May/June 2018

★BUFFALO ASTRONOMICAL ASSOCIATION★

THE SPECTRUM

SHINING NEW LIGHT ON BLACK HOLES

What is the Hubble Telescope?

BAA Time Warp

Member Images

The Official Newsletter of the Buffalo Astronomical Association

ABOUT THE COVER

Image of the Moon taken by Mike Anzalone using a SmartPhone.

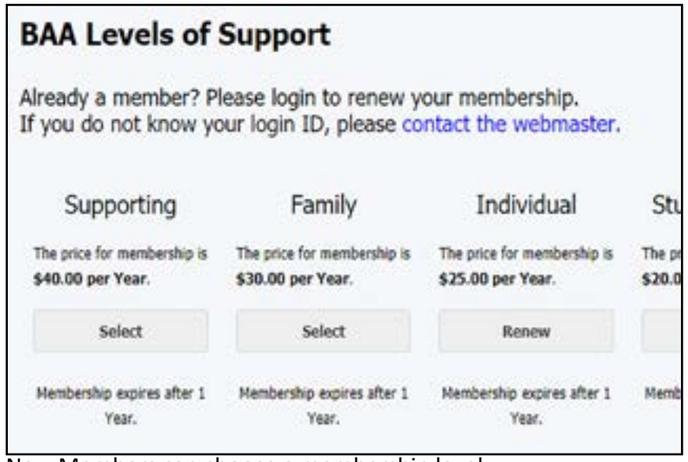
Renew your BAA membership in 3 easy steps

Visit http://www.buffaloastronomy.com

Non-members can sign up by clicking on “Join the BAA”
Current members can renew by clicking on “Membership renewal”(you will be asked to login)

#1

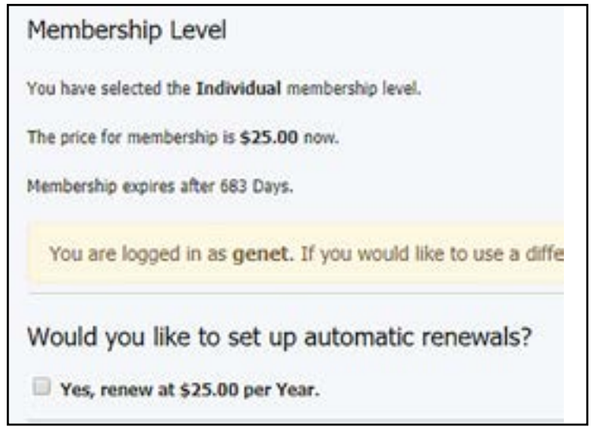
#2



New Members can choose a membership level

existing members can choose to renew current level or choose a new level.

#3



PayPal Check out
The safer, easier way to pay

Confirm your Membership Level and checkout using Paypal where you can pay with a Credit card/Debit Card or your Paypal balance

FIND US ONLINE

Find us on Facebook

Follow Us On twitter

Help Support The BAA by choosing the BAA as your charitable donation within Amazon. Every little bit helps!

amazonsmile
You Shop. Amazon Gives.

Instagram

Online at
www.buffaloastronomy.com

CALENDAR

May 11	7:30 pm	General Meeting
May 12	Dusk	Wilson Star Search
June 2		Public Night @ BMO
June 8	8pm	BAA Election/Pizza Party/General Meeting
June 9	Dusk	Wilson Star Search
June 16	8pm	Public Night @ BMO
July 7	8pm	Public Night @ BMO
July 14	Dusk	Wilson Star Search
July 20	Dusk	BAA City Astronomy @ Buffalo Outer Harbor
July 21	8pm	Public Night @ BMO
August 4	8pm	Publicv Night @ BMO

SEND CALENDAR EVENTS TO
Mike Humphrey thespectrum@buffaloastronomy.com
FOR THE LATEST INFORMATION ON CLUB EVENTS,
visit http://www.buffaloastronomy.com/events

MEMBERSHIP APPLICATION

You can join (or renew) at the organization web site, http://www.buffaloastronomy.com.
Click the 'Membership' Tab. To Join by mail Send funds to address shown along with the following information: Name, Address, Phone Number, Special Interests in Astronomy, Do you own a Telescope? (If so, what kind?), and where you first heard of The BAA.

BAA MEETINGS

All meetings are held at the Buffalo State College classroom building. For directions to the location and more information see the last page.

GENERAL MEETING

7:30 P.M. room C122
Classroom Building

STELLAR NURSERY MEETING (Kids under 10)

7:00 P.M. room C122
Classroom Building

"TUESDAY" NIGHT IMAGERS MEETING

AS POSTED by Dan Marcus via E-mail @ BMO

GENERAL MEMBERSHIP MEETING

The Buffalo Astronomical Association holds its regular monthly General Membership Meeting on the second Friday of each month.

BOARD OF DIRECTORS MEETING

The Board of Directors Meeting is held on dates and at locations scheduled by the board. Information provided to The Spectrum will be published. The meetings are open to all members of the Club in good standing. Attendance is encouraged.

BAA Directory

CLUB OFFICERS

PRESIDENT
Mike Anzalone
VICE PRESIDENT
Mike Humphrey
SECRETARY
Neal Ginsberg
TREASURER
DaRand Land

AT-LARGE-DIRECTORS
Noah Erhart
Taylor Cramer
Steve Smith

COLLEGE OF FELLOWS
Rowland Rupp

BMS RESEARCH ASSOCIATE
Alan Friedman

OBSERVATORY DIRECTORS
Dan Marcus
Gene Timothy

SPECTRUM EDITOR
Mike Humprey

WEBMASTER
Gene Timothy

AD-HOC OUTREACH COMMITTEE
Jim Lehman
Tom Heyer

MEMBERSHIP CHAIR
Dennis Bartkowiak

CHECK THE WEBSITE

BUFFALOASTRONOMY.COM

The BAA website not only has news and information about our association, but also a variety of features to manage your membership and connect with other club members. Current members can post photos, trade gear, pay dues, manage discount magazine subscriptions, swap stories in the forum, and more. Questions about the site? Need a hand to get your account set up? Contact webmaster@buffaloastronomy.com

BAA T-Shirts

Show your support for the BAA

The BAA has a new logo and with it we have new T-Shirts available for Purchase. each T-Shirt is $10 and can be prepaid and ordered by seeing either Dennis bartKowiak or Gene Timothy.

