



# BACK BAY OBSERVER

Aug  
2019

*The official newsletter of the Back Bay Amateur Astronomers*

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Thank you to our astro-family for contributing and attending the annual club picnic.

## UPCOMING

- Aug 1 **BBA Club Meeting**  
7:30-9PM  
TCC, Virginia Beach
- Aug 2 **Cornwatch**  
Dusk-Dawn  
Cornland Park, Chesapeake
- Aug 6 **Sun Safety & Observing**  
3-4PM  
Windsor Woods Library, VB
- Aug 8 **Garden Stars**  
8:30-10PM  
Norfolk Botanical Gardens

*For more information, go to*  
[www.backbayastro.org/](http://www.backbayastro.org/)



## **LOOKING UP!** *a message from the president*

I will keep this month's article short and hopefully sweet since I am currently pressed for time. We had a great turn out for our July Boardwalk Astronomy event with over 600 visitors, and there is no reason to think August will be any different. If you want to come experience one of the best events the club holds, try to make it out to the boardwalk on August 13th. On that note, we also had a great turn out for our annual picnic this year with about 40 visitors. I haven't polled everyone yet, but it appears that the new location at the Elizabeth River Park was a great success. There was even a nice breeze during the whole event.

I let the other club officers know last week that in the future I will either have to step down as club president or be the president from afar. My wife and I are planning an extended trip to the Bahamas over the winter. The most likely scenario is going to be that the club officers will designate someone to take over my position. If you have any interest in helping the club as an officer, please don't hesitate to reach out to me or any of the other club officers.

Have a great July and remember to keep "Looking Up". *Shawn Loescher*

*The BBA is a member organization of the Astronomical League.*



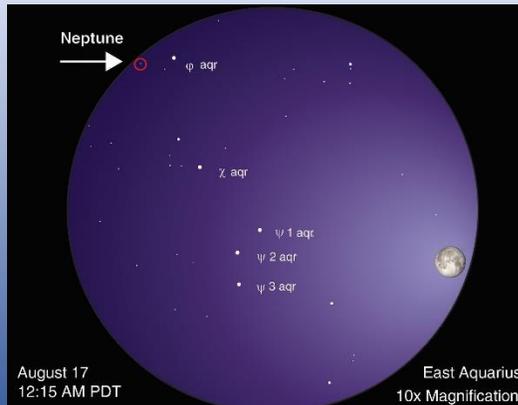
# CHILL OUT: SPOT AN ICE GIANT IN AUGUST

By David Prosper

Is the summer heat getting to you? Cool off overnight while spotting one of the solar system's ice giants: **Neptune!** It's the perfect way to commemorate the 30th anniversary of Voyager 2's flyby.

Neptune is too dim to see with your unaided eye so you'll need a telescope to find it. Neptune is at opposition in September, but its brightness and apparent size won't change dramatically as it's so distant; the planet is usually just under 8th magnitude and 4.5 billion kilometers away. You can see Neptune with binoculars but a telescope is recommended if you want to discern its disc; the distant world reveals a very small but discernible disc at high magnification. Neptune currently appears in Aquarius, a constellation lacking in bright stars, which adds difficulty to pinpointing its exact location. Fortunately, the Moon travels past Neptune the night of August 16<sup>th</sup>, passing less than six degrees apart (or about 12 Moon widths) at their closest. If the Moon's glare overwhelms Neptune's dim light, you can still use the its location that evening to mark the general area to search on a darker night. Another Neptune-spotting tip: Draw an imaginary line from bright southern star Fomalhaut up to the Great Square of Pegasus, then mark a point roughly in the middle and search there, in the eastern edge of Aquarius. If you spot a blue-ish star, swap your telescope's eyepiece to zoom in as much as possible. Is the suspect blue "star" now a tiny disc, while the surrounding stars remain points of white light? You've found Neptune!

