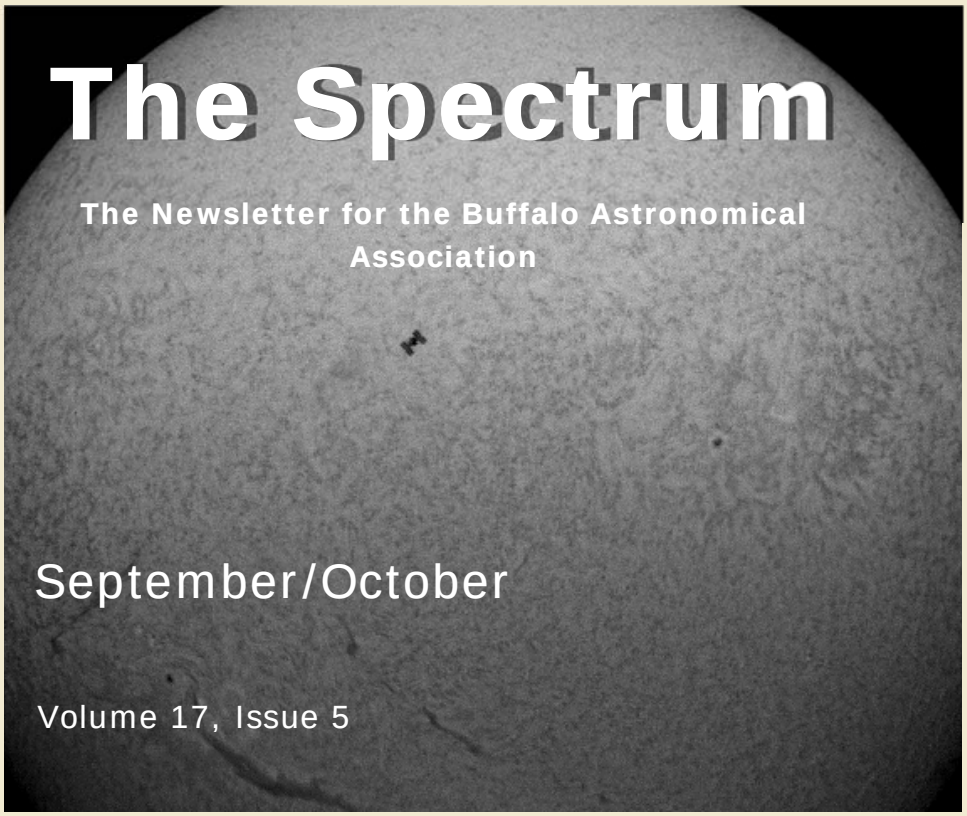


The Spectrum

The Newsletter for the Buffalo Astronomical Association

September/October

Volume 17, Issue 5

Inside this issue:

Supermoon Lunar Eclipse September 27-28

The first "supermoon" lunar eclipse in more than three decades will grace Earth's skies this month, as will a partial solar eclipse that most of the world will miss.

The supermoon total lunar eclipse, which occurs on Sept. 27, features a full moon that looks significantly larger and brighter than usual. It will be the first supermoon eclipse since 1982, and the last until 2033, NASA officials said in a newly released video.

The total lunar eclipse will be visible to observers throughout the Americas, Europe, Africa, western Asia and the eastern Pacific Ocean region.

Courtesy space.com

BAA Schedule of Astronomy Fun for 2015

Public Nights

First Saturday of the Month through October

2015 Schedule of Events:

Sept 5: Public Night BMO

Sept 12: Wilson Star Search

Sept 11-13: Black Forest Star Party

Sept 18: BAA Meeting at 7:30pm at Buffalo State College

changed from the normal 2nd Friday!

Sept 27: Lunar Eclipse at BMO 8:30pm

Oct 3: Public Night BMO

Oct 9: BAA Meeting at 7:30pm at Buffalo State College

Oct 10: Wilson Star Search

Nov 13: BAA Meeting at 7:30pm at Buffalo State College

Dec 11: BAA Meeting at 7:30pm at Buffalo State College – Holliday Party!