Membership Update

104 current members as of 5/8/2018
31 are Supporting
39 are Family
22 are Individual
12 are Student/Senior

Welcome to our new and renewing members:

Gwen Alegre
John DeWitt
Holly Cohen
Christina Donaghy
John Jamulla
Robert Stall

if you have not renewed your membership and would like to do so please visit the Website

Treasury Update

Account Balances (as of 5/9/2018)
PayPal - $1,009.41
Checking - $963.48
Money Market - $25,022.86
Total - $26,995.75

MAY GENERAL MEETING

JOIN US FOR THE MAY GENERAL MEETING

Our May general meeting will be held at buffalo State College Classroom C122 @ 7:30pm. Member Richard Wilds will be presenting a talk on “Dark Nebula”

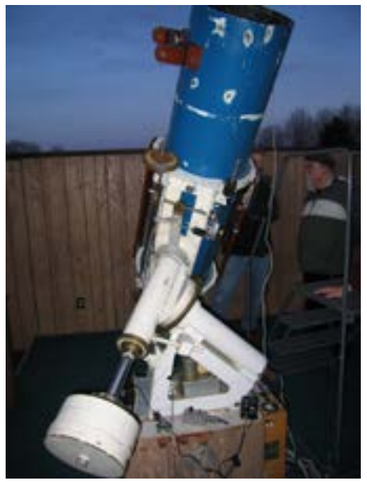
BAA Marketing Materials

The BAA has ordered new marketing materials to represent the association while at public Outreach events. We have a new table cloth with logo as well as 2 new banners for display at the Observatory during Public Nights, Wilson Star Search and at Wilson Pointe Star parties

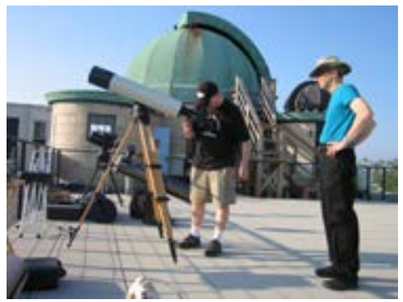
“Elmwood Sidewalk Astronomy”
Stardate 20 April 2007

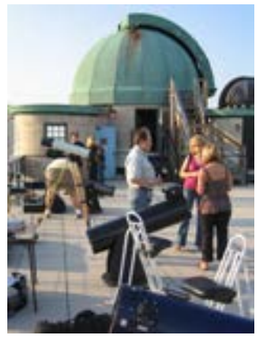
Astronomy Day at the BMO
Stardate 21 April 2007

Astronomy Day at the BMO
Stardate 21 April 2007 (continued)



"Starlights and Bites" at the Buffalo Museum of Science.
Stardate 2 June 2007





Hello all!

Dennis, the BAA's new membership chair (membership@buffaloastronomy.com), here with some exciting information for you about our updates and transformation of the membership process. I have been working hard in conjunction with Gene Timothy to fully renew, expand and customize our interaction as complete group. I am proud to announce to you this simple and completely online connection process. In order to help us keep pace and grow, this electronic connection is integrated with additional member only benefits while providing a solid foundation for us to serve and easily communicate together.

Our process of joining and renewal has now become even easier than before. We can now accept multiple forms of support as well as traditional ones. Has your active participation slipped your mind? We have moved to a rolling year membership in which you will be notified at 90, 60 and 30 days before the end of your active participation. Renewal is just a simple click away. At the following link;

http://buffaloastronomy.com/login-2

You now have access to your personal profile, your account, members only directory, members only forums, and opportunities to share and volunteer at community events and activities. With your level of support you receive instant communication and response along with any necessary reminders. Please check it out and stay tuned for even more coming in September 2018.

I have made the attempt to integrate previous information and ways of recording things in this update and there have been a few glitches. I have addressed any that previously came up. If you have any questions or issues please contact me so that I can personally resolve the situation. Of course, during this update your active membership may have lapsed and any reminders inadvertently missed by me. You can renew or join again today. If you are unable to log in or you would like to check your membership status, please let me know. Feel free to email, text or call me.

Thank you for your continued support and looking forward to all the exciting opportunities we have ahead.

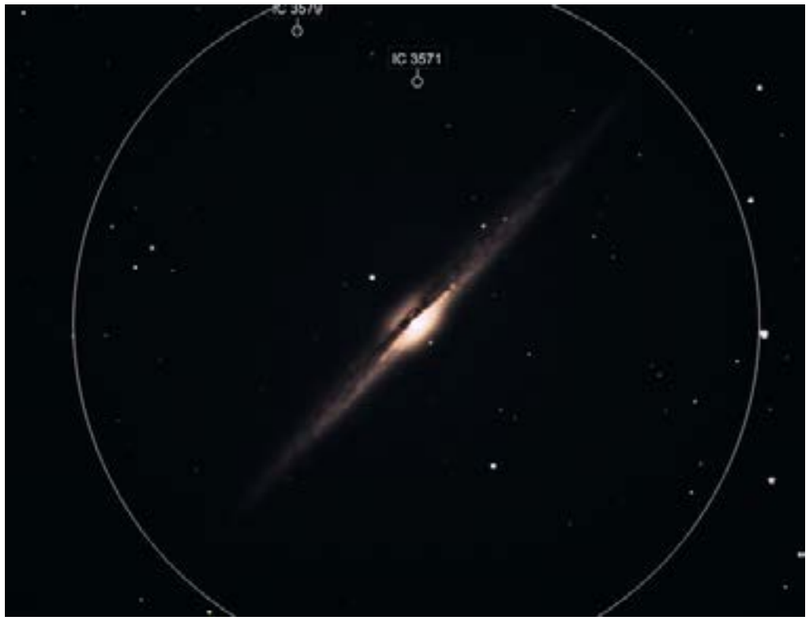
Membership Login -

http://buffaloastronomy.com/login

membership@buffaloastronomy.com

Dennis Bartkowiak (716) 207-2316

ATTENTION OBSERVATORY USERS: The roof rail covers are off till November 2018!