Neptune and Uranus are ice giant planets. These worlds are larger than



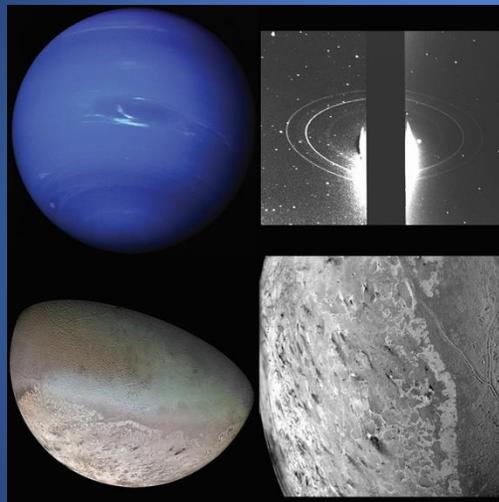
Finder chart for Neptune. This is a simulated view through 10x50 binoculars (10x magnification). Please note that the sizes of stars in this chart indicate their brightness, not their actual size.

*Moon image courtesy NASA Scientific Visualization Studio; chart created with assistance from Stellarium.*

terrestrial worlds like Earth but smaller than gas giants like Jupiter. Neptune's atmosphere contains hydrogen and helium like a gas giant, but also methane, which gives it a striking blue color. The "ice" in "ice giant" refers to the mix of ammonia, methane, and water that makes up most of Neptune's mass, located in the planet's large, dense, hot mantle. This mantle surrounds an Earth-size rocky core.

Neptune possesses a faint ring system and 13 confirmed moons. NASA's Voyager 2 mission made a very close flyby on August 25, 1989. It revealed a dynamic, stormy world streaked by the fastest winds in the solar system, their ferocity fueled by the planet's surprisingly strong internal heating. Triton, Neptune's largest moon, was discovered to be geologically active, with cryovolcanoes erupting nitrogen gas and dust dotting its surface, and a mottled "cantaloupe" terrain made up of hard water ice. Triton is similar to Pluto in size and composition, and orbits Neptune in the opposite direction of the planet's rotation, unlike every other large moon in the solar system. These clues lead scientists to conclude that this unusual moon is likely a captured Kuiper Belt object.

Discover more about Voyager 2, along with all of NASA's past, present, and future missions, at [nasa.gov](http://nasa.gov)



Clockwise from top left: Neptune and the Great Dark Spot traced by white clouds; Neptune's rings; Triton and its famed icy cantaloupe surface; close of up Triton's surface, with dark streaks indicating possible cryovolcano activity.

Find more images and science from Voyager 2's flyby at [bit.ly/NeptuneVoyager2](http://bit.ly/NeptuneVoyager2) Image Credit: NASA/JPL

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 Visit <https://nightsky.jpl.nasa.gov/>

# WHERE WERE YOU ON JULY 20, 1969?



Source: [images.nasa.gov](https://images.nasa.gov)

## A Personal Recollection, by Chuck Jagow

It was hot, being on “The Ranch”, Verdemont Ranch, near Westcliffe Colorado. My mother, sister Rhonda, and I had moved there in the spring of 1966 to live with our maternal grandmother, Grandma Helen. Normally the summertime temperature on The Ranch never got much above middle 80s. I remember that day well, and it must have been near ninety degrees (probably only about 86 in reality).

I was eleven years old and it was the summer that I was first allowed to drive the big International Harvester truck. I was off with it to deliver some fence posts to the older cousins who were fixing fence on the far side of the big pasture. The International did not have power anything. It had a *big* steering wheel that required both arms pulling on that wheel to turn the truck. I could just barely push the clutch to the floor while operating the brake or gas pedal at the same time. I had driven about half way across our big pasture (about 120 acres) when the front end went down. I immediately knew it was not good. I got out and discovered a flat tire. But when I looked in the bed of the truck for the spare, I realized that I had taken the spare out so I could load the fence posts in evenly. I had failed to lift that beast of a tire back into the truck. After a ten-minute hike back down to the Ranch, I located the tire and started rolling it back out to the disabled truck. Once back at the truck, I found that the jack was missing. Another walk back down to find the jack. Grandma Helen had used it in another truck and meant to have me move it back. So now I get the jack, there was no rolling it up to the truck so I had to drag it.

It weighed about fifty pounds. I had enough presence of mind to get the lug wrench from the other truck in case Grandma had borrowed that as well. It took about an hour to get that jack back to the truck and put the spare on.

Finally, I was off to actually deliver the fence posts. My cousins were were sitting out there in the sun waiting, upset that I had been wasting their time.