M 109
Beaver Meadow Observatory
C-14+focal reducer, ST-9 5min subs, 25 min total
BAA imaging Section 7-22-2015

Observatory Report

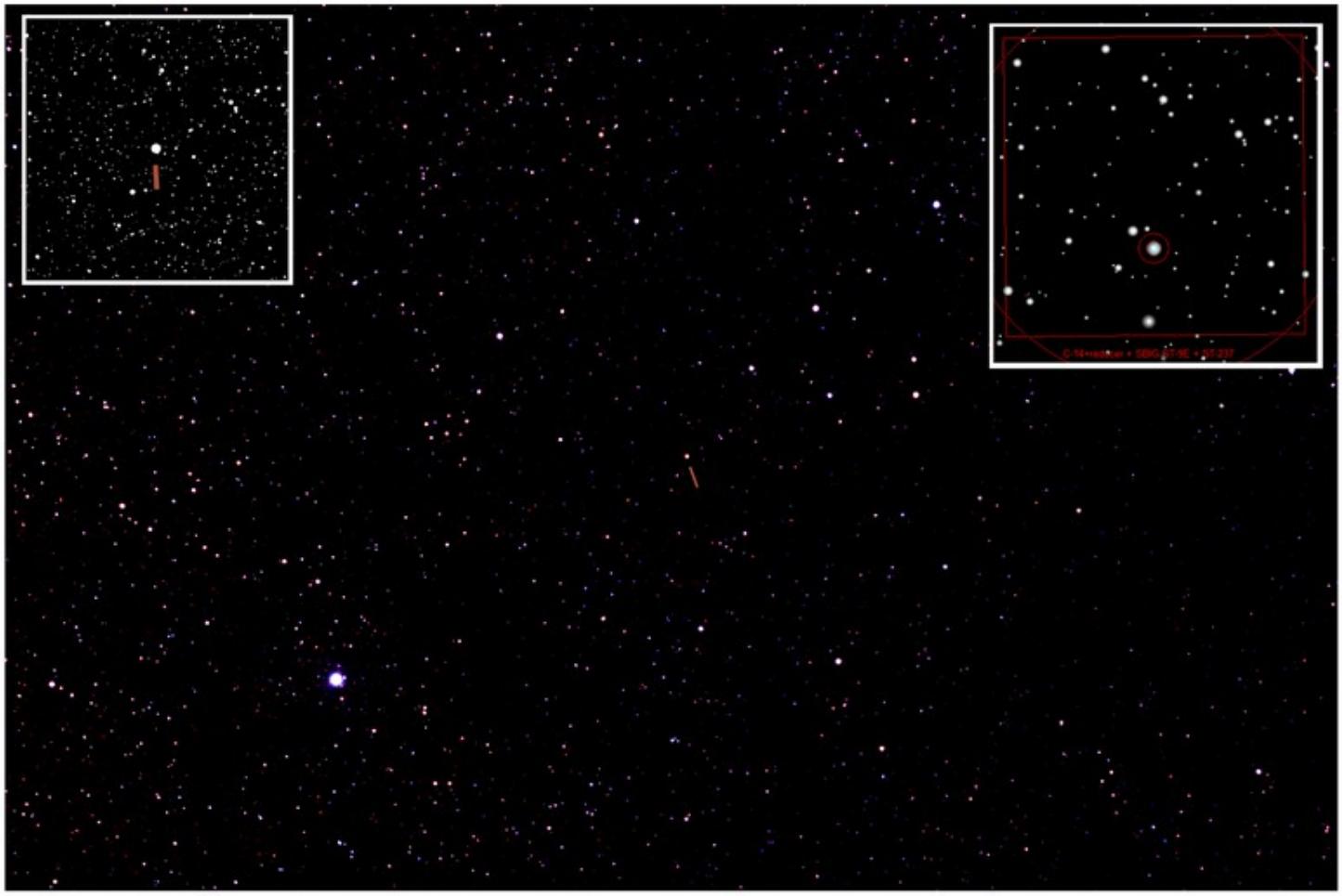
Observatory renovations are going well. The place looks much better painted. Still waiting for the new blackout curtains and the mounting brackets for the TVs. Thanks to Dennis B for garbage picking a 42" TV which had 4 bad capacitors that Rick G replaced and now works. After hearing that Mike A found a 46" with similar issues which only need 3 capacitors replace. We are working on getting a new computer to replace the one we use for the ST-9 camera and AP1200 mount controls. It is currently giving us issues that look to be hardware related. This will give us a chance to upgrade from XP to win 7 or even win 10. The new illuminated keyboards are REALLY great. (Mark P- I will let you know how well they hold up) We can now turn off the lights in the computer room. Will get red filters for the monitors once we get all the computers setup and organized. We may be looking for 2 "new" (think used) monitors that have the same aspect ratio as the TVs to make the setup easier. Soooo if anyone has upgraded and has a 19" or possibly a 20 monitor that is 1200x900 resolution kicking around needing a home, please let me know as we are looking for some. The total width of the monitors is the issue, too wide and we can't fit them in the heated box.