The Tuesday night crew has been wrestling with the clubs ATIK off axis guider, and has come to the conclusion we need to try using the field flattener on the NP101 to get good enough images to consistently guide with. The Board has approved the purchase of the needed hardware. I went to NEAF to purchase the needed parts and to my dismay they did not have any, had to mail order the parts! I am now waiting for the proper rings to attach the ATIK off axis guider to the NP101is field flattener to arrive in the mail. We have also found that if the temperature changes during the night, you have to refocus the C-14 to keep the image sharp. Since the planets have not been easily visible on "Tuesday Nights" we have not had a good chance to really test the optics on the C-14, but they do appear to be crisper since we last collimated the C-14. Using the NP101 for guiding and imaging with the C-14 and focal reducer that we can do 10 minute guided subs with the C-14. NEAF update- Went to Bob's Knobs talk, he mentioned that if you crank down toooo hard on the collimation screws you can warp the secondary mirror. Now we all know a person who likes screws tight :-) and he decide to loosen them and re-colliminate the C-14. When Mike P and I loosened and "properly" tightened and reasonably re-collimated the C-14 we ran out of time to properly test the optics. We will do so next time we get a good night so stay tuned. If there is any improvement it will be slight. But anything we can do to sharpen up the images for the upcoming apparition of Jupiter, Saturn and Mars will be welcome!

Tuesday Night at the Observatory:

As you can see the fun never stops at the Observatory! We will soon be thinking of imaging the Planets especially on Moonlit nights. We have access to an atmospheric dispersion correction device to help with imaging the planets when they are low on the horizon. I have acquired a 8 position motorized filter wheel so we can now easily use the L, R, G, B, methane and IR filters for imaging Jupiter, and Saturn. Should be a great summer if imaging and visual fun. Since it is Galaxy Season, we decided to try for a NGC4565 using the C-14 and the NP101 for guiding. Although we did not take the much needed flats here is a combined image made up of 5 minute subs and 10 min subs put together by Derek Bill.

Loaner Scopes:

The Observatory has several loaner scopes you can check out for 4 weeks at a time. We have a Celestron 8" on a tracking German Equatorial Mount and a 6" Dobson. If you wish to borrow one of these scopes, see Gene Timothy on a "Tues" night.

Astronomy Adventures: Do you want to chase and Asteroid occultation, Grazing Lunar Occultation, Clear dark skies to image? I'm always up for an adventure, so give me a call. I will also be posting to the Tues group as well as on our web site any ISS transits of the Sun or Moon.

See you at the Observatory!
Daniel Marcus
Gene Timothy

Public Night @ BMO April 7th

Astronomy Day 2018 @ The BMS April 28th










Alden Intermediate School Science Night April 20th










The BAA provided solar and Lunar observations as well as some early night time telescopic viewing and astronomy related activities- telescope demonstrations, meteorite and moon cratering presentations, and other astronomy activities at the Alden Intermediate School's Astronomy Themed Family Fun Night Friday, April 20th from 6-8 PM. It was very well attended and enjoyed by all

Astronomy @ Penn Dixie Fosil Park and Nature Reserve Saturday April 21st






Celebrate Global Astronomy Month for 2018


The busy halls of the Buffalo Museum of Science during Astronomy Day 2017.
Image Credit: Mike Anzalone / Buffalo Astronomical Association

Global Astronomy Month is organized each April by Astronomers Without Borders and is the world's largest annual celebration of astronomy. GAM returns for 2018 (#GAM2018) with more exciting programs for astronomy enthusiasts worldwide. Featuring events dedicated to stargazing, sharing astronomy with the public, internet streaming of telescope views, and even art inspired by the wonders of the universe, GAM serves to showcase the wonders of the universe to everyone.

.This year's theme centers around the Moon: a familiar sight to people all around the world. In many ways the Moon is the ideal astronomical object for GAM, since our satellite is so bright and easily recognized; it can be seen in daytime as well as night, is so large in our sky that it can be readily observed without a telescope, and is visible to observers around the globe regardless of their hemisphere or the amount of light pollution in their sky! The Moon has fascinated cultures around the world for thousands of years, and continues to fascinate and delight people of all stripes in the present. With that in mind #GAM0018 featured many programs focused on observing the Moon and exploring its impact on our world.

You can find events held around the globe on their world map of events, or search by country on their event listings page. Of course you can also find astronomy events in the United States by using the Night Sky Network's astronomy events page. If you are in a club and you have entered your event on the Night Sky Network, you can also submit your public event to the events page on the AWB website for even more publicity!

A successful Astronomy Day event held by the Back Bay Amateur Astronomers at the Virgina Beach Central Library.
Image Credit: Leigh Ann Lagoe / Back Bay Amateur Astronomers

BAA Dinner Banquet @ Rizotto









Over 50 BAA members attended this year's banquet organized by Mary and Pat Hays and assisted by Irene and Paul Ziarnowski. All enjoyed a great night of chatting with fellow members, wonderful food and of course a fabulous presentation by Dr. Jason Nordhaus from the Rochester Institute of Technology.

Learn to Skywatch

The Double Star "Almach" (Gamma Andromedae) One star is Gold, the other is Indigo Blue!
Provided o the left: 3 Star Hops

Shining New Light On Black Holes

By Randy Boswell

Black holes have long intrigued astronomers ever since they were first conceptualized by the English clergyman, geologist and amateur astronomer John Michell in 1784, and later by the French astronomer and mathematician, Pierre De Laplace in 1798. The present understanding is that they are the result of supernovae, whose source stars were more than 10 times the mass of our Sun and whose collapsed cores were more than 4 solar masses. It is believed that the first black holes, called seed black holes, were the product of the supernovae explosions of the earliest stars (Population III stars). They are also thought to have contained no more than a few hundred solar masses as the infant black holes sucked in the gas from nearby stars. Then, during the course of no less than a billion years it is held that they continued to suck in the gas from nearby stars and acquired around a billion solar masses, resulting in quasars, one of the most brightest and distant objects in the universe.