When I finished that chore, I drove back and parked the truck, took the flat tire out and put it in my mom’s truck (the only street legal vehicle we had) so it could be taken to town and fixed. **It was about then that I remembered that Apollo 11 was due to land on the moon in about an hour or so.**

We had a small 10” portable black & white TV on a flat-top Singer sewing machine in the kitchen. We were able to receive *one* channel that was not full of “snow,” and that was NBC. A heck of a childhood— one TV channel and a tiny little screen. Grandma Helen generally would not let the TV get turned on in the daytime, unless it was noon on a weekday so she could watch her “plays” (soap operas). When I walked into the kitchen I was surprised to see the TV on and at high volume. I went over and grabbed my red stool and started watching.

By then it was late morning, about 10:30 a.m. Neil and Buzz were orbiting the moon and getting ready for the maneuver that would knock them out of lunar orbit and bring them down to the surface. We all watched that tiny screen, Grandma, Mom, Sister, me, and the two cousins who had come back from

fence-fixing. I had gotten knocked off the stool—sucks to be the youngest—and was sitting on the floor looking up only about two feet from the TV. We watched the animations showing the intended path to the Sea of Tranquility.

I couldn't get over Mission Control. Each person had their own *big* TV to watch. Little did I realize until later that most were computer displays showing data, not the video we were being treated to. Once the maneuver was initiated, we waited and watched, glued to the screen. Nobody talked, as we listened to the dialogue between the astronauts and Mission Control. I got yelled at for explaining that the numbers we were hearing were about horizontal movement, vertical movement, and the third number represented fuel remaining in seconds. We watched as we heard of the computer error; how could a computer make an error? The computer on Star Trek never had an error.

I distinctly remember when they announced that Neil had taken direct full control of the lander and was piloting it himself. Images of his less than perfect practice with the Earth-bound lander flashed on a news clip. But Neil

did good and landed that eagle without hitting anything.

To this day, I get tears in my eyes when I hear the recording of Neil stating, "Houston, Tranquility Base here, the Eagle has landed."

We had been sitting, staring at that tiny TV for several hours.

As soon as we got done feeding and watering the horses, goats, rabbits, chickens and sheep, we were allowed to continue watching as Neil came to hop down the ladder. The video feed from the moon was very poor but we got to see it, and it was over a quarter of a million miles away! I remember eventually falling asleep at the kitchen table. My neck hurt like all get-out in the morning. What I enjoyed the most was watching Buzz hop around on the surface.

That is my memory of the day. I have seen various clips of the landing video since, and get choked up each time. This last February, my bride and I went to an Imax theater and watched the documentary of the Apollo 11 landing on the big IMAX screen. I will NEVER forget that experience either, and yes I cried.

**(20 July 1969)** --- Astronaut Edwin E. Aldrin Jr., lunar module pilot, walks on the surface of the moon near a leg of the Lunar Module during the Apollo 11 extravehicular activity (EVA). Astronaut Neil A. Armstrong, Apollo 11 commander, took this photograph with a 70mm lunar surface camera. The astronauts' bootprints are clearly visible in the foreground. While astronauts Armstrong and Aldrin descended in the Lunar Module (LM) "Eagle" to explore the Sea of Tranquility region of the moon, astronaut Michael Collins, command module pilot, remained with the Command and Service Modules (CSM) "Columbia" in lunar orbit.

Source: [images.nasa.gov](http://images.nasa.gov)





## Summer Milky Way Rising

28mm f/3.5  
121 second exposure at ISO 800  
Coinjock NC

By Kent Blackwell



## CLUB MEETING

Our July meeting was held during our annual club picnic at Elizabeth River State Park.

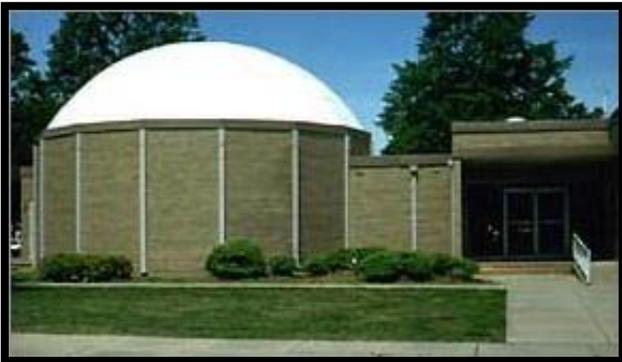
Our next regular club meeting will be held on August 1<sup>st</sup>. George Reynolds will present the video “Cosmic Collisions.”