The AP1200 hand paddle is currently giving us trouble, the mount works ok most of the time, but it lost the Messier object and NGC library. We reloaded the firmware for it and all was working ok, but I have had a report that is it acting up again when you use the stop button to stop a slew?? Only time will tell. We may end up sending the hand paddle back to AP for repairs. If it malfunctions while using it, park the scope, turn off the power and reboot it. When all else fails, turn on the left hand computer and go the telescope folder on the desktop and start up The Sky 6, tell it to link to the scope (the scope info is all entered - so you only have to link it). Once you have linked to the mount you can control the scope with the computer. Actually this is the best way to do it if you are using the scope in the daytime as the display on

the keypad is hard to read in the daylight.

Tuesday Night at the Observatory has been a blast. We have been putting up with the Moon, and have not really worked on any great images, but we now have a flat field generator for the C-14 which was GREATLY needed. The images are much better now that we can get rid of the vignetting and dust motes. Here is an image of Barnard's Star that we took while the Moon was up. Next year we will image the same spot again to show its motion. We are having way too much fun. Even though the sky conditions were not good- M109 was setting and in Buffalo's light dome, but we went for it anyway as that was where it was clear. Just goes to show you how much proper flat fielding, and darks can help any image.

See you at the Observatory **Daniel Marcus**

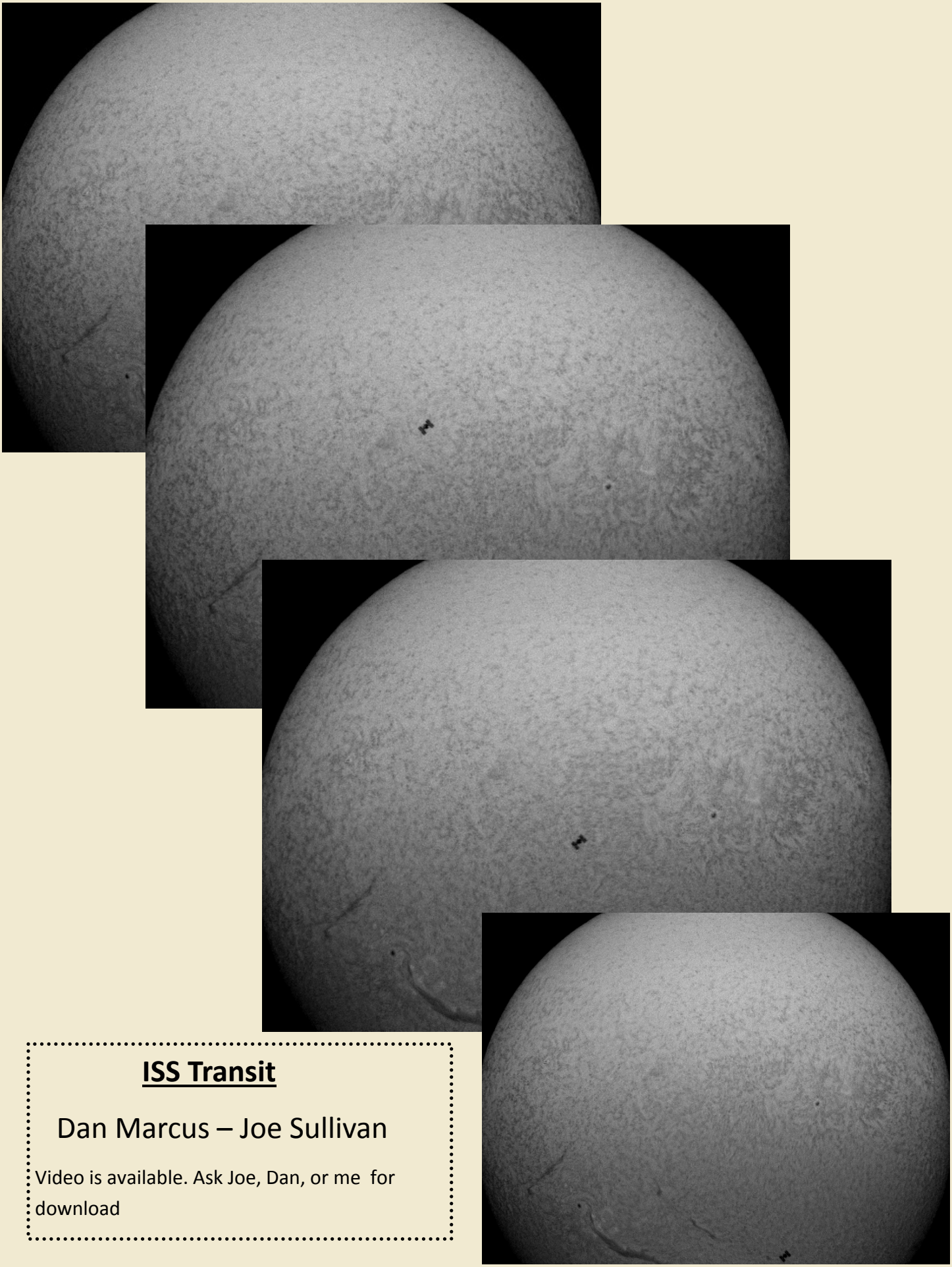


Barnards Star July 13, 2015 22:30pm EDT Beaver Meadow Observatory

NP101is Canon T3i

Upper Left C-14 +reducer ST-9 camera no filters

Upper Right Chart from The Sky 6 circle shows location for where The Sky 6 think it is



ISS Transit

Dan Marcus – Joe Sullivan

Video is available. Ask Joe, Dan, or me for download

A New Theory Regarding Dark Energy