However, recent discoveries are threatening to re-write the book on this standard scenario. In 2001, the Sloan Digital Sky Survey (SDSS) detected quasars that dated back earlier than conventional theory suggests for their existence. The oldest and most distant quasar detected was determined to have existed only 690 million years after the big bang when the universe was just 5% of its present age. Named J1342+0928, it is said to contain 800 million solar masses with a look-back distance of 13.1 billion light years and measured a high redshift of 7.54. This was a significant finding. According to the Standard Model, after a few hundred million years after the big bang, the mostly hydrogen gas in the universe coalesced to form Population III stars, which grouped together to form galaxies. Accordingly, these oldest quasars discovered led to a surprising conclusion: there was not enough time for these quasars to form according to the conventional scenario.

This led researchers to propose an alternative theory for these early quasars. Known as direct-collapse black holes (DCBHs), they are theorized to have formed from hydrogen gas. Priyamvada Natarajan, a theoretical astrophysicist at Yale University along with her collaborator, Giuseppe Lodato, constructed a model whereby this could occur. This model starts with large hydrogen gas disks that would normally cool enough to coalesce or condense into stars. However, in order for DCBHs to form in this way, something has to occur to prevent the normal cooling process. And this has to do with the type of hydrogen gas

in the disks. Molecular hydrogen, that is two hydrogen atoms bonded together cools more efficiently than atomic hydrogen, which is composed of only one hydrogen atom. Therefore, in order to thwart the cooling of molecular hydrogen the model proposes that radiation from stars in nearby galaxies strike the hydrogen disk, causing the molecular hydrogen to dissolve into atomic hydrogen, keeping the gas too hot to form stars. The result, according to the model is that this hypothetical disk of mostly atomic hydrogen , minus stars, could become unstable and funnel towards the center of the disk , forming a DCBH. According to Natarajan and Lodato, such a scenario could produce a black hole of around a billion solar masses with the power to form quasars that can be detected at far distances.

In addition to this, computer simulations support the theory. Greg Bryan, professor of astronomy at Columbia University, along with colleagues John Rogan and Eli Visbal used the latest computer modeling to demonstrate this process. The computer simulations showed that a system of twin forming galaxies at the early stages of the universe would give birth to DCBHs. The simulations showed that there has to be an extremely high level of radiation present in order to break the bonds of molecular hydrogen to keep stars from forming. And that extremely high level of radiation according to the simulations is from new stars in one of the twin galaxies. This would thus enable the gas cloud in the other forming galaxy to collapse and form a black hole.

The next step is to found evidence for the DCBH theory. And one way to find out is by studying the light from developing galaxies. And one such galaxy that may provide evidence is the distant galaxy, CR7. Discovered in 2015 by the European Space Agency's (ESO) Very Large Telescope (VLT), it is one of the oldest and most distant galaxies. Situated at a look-back distance of 12.9 billion light-years, it measured a redshift of 6 at the time of its discovery. It is said to have formed when the universe was just 800 million years old. It turns out that CR7 has some unusual and striking features. Among these, its spectrum showed a certain hydrogen line, known as Lyman-alpha, that was uncommonly bright. Also, its spectrum showed an exceptionally bright helium line. In addition to this, there was an absence in its spectral lines of elements heavier than helium. This suggested to researchers that its source must be very hot, that is, on the order of 100,000 degrees Celsius. Researchers concluded that this could either be due to a group or cluster of early-formed Population III stars or a massive DCBH. Researchers tested these concepts by running separate computer simulations for each scenario. Utilizing the Stampede supercomputer at the University of Texas at Austin, it was shown that the star-forming model failed, whereas the DCBH model worked, thus adding support to the DCBH theory.

Another piece of observational evidence involves the light from DCBHs when it is thought they experience a specific transitional phase. It is proposed that seed black holes will merge with nearby galaxies – since it is thought that DCBHs form from multiple galaxy systems – like the twin galaxy system mentioned earlier – and when this happens they will consume massive amounts of gas from the adjoined galaxies. Appropriately named, obese black hole galaxies (OBGs) because it is said that their mass will temporarily outweigh the mass of the stars in their host galaxies, their light is expected to exhibit certain characteristics. Among these are quasars whose luminosities are brighter that all the stars in their host galaxies. Also predicted is that their light in the infrared portion of the spectrum should be between 1 and 30 microns in wavelength. This is important because this is the wavelength range where the James Webb Space Telescope (JWST) – slated to launch in 2019 – will operate. Accordingly, should the JWST detect OBGs, researchers say that it would provide strong evidence for the theory of DCBHs.

Overall, the study of the earliest black holes will aid our understanding of the early development of the universe. For example, this will aid researchers in understanding the evolution of star formation. Specifically, it is believed that as the black holes suck up the surrounding gas the nearby region of gas is heated up, thereby thwarting the cooling needed for star formation. Thus, our understanding of the relationship between these early black holes and their host galaxies can offer insights into the development of galaxies and the universe as a whole. End.

Sources

"Astronomers find evidence for 'direct collapse' black hole," The Royal Astronomical Society, July 7, 2016, https://www.ras.org.uk/news-and-press/2887-astronomers-find-evidence-for-direct-collapse-black-hole (accessed April 2,2018).

Choi, Charles Q., "Oldest Monster Black Hole Ever Found Is 800 Million Times More Massive Than the Sun," Space.com, December 6,2017, https://tinyurl.com/ybn4hbmf (accessed April 12, 2018).

Dickinson, Terrence. The Universe And Beyond (3rd ed.). Buffalo, New York: Firefly Books (U.S.) Inc., 1999.

"How Supermassive Black Holes Can Form Without Collapsing Stars," Simmonsfoundation.org, March 17, 2017, https://tinyurl.com/y9agm4sa (accessed April 7,2018).

Natarajan, Priyamvada, "The First Monster Black Holes," Scientific American, February 2018, Vol. 318, No. 2, pps. 24-29.

Siegel, Ethan, " 'Direct Collapse' Black Holes May Explain Our Universe's Mysterious Quasars," Forbes.com, December 26, 2017,https://tinyurl.com/yak5wr4y (accessed April 7, 2018).

What Is the Hubble Space Telescope?