**The Back Bay Amateur Astronomers meet on the first Thursday of each month from 7:30 – 9pm.**

Typically, we meet at TCC Virginia Beach on the second floor of **Building J—the Science Building**, in room JC-11. (June meeting will be held in JC-16)

Occasionally, we meet at either TCC’s planetarium on the first floor, or at the Plaza Middle School planetarium.

**All meetings are free and open to the public.** After normal business, there is usually a presentation.



The **Chesapeake Planetarium** offers free programs to the general public on Thursday nights at 8:00.

For reservations call Chesapeake Public Schools between 8:00 a.m. and 4:00 p.m. weekdays. (757-547-0153) For more details, visit: <https://cpschools.com/planetarium/public-programs/>



**Our friends at VPAS (Virginia Peninsula Astronomy/ Stargazers) offer free star gazing at the Virginia Living Museum, beginning at sunset on the second Saturday of every month.**

<https://thevlm.org/event/s/planetarium-shows/evening/>

# Table of Interesting Objects

By Bill Rust

This table shows the position of objects that I consider to be beautiful enough to spend the time and effort to view or capture. Positions are within roughly an hour of meridian transit during the new moon on 1 August 2019. The sky will be as dark as it is going to get for any given site.

This table gives the name and location of galaxies, star clusters (open or globular), bright or planetary nebula (B.N. or P.N), that are a reasonable size and have enough air under them to allow enough time to image. I don't image below -20 declination around here because typically it "gang aft agley".

The distant, faint or huge objects are omitted in favor of objects that can be imaged with prime focus or can potentially be captured using a focal reducer.

The table translates as follows:

- Right Ascension (RA) in hours, minutes, seconds and decimal format
- Declination (DEC) in north (N) or south (S) degrees, minutes, seconds and decimal format
- Size is in arc minutes so you can get the right equipment to image set up.
- Magnitude is Visual
- Surface Brightness (SB)
- Altitude is computed for 37 deg. N Latitude, so I can tell how soon I the object will get behind my tree. Alas.
- Messier No. = M
- New General Catalogue (NGC) = N
- Other catalogue designations = PAL, SH2, and IC.

## Interesting Objects at New Moon, 1 Aug 2019

	RA (HR)	(MIN)	(SEC)	LST @2400 decimal	N/S	DEC (DEG)	(MIN)	(SEC)	decimal	Size (ARCMIN)	Mag	SB	Max Alt @ LAT 37
8-1-2019 new moon				20.6									37
Galaxy				RA decimal									
IC1308	19	44	58	19.749	S	14	48	3	-14.801	15.5X14.5	8.7	14.4	38
N6946	20	34	52.3	20.581	N	60	9	13.2	60.154	11.5X9.8	8.8	14.5	67
Cluster													
PAL 11	19	45	14.4	19.754	S	8	0	26	-8.007	10	9.8		45
M2	21	33	27	21.558	S	0	49	23.7	-0.823	15X15	6.6		52
M15	21	29	58.3	21.500	N	12	10	1.2	12.167	18	6.3		65
M71	19	53	46.4	19.896	N	18	46	45.1	18.779	7.2	8.4		72
B.N., P.N.													
N6974	20	51	4.3	20.851	N	31	49	41	31.828	30X30			85
N6960	20	45	38	20.761	N	30	42	30	30.708	30X60			84
SH2-115	20	34	30	20.575	N	46	52	0	46.867	30X20			80
SH2-112	20	33	54	20.565	N	45	39	0	45.650	13X13			81
N6992	20	56	19	20.939	N	31	44	35.9	31.743	60X60			85
N6995	20	57	0	20.950	N	31	13	1.2	31.217	60X60			84

# BRINGING ASTRONOMY TO THE PEOPLE *of Hampton Roads*



**The Back Bay Amateur Astronomers, Inc.** is a 501(c)(3) nonprofit organization dedicated to astronomy outreach.

We are a 100% volunteer-run organization that relies on our dedicated members to “bring astronomy to the people of Hampton Roads.”

Anyone who has volunteered at one of our events can tell you that it is incredibly rewarding to show the moon to someone who has never seen it through a telescope. You never know whom you’ll inspire to become the next great astrophysicist. At the very least, you may instill within someone a passion to look up at the sky.