By

Randy Boswell

Dark energy, said to constitute ~27% of the universe, remains one of the hottest topics for researchers. Dark matter was first theorized by the astronomer Fritz Zawicky in 1933 based on his observations of the Coma Cluster of galaxies. This grouping of galaxies revolves around a central hub and Zawicky measured the velocities of the galaxies about its center by noting the Doppler-shifts in their spectrum and discovered an anomaly. I.e., according to Newton's laws of gravity the velocities of the revolving galaxies were found to be too fast for the mass of the central galaxies to keep them in orbit. Instead, they should be flying off. Zawicky answered this by theorizing that there was an invisible entity permeating the cluster that was producing an additional force that was exerting a gravitational pull and holding the cluster together and referred to this as "dark matter." The astronomer Vera Rubin did additional and more extensive work in this area in the 1960's and 1970's. Rubin studied the rotation of spiral galaxies, including our Milky Way Galaxy, and found that, like the Coma Cluster of galaxies, the spiral arms were revolving about their cores at velocities too fast for the mass of the central part of the galaxies to keep them from flying away. Thus, the concept of dark matter was established.

The current and major explanation for dark matter is that it is comprised of WIMPs, which stands for **W**eakly **I**nteracting **M**assive **P**articles. In addition, WIMPs are said to have their own antiparticles, which are thought to annihilate one another upon colliding, as is the case with matter and antimatter. Such WIMP annihilations would produce normal matter particles that would in turn create high-energy photons, or particles of light, that we could see [Moskowitz 2015]. It is this idea that has led researchers in recent years to theorize that dark matter may have been responsible for the formation of the first stars, which later led to the creation of black holes.

