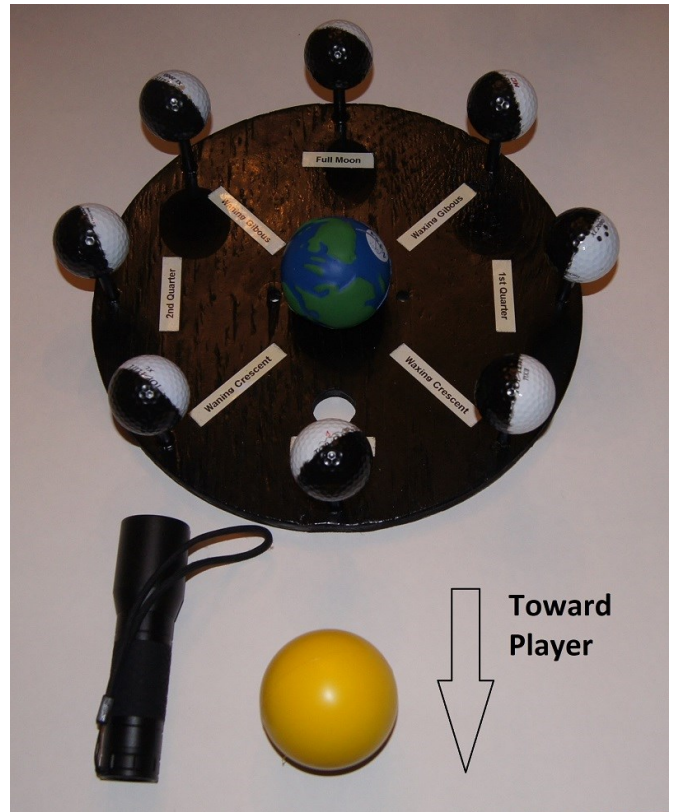
3-D model of Orion.

Photo by Ray Bradley

ment comes when the player steps backs and views the board along its length to reveal the constellation's pattern as seen from Earth. Even kids that can't read, yet, enjoy playing with this pegboard model.

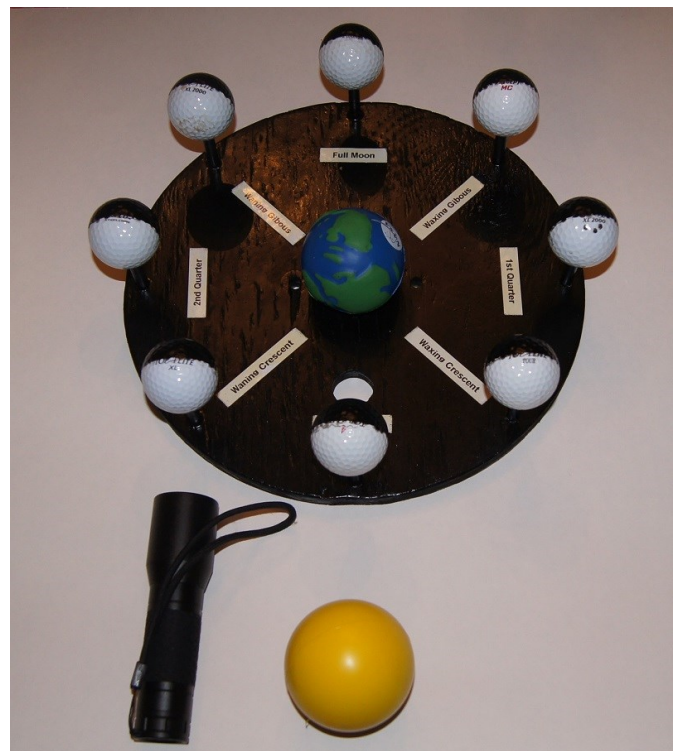
While preparing for outreach events focused on the upcoming 2017 solar eclipse, my daughter, **Sierra Bradley**, found a picture online of a simple model used to demonstrate why a solar eclipse only occurs during a full moon. Our Lunar Phase Game was born from an expansion of this model.

The main component is made from golf balls half painted black which, when placed atop a dowel pin on the board, rotate from a hole drilled at the "terminator". These golf balls represent the moon half lit by the sun and are placed at eight points along the orbital path around the earth sitting at the center of the board. The player must angle the golf balls into the correct position for each moon phase. Few students get it correct at first until



Initial setup of the Lunar Phase Game.

Photo by Ray Bradley



End game.

Photo by Ray Bradley

(STEM Continued on page 15)

(STEM Continued from page 14)

the demonstrator shows that no matter where the moon is in its orbit, the light from the sun always bounces straight back toward the sun.

What started as my novice attempt during that first STEM night at West Salem ES has culminated into a mature outreach program containing a good variety of portable, hands-on activities for practi-

cally all ages. Any volunteer can quickly learn to run each activity. With more activities than members at this event, Mike, Dan and I easily rotated among the activities based on where students and parents showed interest. And we are always looking for ways to improve upon and add to our repertoire. More importantly, though, we are always looking for members eager to volunteer their time to teach a little astronomy to the next generation."