Please help us achieve our mission and sign up to volunteer. **All experience levels welcome.**

See our monthly [calendar](#) for events.



## The Moon and the Muse

The BBAA set up in the parking lot outside the Muse Writers Center in Norfolk for the annual Ghent Market Shoppes summer party. Between the clouds, guests were able to view the Moon and Jupiter.

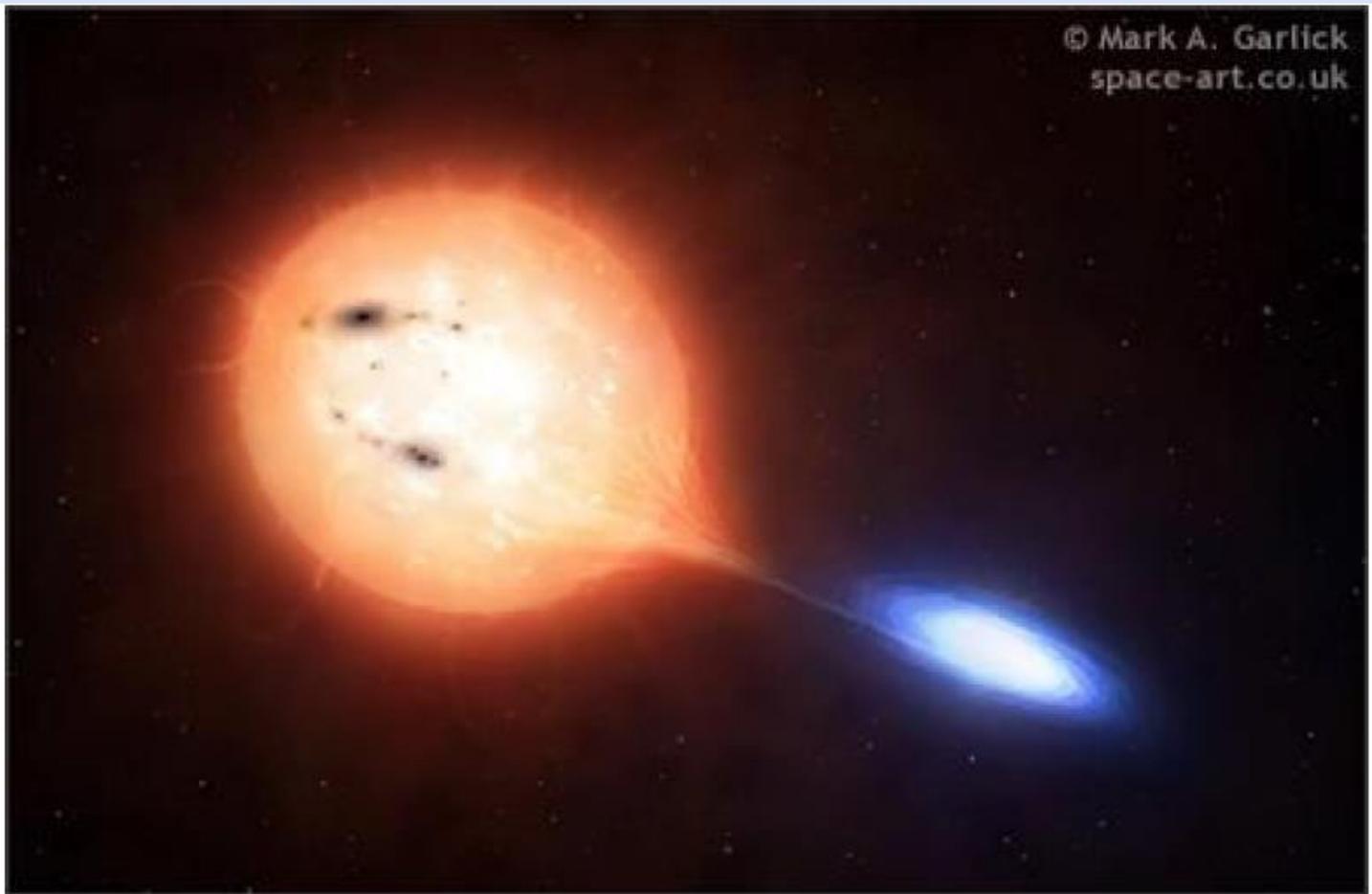
## Boardwalk Astronomy



Approximately 600 people stopped to look through telescopes at the third Boardwalk Astronomy event of 2019. The skies stayed clear all night and guests were treated to views of Jupiter, Saturn, and the Moon.