Specifically, the idea is that as early as 200 million years after the big bang - when cosmologists claim there was a higher density of dark matter than today - the first stars are said to have formed in the midst of dark matter. According to this model, the stars formed and grew in size by accreting dark matter along with the hydrogen from their surrounding environment. Then, as the WIMPs annihilated themselves due to their own antiparticles, a heat source would be produced. If the dark matter density was high enough, this heating would dominate over other heating (or cooling) mechanisms, such as nuclear fusion [Zyga 2009].

Another aspect to these stars, which are dubbed dark matter stars or simply dark stars, is that it is thought that they grew to enormous sizes. The idea behind this is that they grew as they kept on accreting dark matter from their surroundings and increased in size up to a thousand or a million times as massive as the Sun. Researchers conjecture that these dark stars remained stable, i.e., maintained hydrostatic equilibrium, for a minimum of one million years. Then, they would eventually move away from the regions where they are accreting dark matter - i.e., due to the peculiar motion of stars - thereby depleting their dark matter fuel and collapse into the stars we know today and resort to the remaining fusion of hydrogen as their power source. Finally, after they exhausted their supply of hydrogen they would collapse and ultimately become black holes according to this scenario. These enormous dark stars may explain the presence of massive black holes such as the billion-solar-mass black holes thought to be present at the time the first galaxies formed [Zyga 2009].

The next step is seeking evidence for their existence. One of the ways in which researchers could search for the telltale signs of dark stars is by contrasting their elements with those of conventional supernovae. E.g., it is known that supernovae yield precise ratios of even to odd elements whereas it is thought that these things do not occur in dark stars. Researchers conclude that this distinction provides a measurable test of the two situations and that this will eventually be determined and provide an avenue for answers.

In addition to this, another method that has been proposed for detecting dark stars deals with detecting their light with future telescopes such as the James Webb Space Telescope (JWST) or using special telescopes to detect neutrinos, which are thought to be emitted from dark stars. Compared with conventional main sequence stars, dark stars that have run out of dark matter fuel and started using fusion would be much larger, cooler, and “puffier” [Zyga 2009]. This, according to researchers would provide a point of comparison. End.

References:

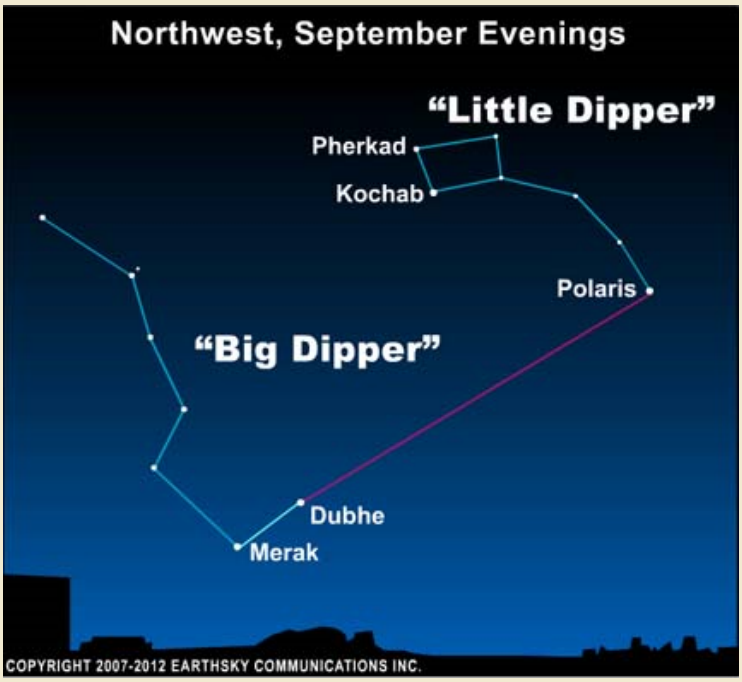
Moskowitz, Clara. “Dark Matter May Be Destroying Itself in Milky Way’s Core.” *Scientific American*. 8 April 2015. Web. 9 July 2015.