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## Welcome Mat

The Society bids a warm and cordial welcome to Mike and Robin Shorter and their sons, Jacob and David, of Roanoke County, who joined at the November meeting with a family membership. Nearing their 21<sup>st</sup> anniversary, Mike and Robin are both County natives and have made South County their home for nearly as long. He's been a production tire builder for the last 15 of his 24 years with Yokohama Tire Corp. in Salem; she's a homemaker. Mike's interest in astronomy traces back to 8<sup>th</sup> grade science class and a special teacher whose lessons on the subject captured his attention. But it was Jacob, now in 8<sup>th</sup> grade, whose own growing interest in astronomy over the past few years prompted Mike to search the internet for a local club. Hoping to nurture that mutual interest, both attended our September meeting and then November's, and felt welcomed and encouraged to get involved. In between, they attended our South Roanoke County Library outreach, where they were wowed by views of Saturn and the Moon. Mike just ordered a set of 10x50 binoculars for their stargazing, and is looking forward to his and Jacob's gaining further knowledge through membership in the club.

Mike, Robin, Jacob and David, thanks for joining the club! Glad to have all of you with us. We hope you'll become regulars at our meetings and other activities. We'll be happy to share whatever knowledge we may have and hope you'll share the knowledge you gain.

### Are You Receiving Your Newsletters and Other Club Emails?

To save having to download newsletters from our website, these and other items of interest are emailed to members. If you have not been receiving these items by email, please let us know by calling the RVAS Message Line at 540-774-5651. Please also check whether your spam blocker is intercepting our emails.

### Wanted

**Astro photos** by members for display on the RVAS web site. Send to [editor@rvasclub.org](mailto:editor@rvasclub.org)  
**Observing reports** or articles from members about astronomy activities in which they may be involved  
E-mail any material you would like to submit for publication to: [editor@rvasclub.org](mailto:editor@rvasclub.org)

# Monthly Calendar

**MONTHLY MEETING: "Winter Solstice Social", Monday, December 17<sup>th</sup>, 7:30 p.m., Classroom B, 3rd floor, Center on Church, Downtown Roanoke.** Time again for our annual end-of-year get together. Bring a treat or two to share with others. The RVAS will provide the beverages. Bring your latest astro-gizmo, photos, short videos, stories or whatever to share during "open mic" time. We'll have our annual end-of-year slideshow, maybe a game or two, and festive music to add to the holiday spirit. The Deep Space Mysteries you've reserved and any unsold ones will be available for \$7.50 each (check or exact cash, please). See elsewhere in this newsletter for more. Mark the date and plan to spend a fun evening with your RVAS friends!

**RVAS WEEKEND OBSERVING OPPORTUNITIES:** RVAS members observe from various sites, with Cahas Knob Overlook, at milepost 139 on the Blue Ridge Parkway, being our traditional location. For updates on members' observing plans, log onto the RVAS Yahoo Group (RVAS members only) and/or call the RVAS Message Line, 540-774-5651, about an hour before sunset on the indicated dates.

-- **Friday and Saturday, December 7<sup>th</sup> and 8<sup>th</sup>.** Sunset is at 5:02 p.m. Astronomical twilight ends at 6:35 p.m. The Moon sets at 5:38 and 6:24 p.m., respectively.

-- **Friday and Saturday, December 28<sup>th</sup> and 29<sup>th</sup>.** Sunset is at 5:11 p.m. Astronomical twilight ends at 6:44 p.m. The Moon sets at 12:08 and 1:13 a.m., respectively.

-- **Future Weekend Observing Opportunities:** Jan. 4<sup>th</sup> and 5<sup>th</sup>; 25<sup>th</sup> and 26<sup>th</sup>.

**ROANOKE CITY PARKS and RECREATION PUBLIC STARGAZE: Saturday, December 1<sup>st</sup>, 5:45 p.m., Cahas Knob Overlook, milepost 139, Blue Ridge Parkway.** Nonmembers must register with Parks & Rec. at 540-853-2236. Members can call 540-774-5651 for information. (Next session: January 5<sup>th</sup>, 6:00 p.m., Cahas Knob Overlook.)

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## Astro-Quiz

It is possible that Charon, the moon of dwarf planet Pluto, could in the future itself be reclassified as a dwarf planet. If that happens it may well be because of a distinct orbital characteristic of the Pluto-Charon system. What is this characteristic?

**Answer to Last Month's Quiz:** Written by the Alexandrian Greek polymath Claudius Ptolemaeus ("Ptolemy") in the 2<sup>nd</sup> Century C.E., his treatise "the Almagest" was for well over a thousand years taken as the last word on the stars. Stellar positions were updated from time to time by other astronomers, but none made any lasting addition to Ptolemy's constellation list. This changed in 1536 when German globe maker Caspar Vopel added two new northern constellations, Coma Berenices and Antinous, to the classical forty-eight. The stars in both figures had been cataloged earlier by Ptolemy but had not been set up as distinct constellations. Vopel's Coma Berenices survives today, but Antinous does not. Hats off once again to Harry Montoro for correctly identifying the name of the treatise and the role played by these two constellations. Have an answer to this month's quiz (or a future question and answer to suggest)? E-mail it to [astroquiz@rvasclub.org](mailto:astroquiz@rvasclub.org)!