# I LIKE THE STARS, THE STARS THAT GO BOOM



**By Rich Roberts**

In their 1988 classic, *Lady Tigua and Bunny D.* of L'Trimm sing about their love for the cars that go boom. I have similar affection for Novae, the stars that go boom. Any second now, a good one in Scorpius is getting ready to ignite.

Novae come in several forms; Supernovae (SNe), Recurrent Novae (RNe), Classic Novae (CNe), and Dwarf Novae (DNe). In each case, these systems comprise of a white dwarf star (WD) orbiting either a main-sequence or red-giant star close enough to accrete matter onto the WD. Although the physical processes of the eruptive event in each nova type are vastly different, you see the same thing when viewing through a telescope. A very dim star gets really bright and then fades back towards quiescence over a period of time. The spectrum (I'll be speaking on stellar spectra at the September BBAA meeting) and the shape of the eruption's

light curve tell us what caused the star to go boom, as well as give us insights into stellar inner workings and processes.

The variable star observers who go after these types of cataclysmic variables often refer to themselves as hunters. They're hunting for the outburst, hoping to be the first one to catch eruption of energy and alert the astronomical community to the star's violent awakening. The dwarf novae are considered small game, as they have relatively small (2-6 magnitudes in V) outburst due to instabilities of their accretion disc on time scales of several months. The small game can still be tough and rewarding. I was super stoked to actually see dwarf novae U Gem at 11.8 vis on 3/13/19.

Although the star outbursts every 3-6 months,

the previous 12 times I attempted to observe the star, I saw nothing. I had missed the previous two outburst by a matter of two and three days respectively. Bigger game, like GK Perseus, outburst on the order of a few years. GK Per has a very long fade time, so I was able to catch the tail end of its last outburst in October of 2018.

A Classic Novae outburst occurs due to the material (mostly hydrogen) accreted from the secondary star onto the WD reaching high enough temperatures and pressures to trigger a thermo-nuclear runaway event (TNR). Essentially the white dwarf becomes an Earth-sized hydrogen bomb. A Recurrent Novae is simply a Classic Novae with multiple occurrences. These Recurrent Novae are the biggest game out there. Recurrent Novae can go as long as 100 years between outbursts. Currently only 10 RNe are known to exist in the Milky Way. 10 more likely candidates exist, but multiple outburst have yet to be observed in the candidate stars in order to confirm them.

Although Recurrent Novae are rare and outburst infrequently, we have one ready to go off at any moment, U Scorpii. The AAVSO recently sent out an alert requesting several observations per night of this star. Frequent monitoring of U Sco is important because it is unique in how fast it rises and falls from its peak magnitude. U Sco holds the record in this regard as the fastest nova out there. It rises from its quiescent state of 17.6 V (with deep eclipses to 18.9 V) to its peak magnitude of 7.5 V in just 6-12 hours. U Sco then takes only 2.6 days on average to fade by 3 magnitudes in V. Most Recurrent Novae increase in B-Band flux prior to outburst which helps give an important indicator to astronomers when it is about to blow so they can train their instruments on target. U Sco gives no such indication, so the dedication of amateur astronomers is critical in studying this star since it falls on backyard observers to alert the community when U Sco awakens. In order to catch U Sco's last outburst, the star averaged being observed by 7 different amateur astronomer across the globe per night.

This level of dedication is important since recurrent novae outbursts are not well understood due to their rarity

and the infrequency of their outbursts. U Sco is by far the best observed and studied of these objects (I was able to read 48 papers on the star posted on arXiv.org.) since it has the most frequent outburst rate. But still, only the last two outbursts (January 2010 and February 1999) were well documented by sophisticated telescopes in multiple wavelengths for study. RNs are of interest since many believe they are likely progenitors of the Type Ia supernova. The distinction between a nova and a supernova is that a supernova explosion actually destroys the star. I've seen a model of U Sco which predict it will explode as a Type Ia Supernova in 700,000 years, but it was fairly simplistic and made some broad (and subsequently debunked assumptions). Newer research is starting to take us in a direction that two types of Recurrent Novae actually exist. One group is modeled after RS Oph and the other after U Sco and that the U Sco group is actually very unlikely to supernova. The reasons for this are very interesting.