The Hubble Space Telescope is a large telescope in space. NASA launched Hubble in 1990. Hubble is as long as a large school bus. It weighs as much as two adult elephants. Hubble travels around Earth at about 5 miles per second. That is as fast as driving a car from the East Coast of the United States to the West Coast in 10 minutes. Hubble faces toward space. It takes pictures of planets, stars and galaxies. Hubble has seen stars being born. Hubble has seen stars die. It has seen galaxies that are trillions of miles away. Hubble also has seen comet pieces crash into the gases above Jupiter.
Scientists have learned a lot about space from Hubble pictures. The pictures are beautiful to look at too.

What Makes Hubble Different From Telescopes on Earth?

The mixture of gases that surround a planet is called its atmosphere. Earth's atmosphere changes and blocks some of the light that comes from space. Hubble flies around, or orbits, high above Earth and its atmosphere. So, Hubble can see space better than telescopes on Earth can. Hubble is not the kind of telescope that you look through with your eye. Hubble uses a digital camera. It takes pictures like a cell phone. Then Hubble uses radio waves to send the pictures through the air back to Earth.

Where Did the Name Hubble Come From?

Hubble is named after Edwin P. Hubble. He was an astronomer. An astronomer is a scientist who studies the planets, stars and space. Edwin P. Hubble made important discoveries about the universe in the early 1900s.

What Is NASA Learning From the Hubble Space Telescope?

Hubble has helped scientists learn about our solar system. The telescope observes comets and planets. Hubble even discovered moons around Pluto that had not been seen before. The telescope has helped scientists understand how planets and galaxies form. Galaxies contain billions of stars. A picture called "Hubble Ultra Deep Field" shows some of the farthest galaxies ever seen. Pictures from Hubble help scientists learn more about the whole universe. Because of Hubble pictures, scientists think the universe is almost 14 billion years old.
Hubble has spotted black holes. Black holes suck in everything around them. They even suck in light. And Hubble has helped scientists learn more about explosions that happen when huge stars burn out.

What Is the Future for Hubble?

In 2009, astronauts flew to Hubble on the space shuttle. This was the fifth time astronauts went to Hubble. They went to fix parts. They also put new parts and cameras in the telescope. So it is working very well. Hubble will not be fixed again. In 2015, Hubble turned 25 years old. It still takes beautiful pictures of objects in space.

WHAT IS THE HUBBLE TELESCOPE?

NASA is building another space telescope. It is called the James Webb Space Telescope. It will be bigger than Hubble. Webb will not orbit Earth as Hubble does. Webb will orbit the sun in a spot on the other side of the moon. The Webb telescope will be able to see a different kind of light than the light Hubble sees. Webb will help NASA see even more of the universe.

Where Can I See More Hubble Pictures?

HubbleSite Gallery

More About the Hubble Space Telescope:
Amazing Space
Hubble 25th Anniversary Crafts and Activities
NASA's Main Hubble Page
What Is a Black Hole?
What Was the Space Shuttle?

Dan Stillman, Institute for Global Environmental Strategies

DONATION

2018 Buffalo Astronomical Association
Observatory Fundraising Campaign

To Enhance Astronomy and Science Education

The BAA is raffling off a Telescope (1st Prize) and a pair of Astronomical Binoculars w/Tripod (2nd Prize) in order to raise money for improvements to our Observatory at our Dark Sky location (Beaver Meadow).

- Tickets cost $10 and all proceeds will be used for the observatory project.
- Winners will be chosen on August 17, 2018 during the "Astronomy on the Pointe" event at Wilkeson Pointe.
- The winners do not need to be present to win.

1st PRIZE: Orion Skyline 8" Dobsonian Telescope

- This is an excellent telescope for any visual observer.
- 8" Aperture with 1200 mm focal length (f6) will provide excellent views of the Moon, planets and many interesting Deep Sky Objects (Nebulae, Star Clusters, & Galaxies)
- Includes: 2" Dual-speed focuser, 2" 30 mm Erfle eyepiece, 1.25" 9 mm Sirius Plossl Eyepiece, 8 X50 Right Angle Finder Scope, Laser Collimator, cooling fan, and eyepiece rack.
- Also included is a padded carrying case for the telescope tube.
- A 1-year family membership to the BAA and a copy of "Turn Left at Orion" to help you get the most out of your telescope.

2nd PRIZE: Orion 15x70 Astronomical Binoculars with HD-F2 Tripod

- A complete binocular and tripod setup ideal for astronomical or terrestrial viewing.
- 15x magnification and 70 mm lenses provide powerful magnification and light gathering.
- Stable and adjustable Orion Paragon HD-F2 tripod to keep binoculars steady while viewing.
- A 1-year family membership to the BAA and a copy of "Nightwatch: A Practical Guide to Viewing the Universe" to help you get the most out of your binoculars.

Friday, June 8th 7PM
Short presentation: TBA

Slate of Candidates:

President:
- Mike Humphrey
- Gene Timothy

Vice-President:
- Dennis Bartkowiak

Treasurer:
- DaRand Land

Secretary:
- Neal Ginsberg

At Large Director (1- year)
- Ernie Jacobs
- Tim Collins

The moon imaged by Mike Anzalone using a Smart Phone

M51 by Phil Newman @ BMO. This is Phils 1 st attempt at imaging M51 and was conducted at the BMO on Monday May 7, 2018 using his Questar Scope on a Celestron Mount. I took 21 5min at 800. stacked 80% 16 were used. I dithered with no calibration frames.