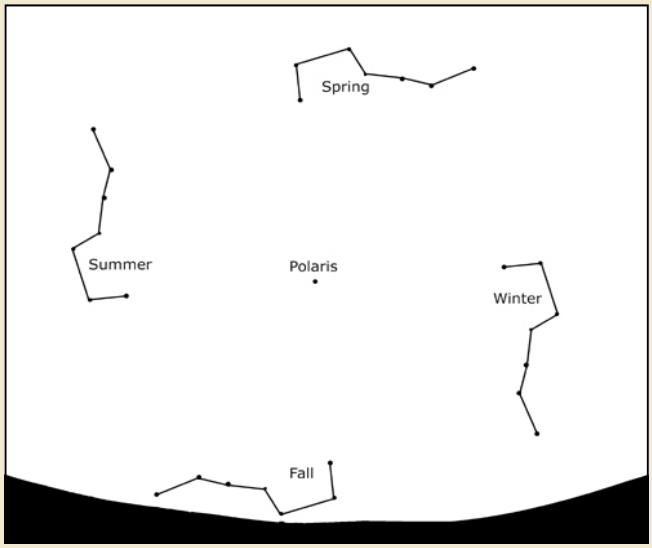
Zyga, Lisa. “Stars Fueled by Dark Matter Could Hold Secrets to the Universe.” 3 November 2009. Web. 6 July 2015.

Outreach Resources

Tonight's chart shows Polaris and the Big and Little Dippers for a September evening. You can use the Big Dipper to find Polaris, which is also known as the North Star. Notice that a line from the two outermost stars in the bowl of the Big Dipper points to Polaris. And notice that Polaris marks the tip of the handle of the Little Dipper.

The northern sky is a large clock, with Polaris at its center. The hour hand is a line drawn through Dubhe and Merak, the two pointer stars of the Big Dipper. Because the stars make a full circle in 23 hours 56 minutes instead of exactly 24 hours, this star clock is not exactly the same as the one on the wall, but with a little practice you can learn to read





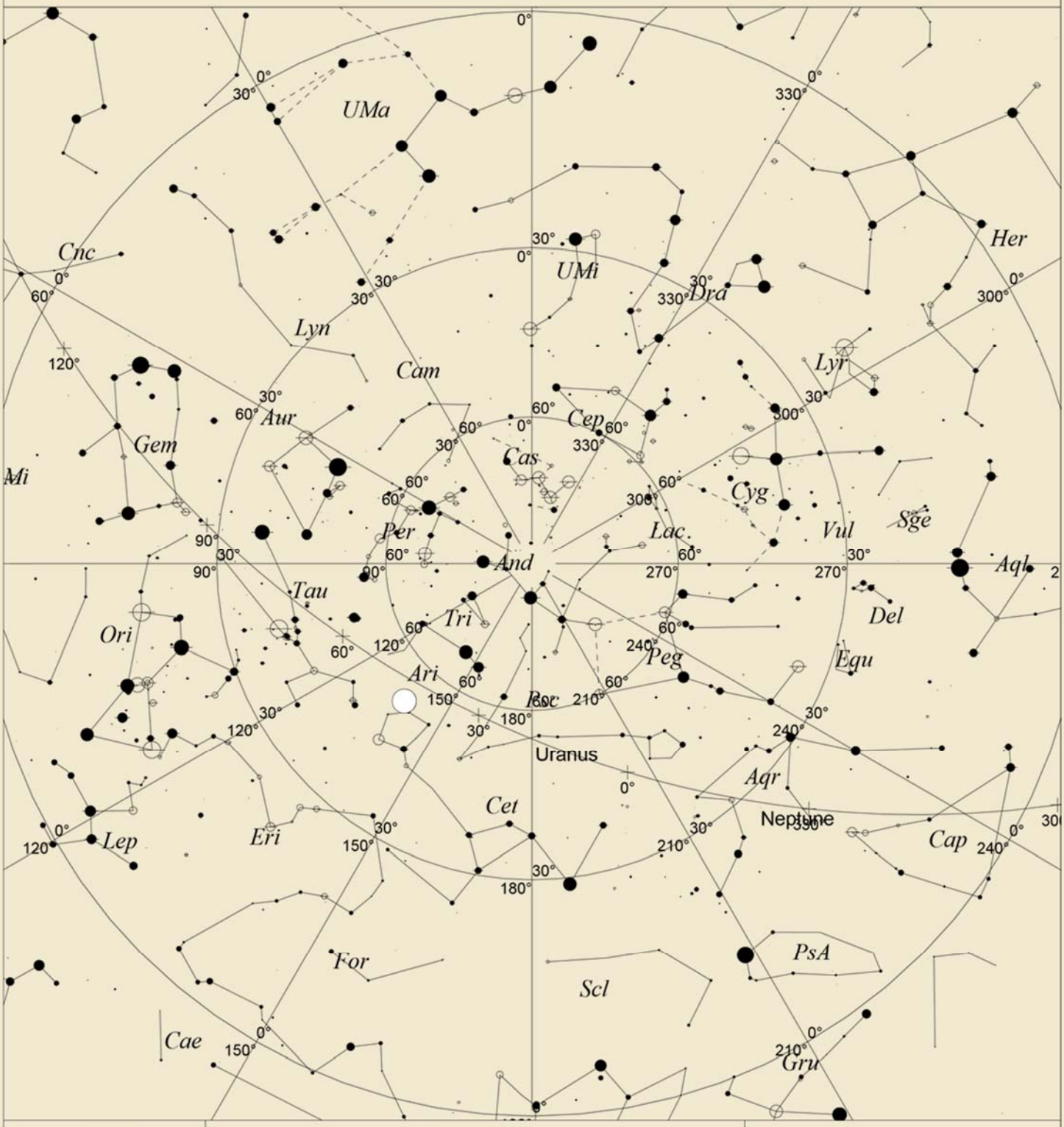
If you're in the northern U.S., Canada or at a similar latitude, the Big Dipper is circumpolar for you – always above the horizon. Image via burro.astr.cwru.edu