In 1930, at the ripe old age of 20, Subrahmanyan Chandrasekhar figured out that white dwarf stars must have an upper mass limit due to a bunch of complex quantum physics. This limit was determined to be 1.44 times the mass of the sun. If a white dwarf exceeded this mass, (simplistically) the internal nuclear forces of the WD's atoms can no longer hold up against the WD's gravity and it collapses, releasing tremendous amounts of energy which will blow the star apart. So, this means white dwarfs can't be born this massive or they'd never be white dwarfs. In order to reach the Chandrasekhar limit, they have to be born as lower mass WDs and then gain mass by some process. As mentioned earlier, these WDs are accreting stolen mass from its main sequence or red giant sibling. U Sco, like all known RNs, is a very high mass WD near the Chandrasekhar Limit. So the question becomes, is U Sco actually gaining mass over time?

Several astronomers have attempted to determine the mass of U Sco's white dwarf. The range is between 1.2 and 1.4 solar masses, with 1.37 being the accepted average. The WD's companion star is estimated to be around 0.88 solar masses. The key in understanding

U Sco's fate is the accretion rate and how much mass gets blown away with each runaway thermonuclear explosion. Interesting enough, we've measured the average accretion rate (how much mass the WD gains) to be  $3 \times 10^{-7}$  solar masses per year. We have also determined that the amount of mass lost in each of the last two outburst was  $3 \times 10^{-6}$  solar masses (or 1 Earth mass). So, with an average of 10 years between outbursts, it appears the white dwarf is in some sort of equilibrium (or near equilibrium state).

The numbers are really too close and the uncertainties not well enough defined for us to determine if the white dwarf is increasing in mass or not. Is it possible that RNs are not in fact a Type IA Supernova waiting to happen as we long thought, but in fact some odd special case?

The accretion and ejection rates are not the only interesting thing going on with U Sco. Both the white dwarf and the ejecta from its near decennial outburst have unusual spectra, which tells us about the composition of both. Almost all white dwarfs are comprised of carbon and oxygen. U Sco's ejecta shows high levels of nitrogen, helium, and neon, elements you wouldn't expect to find in a standard C-O white dwarf thermonuclear explosion. Studies of the white dwarf have shown a ratio of neon to oxygen to be 1.69, again

way higher than you'd expect to find in a typical C-O white dwarf. Many now suspect that the U Sco white dwarf is an Oxygen-Neon-Magnesium WD. O-Ne-Mg WDs are the stellar remnants of high mass stars (initial mass between 8 to 10 solar masses) that just weren't quite massive enough to collapse into a neutron star after exhausting its nuclear fuel. These white dwarfs are very rare and have high initial masses. Sound familiar? Theory also suggests that a O-Ne-Mg white dwarf would not explode as a Type Ia supernova but would instead collapse into a neutron star or millisecond pulsar if it were to reach the Chandrasekhar Limit.

In conclusion, U Scorpii is a fascinating and scientifically relevant system. It's rare. It's not fully understood. It's controversial. It's our best bet to understand this type of novae. It goes boom, and it's about to go boom any day now. The more people watching this star in order to catch the first seconds of its pending outburst, the better. U Sco is almost directly north of Antares (about 8.7 deg) making it easy to find. Jupiter is currently a few degrees to the East, so you'll likely be in the neighborhood. So go download a chart that matches your equipment from the AAVSO and check it out. You could be the one that bags the big game and provide an invaluable service to the professional astronomical community.

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**Rich Roberts** has been fascinated by Astronomy since a child and hopes his 15 month old son develops a similar passion. He has a B.S. in Physics from Virginia Tech and a MBA from Averett University. After college, he served in the Navy as a submarine officer aboard USS MINNEAPOLIS-ST PAUL and a Liaison Officer for CJTF-HOA in Djibouti, Africa. He now works as an account executive in the building automation industry and spends clear nights visually recording variable star magnitudes with his 11" SCT in Carrollton, VA.