Wilkeson Pointe, Outer Harbor. Buffalo, NY

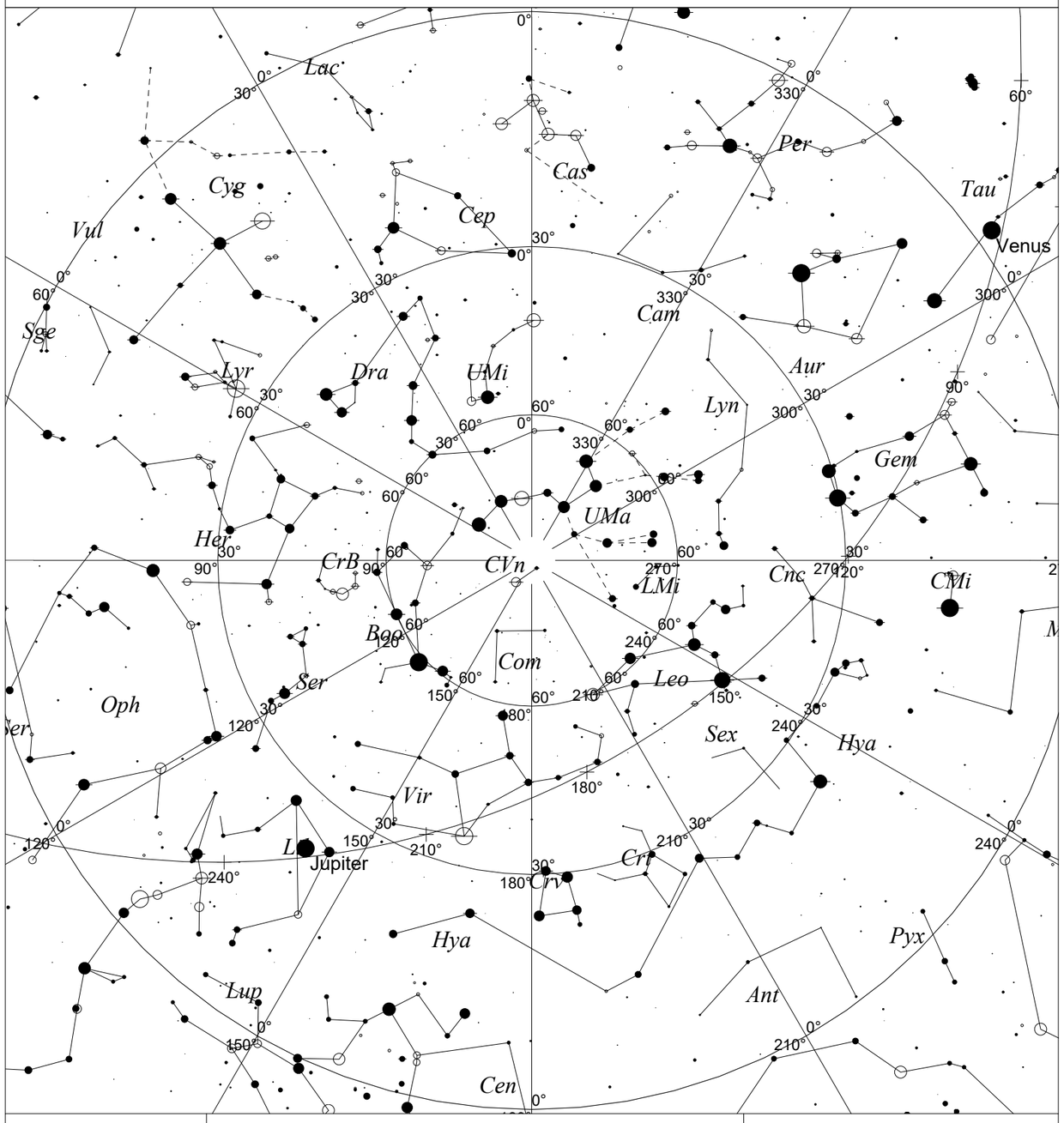
Two dates this year!

Friday, July 20th

Friday, August 17th

Don’t miss these events! Great venue and astronomical fun!