The Big Dipper swings full circle – 360 degrees – around Polaris in about 23 hours and 56 minutes.

In 24 hours, the Big Dipper actually swings more than full circle, or 361 degrees. Does that make a difference? Yes! It means that – if you look at the same time each evening – the Big Dipper will appear just a little bit *lower* in the northwestern evening sky.

If you're in the northern U.S., Canada or at a similar latitude, the Big Dipper is circumpolar for you – always above the horizon. Image via burro.astr.cwru.edu
A month from now at mid-evening, the Big Dipper will be noticeably lower in the northwest. It'll actually beneath the horizon as seen from the southern latitudes in the United States – although it's circumpolar, or always above the northern horizon, as seen from the northern U.S., Canada and similarly northern latitudes.
The constant motion from night to night of these stars circling Polaris is a bit like a bear circling its prey, looking for a way to attack. Several ancient cultures from the Greeks and Romans to the Micmac Indians likened these stars to a bear.
In Greek mythology, the Big Dipper asterism represents the hindquarters and tail of the constellation Ursa Major, the Great Bear. The Micmacs saw the three stars of the Big Dipper handle as hunters chasing the bear.
Watch the Big and Little Dippers circle around Polaris tonight! To locate Polaris, the North Star, just draw a line between the two outer stars in the bowl of the Big Dipper.