# MAKING CONTACT

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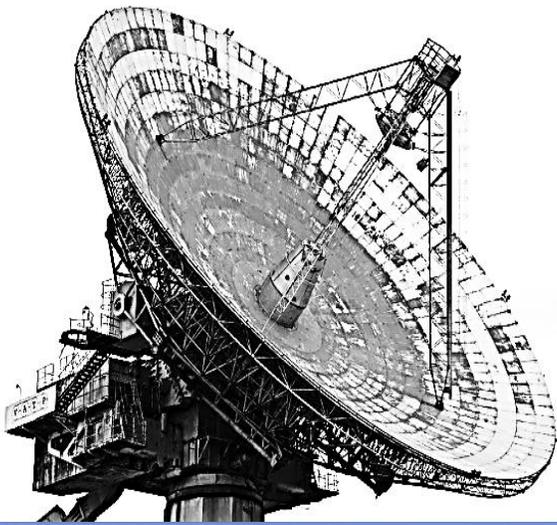
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[Groups.yahoo.com/neo/groups/backbayastro/info](https://groups.yahoo.com/neo/groups/backbayastro/info)

## TELL US ABOUT IT!

Whether you're a seasoned astro-photographer or a beginner enjoying your first view through a telescope, we'd love to hear about your experience at club events or doing astronomy-related activities on your own. Please submit your articles and/or photographs for publication in the Observer.

Email [editor@backbayastro.org](mailto:editor@backbayastro.org)

# Upcoming BBAA Events

## August

<b>Aug 1</b>	7:30-9PM	TCC Virginia Beach, Science Bldg J	<b>BBAA Club Meeting</b>	Club business, then presentation by Dr. Kunio Sayanagi
<b>Aug 2</b>	Dusk-Dawn	Cornland Park, Chesapeake	<b>Cornwatch</b>	BBAA members-only observing
<b>Aug 6</b>	3-4PM	Windsor Woods Library, VB	<b>Sun Safety and Observing</b>	Public solar viewing
<b>Aug 8</b>	8:30-10PM	Norfolk Botanical Gardens	<b>Garden Stars</b>	Public observing
<b>Aug 13</b>	6-11PM	24 <sup>th</sup> Street Boardwalk, Virginia Beach	<b>Boardwalk Astronomy</b>	Public observing
<b>Aug 16</b>	8:30- 9:45PM	Croatan Public Beach	<b>Stargazing in Croatan</b>	Public observing
<b>Aug 17</b>	10AM-1PM	Elizabeth River Park, Chesapeake	<b>Saturday "SUN" day</b>	Public solar viewing
<b>Aug 19</b>	6-8PM	Billsburg Brewery, Williamsburg	<b>Art Unplugged Paint Night</b>	Public observing during space- themed paint night
<b>Aug 24</b>	7:30-10:30	Northwest River Park, Chesapeake	<b>Night Hike</b>	Public observing
<b>Aug 24</b>	8PM-12AM	Northwest River Park, Chesapeake	<b>Skywatch</b>	Public observing
<b>Aug 30</b>	Dusk-Dawn	Cornland Park, Chesapeake	<b>Cornwatch</b>	BBAA members-only observing
<b>Aug 31</b>	Dusk-Dawn	Chippokes Plantation, Surry	<b>Nightwatch</b>	BBAA members-only observing

## September

<b>Sep 5</b>	7:30-9PM	TCC Virginia Beach, Science Bldg J	<b>BBAA Club Meeting</b>	Club business, then presentation by Rich Roberts
<b>Sep 10</b>	6-11PM	24 <sup>th</sup> Street Boardwalk, Virginia Beach	<b>Boardwalk Astronomy</b>	Public observing
<b>Sep 12</b>	8-9:30	Norfolk Botanical Gardens	<b>Garden Stars</b>	Public observing
<b>Sep 14</b>	10AM-1PM	Elizabeth River Park, Chesapeake	<b>Saturday "SUN" day</b>	Public solar viewing
<b>Sep 21</b>	7-11PM	Northwest River Park, Chesapeake	<b>Skywatch</b>	Public observing
<b>Sep 27</b>	Dusk-Dawn	Cornland Park, Chesapeake	<b>Cornwatch</b>	BBAA members-only observing
<b>Sep 28</b>	Dusk-Dawn	Chippokes Plantation, Surry	<b>Nightwatch</b>	BBAA members-only observing

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Check for details, updates, cancellations, and more on our website

[www.backbayastro.org](http://www.backbayastro.org)

Click on our [event calendar](#).