Beaver Meadow 5/5/18 22:00:00



STARS

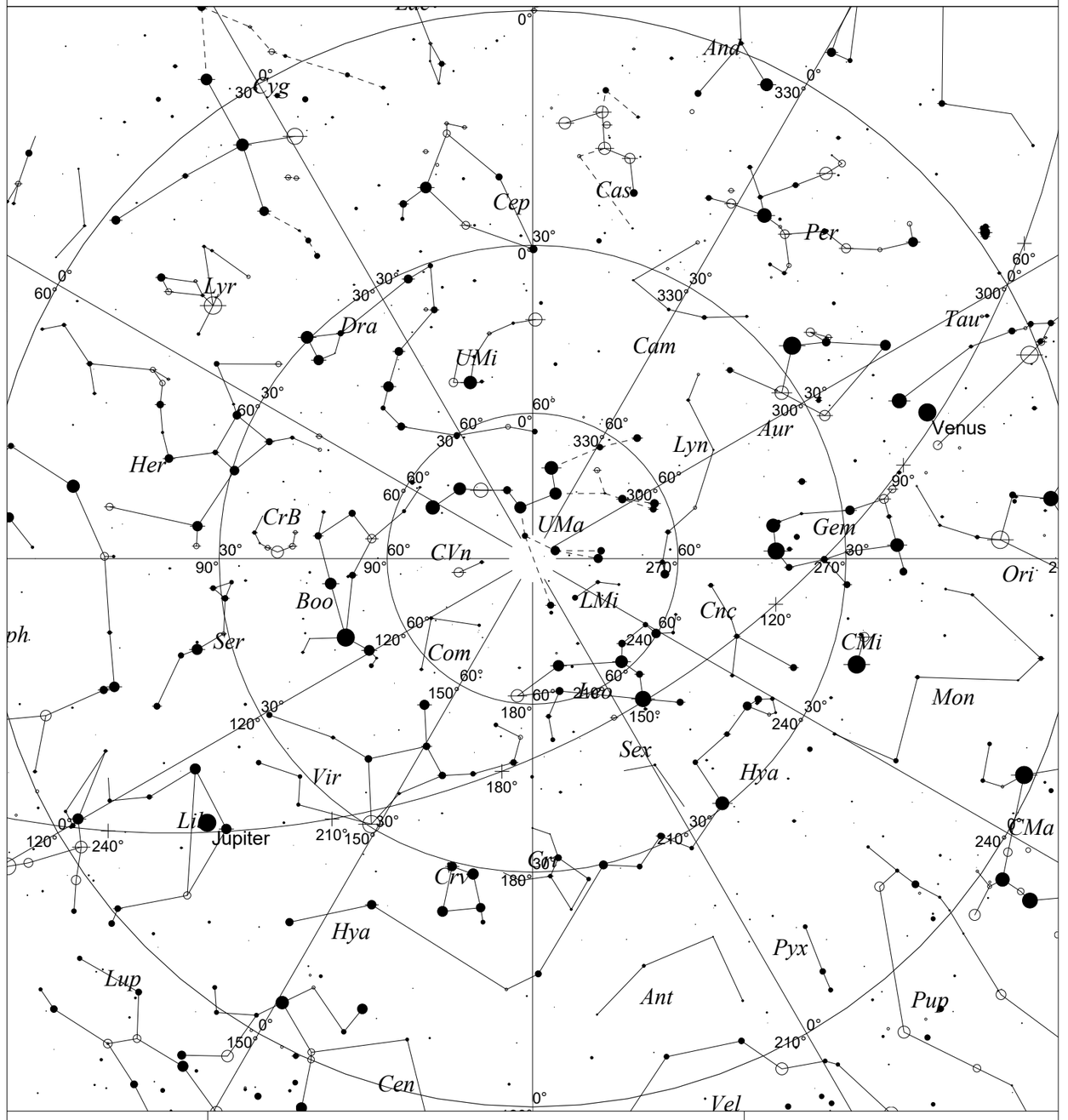
<1		3.5	
1.5		4	
2		4.5	
2.5		>5	
3			

SYMBOLS

Multiple star	Dark nebula	Radio source
Variable star	Globular cluster	X-ray source
Comet	Open cluster	Other object
Galaxy	Planetary nebula	
Bright nebula	Quasar	

Local Time: 22:00:00 5-May-2018 UTC: 03:00:00 6-May-2018 Sidereal Time: 12:40:13
Location: 42° 52' 48" N 78° 52' 12" WRA: 12h40m13s Dec: +42° 52' Field: 182.0° Julian Day: 2458244.6250

Penn Dixie 5/12/18 20:30:00



STARS

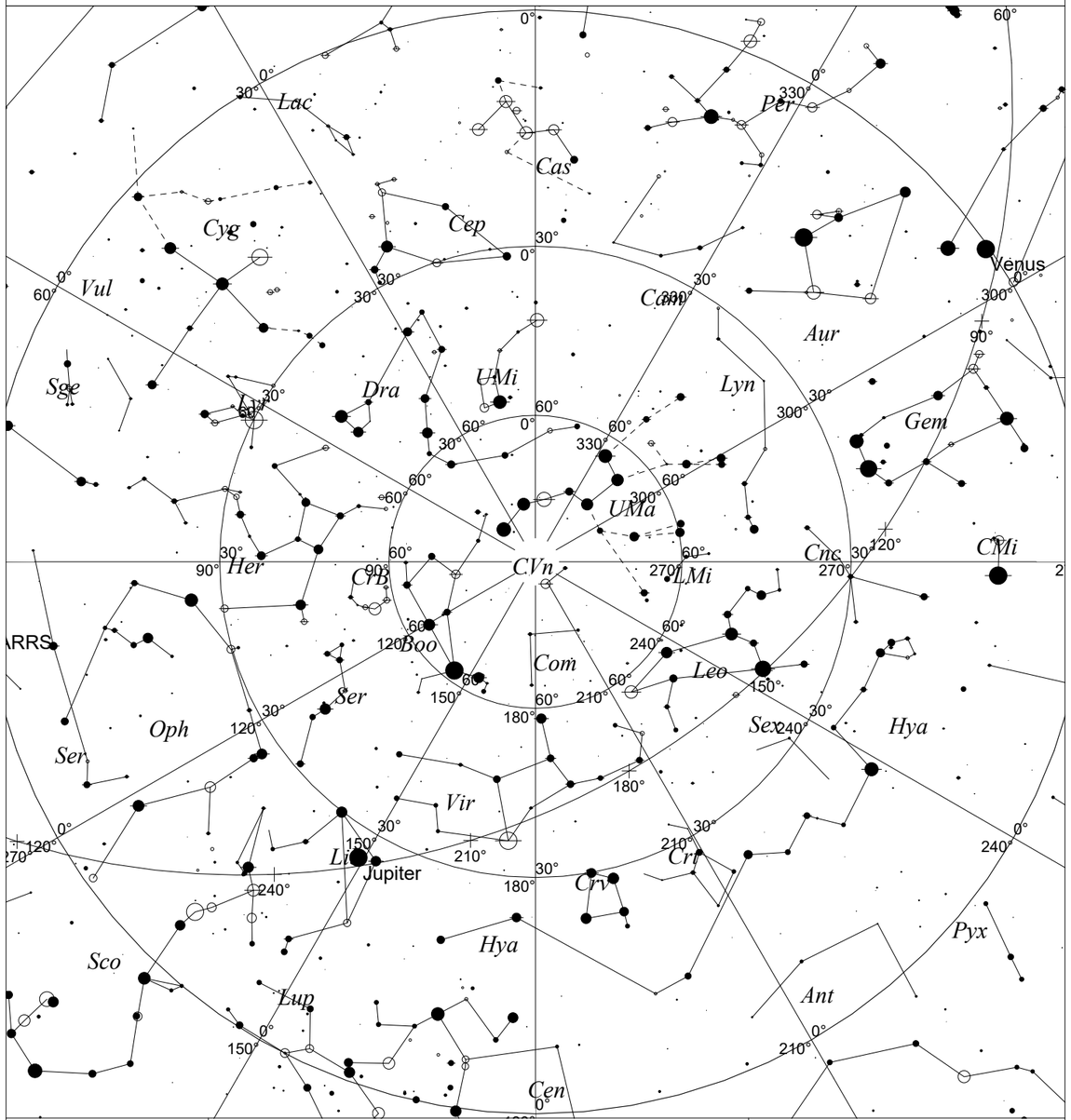
<1		3.5	
1.5		4	
2		4.5	
2.5		>5	
3			

SYMBOLS

Multiple star	Dark nebula	Radio source
Variable star	Globular cluster	X-ray source
Comet	Open cluster	Other object
Galaxy	Planetary nebula	
Bright nebula	Quasar	

Local Time: 20:30:00 12-May-2018 UTC: 01:30:00 13-May-2018 Sidereal Time: 11:37:34
Location: 42° 52' 48" N 78° 52' 12" WRA: 11h37m34s Dec: +42° 52' Field: 182.0° Julian Day: 2458251.5625