Oct 27, 2015 23:00.00



STARS

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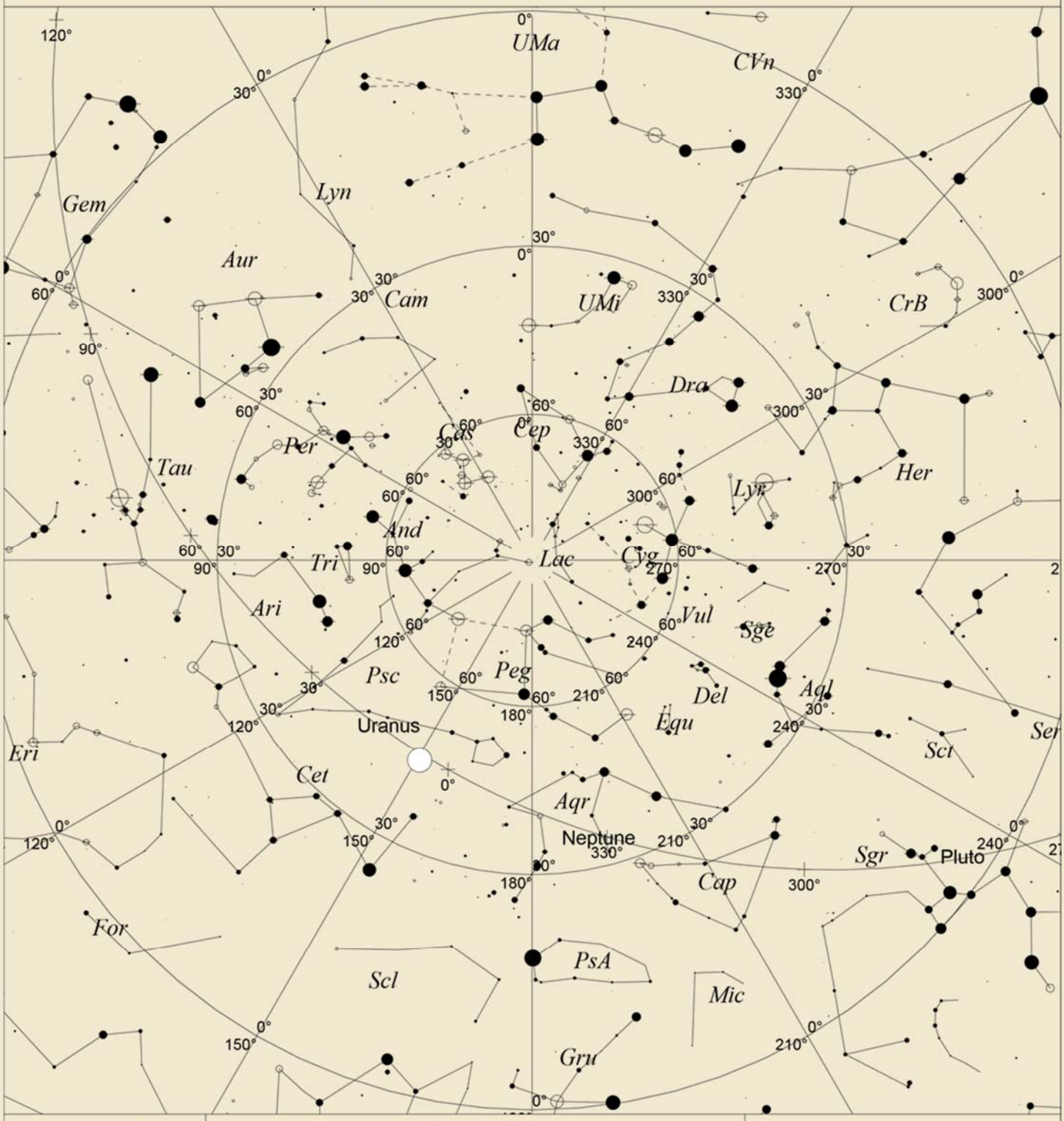
SYMBOLS

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

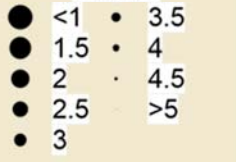
Local Time: 23:00:00 27-Oct-2015 UTC: 04:00:00 28-Oct-2015 Sidereal Time: 01:09:16

Location: 42° 52' 48" N 78° 52' 12" W RA: 1h09m16s Dec: +42° 52' Field: 182.0° Julian Day: 2457323.6667

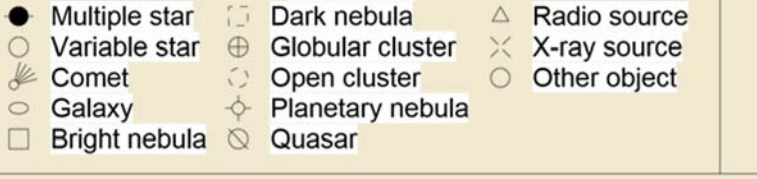
Sept 27, 2015 22:48.00



STARS



SYMBOLS



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Location: 42° 52' 48" N 78° 52' 12" WRA: 22h58m58s Dec: +42° 52' Field: 182.0° Julian Day: 2457293.6583

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Location / Time of Meetings: BAA meetings are held on the 2nd Friday of the month from September to June starting at 7:30pm. Our meetings are held in room C122 of the Classroom Building at the Buffalo State Campus. See map below, building 35.