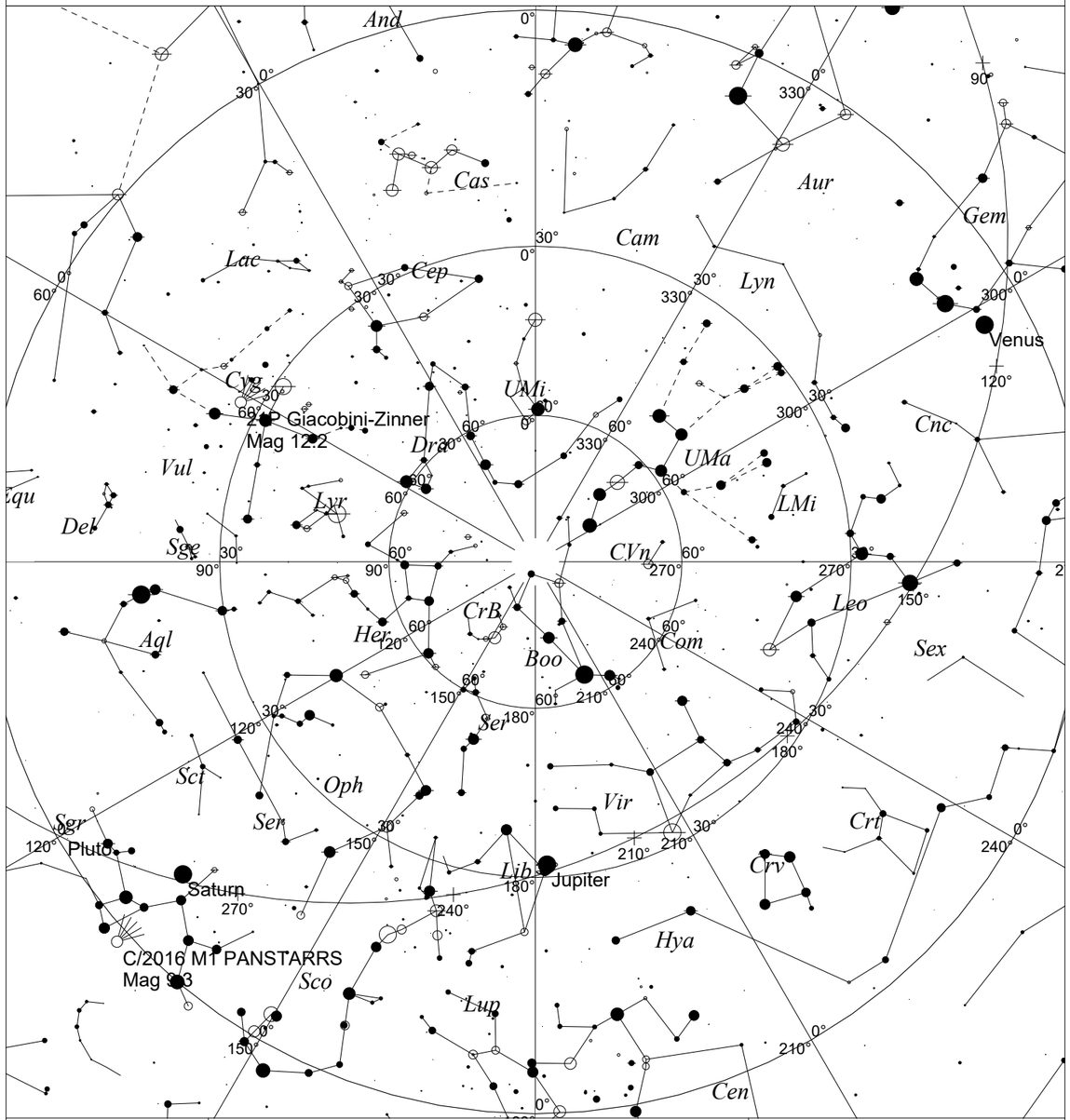
Wilson Star Search 5/12/18 22:00:00



STARS			SYMBOLS		
<1	3.5		Multiple star	Dark nebula	Radio source
1.5	4		Variable star	Globular cluster	X-ray source
2	4.5		Comet	Open cluster	Other object
2.5	>5		Galaxy	Planetary nebula	
3			Bright nebula	Quasar	

Local Time: 22:00:00 12-May-2018 UTC: 03:00:00 13-May-2018 Sidereal Time: 13:07:48
Location: 42° 52' 48" N 78° 52' 12" WRA: 13h07m49s Dec: +42° 52' Field: 182.0° Julian Day: 2458251.6250

Wilson Star Search 6/9/18 22:00:00



STARS			SYMBOLS		
<1	3.5		Multiple star	Dark nebula	Radio source
1.5	4		Variable star	Globular cluster	X-ray source
2	4.5		Comet	Open cluster	Other object
2.5	>5		Galaxy	Planetary nebula	
3			Bright nebula	Quasar	

Local Time: 22:00:00 9-Jun-2018 UTC: 03:00:00 10-Jun-2018 Sidereal Time: 14:58:12
Location: 42° 52' 48" N 78° 52' 12" WRA: 14h58m13s Dec: +42° 52' Field: 182.0° Julian Day: 2458279.6250

THE BUFFALO ASTRONOMICAL ASSOCIATION

(BAA) welcomes you to our organization.

The BAA is a group of dedicated amateur astronomers, most of whom are observers, but some are armchair astronomers, and imagers.
The benefits of membership are:

- Access to our Dark Sky observing site in North Java -- a great place to observe the universe!
- A telescope loaner program -- borrow a BAA telescope and try observing for yourself!
- A monthly kids meeting, site orientation meeting, and general meeting with speakers of interest. Access to meeting videos on the BAA web site. - Opportunities to participate in programs that promote astronomy to the general public (such as Star Parties)
- Meet other amateurs and share experiences, learn techniques, and swap stories.

The BAA is a non-profit corporation organized under section 501 (C) 3 of the Internal Revenue Code. The Society was formed for education and scientific purposes. All contributions and gifts are deductible for federal income tax purposes. General membership meetings are open to the public and attendance is encouraged.