

CONSTELLATION *addendum ...*

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Scott Petersen, editor © BMAA 2 015

Observing Report

February 10th, 2015

- by Igor Peshenko

Yesterday, I was working on my cooled Canon t3 project in my workshop in the basement and, actually, did not have any observing plans for the night when I stepped outside for a moment to pick up something from the garage. After so many cloudy nights it was an unexpected surprise to discover that the sky was clear and Jupiter was up and shining. I was still not up to any observing but took a peek on it through binoculars nevertheless. One on the Jupiter's moons was missing. It was around 9 pm in the evening. Stellarium software confirmed that it was Europa flying in front of Jupiter and casting the shadow on its surface at the same time. That looked really nice on the simulation, I do not recall the old versions of Stellarium ever showed shadows. So I got dressed and picked my 90 mm Mac-Cassegrain first to take a look what is going on. The shadow was there, indeed, yet I could not see Europa itself. Besides, the image looked rather dim and not as sharp as I would like it to be. Seeing was pretty good and the scope was very well pre-cooled, so I concluded that it was just the lack of aperture. I decided to take my 10" dob from the garage for such occasion and I am glad I did. What I really like about low-tech stuff is that it does not take 1.5 hours to set it up. In just 10-15 min the dob was assembled and even recollimated. Yes, the image was much brighter and sharper through 10" compare to 90 mm scope. I could increase the power to 228x without scarifying details. The belts, zones and vortices looked nice with a great number of details. Alas, low contrast Europa blended with the Jupiter's surface so well that I am not sure if I really saw it, that could be another vortex or just my imagination. Besides, my eyes began to water from time to time because of cold. However, as Europa approached the darker limb of Jupiter it literally popped up as a fairly bright disk. Watching it clearing the Jupiter was the most rewarding moment of the evening. After the transit ended around 10:30 pm, I switched my attention on the comet C/2014 Q2 Lovejoy which was just below Perseus at that time. I could not aim my big scope on it, but the comet was an easy binoculars target even for Elkins Park light polluted sky. I think I even saw a hint of its tail through 70x11 binoculars but that could be just my imagination.

Regards, Igor

BMAA member Igor Peshenko is an active astrophotographer [-ed]

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2015: BMAA Public Observing Schedule (listed on BMAA website):

Date(s)	Type/Location	Starting Time
April 27 (no alternate) Monday	Public Moon/Jupiter watch: Jupiter transits Igoe-Porter-Wellings Memorial Field, Parking lot, Warrington	7:30pm (7:45 sunset)
May 23/24 Saturday/Sunday	Public Moon/Jupiter watch: Tyler State Park (find another observing area, just outside of the picnic grove or at another lot near there has a better western horizon because the moon will be low.	8:00pm 8:09 sunset
June 10 (no alternate) Wednesday	Public Star Watch: Igoe-Porter-Wellings Memorial Field, Parking lot, Warrington	8:30pm
June 18 (no alternate) Thursday Date requested by Park	Public Star Watch: New moon Northampton Municipal Park, Richboro	9:00pm
July 15/18 Wednesday/Saturday	Public/Member Star Watch: New moon, Jupiter 4degrees N of new moon Green Lane Park	9:00pm Possible Club picnic?
August 13 (no alternate) Thursday	Public/Member Star/Meteor watch: Perseid meteor peak Nockamixon, Tohickon Boat Access Area*	8:30pm
September 27 (no alternate date) Sunday	Public/Member Lunar Eclipse watch: Nockamixon, Tohickon Boat Access Area* Enters Penumbra at 9:07 PM EDT, Umbra at 10:11 PM, Greatest at 10:47 PM EDT	7:30pm

- Late evening access allowed at this location.

Non-public, charitable event (not listed on BMAA website)

Date/Time	Location/Organization
Thurs. Feb 26 th 2015 6:15 PM	Program/StarWatch for kids/parents at the Nockamixon Nature Center
Fri. March 20 th 2015 8:00 PM	Program/StarWatch for the St. Luke's Hospital wilderness Medicine Conference at Bear Creek Resort near Macungie
TBD – April 2015	Program/StarWatch at St. John the Baptist School in Ottsville, PA, Set with alternate date
Thurs. April 23 rd	StarWatch at Council Rock South High School in Newtown, PA – Tentative Date
Sat. April 25 th 2015 9:30am-12:30pm	Earth Day Celebration at the Jarrett Nature Center in Horsham – Solar Event & PR Display
Sat. June 20 th 2015	starting at dusk Family Camp Out at the Jarrett Nature Center in Horsham – StarWatch
Fri. May 15 th 2015	Simmons Elementary Cub Scout Troop Pack Meeting (not sure of time or if this is just a program or program with Starwatch)

The Heavyweight Champion of the Cosmos

- by Dr Ethan Siegel

As crazy as it once seemed, we once assumed that the Earth was the largest thing in all the universe. 2,500 years ago, the Greek philosopher Anaxagoras was ridiculed for suggesting that the Sun might be even larger than the Peloponnesus peninsula, about 16% of modern-day Greece. Today, we know that planets are dwarfed by stars, which themselves are bound together by the billions or even trillions into galaxies.

But gravitationally bound structures extend far beyond galaxies, which themselves can bind together into massive clusters across the cosmos. While dark energy may be driving most galaxy clusters apart from one another, preventing our local group from falling into the Virgo Cluster, for example, on occasion, huge galaxy clusters can merge, forming the largest gravitationally bound structures in the universe.

Take the "El Gordo" galaxy cluster, catalogued as ACT-CL J0102-4915. It's the largest known galaxy cluster in the distant universe. A galaxy like the Milky Way might contain a few hundred billion stars and up to just over a trillion (10^{12}) solar masses worth of matter, the El Gordo cluster has an estimated mass of 3×10^{15} solar masses, or 3,000 times as much as our own galaxy! The way we've figured this out is fascinating. By seeing how the shapes of background galaxies are distorted into more elliptical-than-average shapes along a particular set of axes, we can reconstruct how much mass is present in the cluster: a phenomenon known as weak gravitational lensing.

That reconstruction is shown in blue, but doesn't match up with where the X-rays are, which are shown in pink! This is because, when galaxy clusters collide, the neutral gas inside heats up to emit X-rays, but the individual galaxies (mostly) and dark matter (completely) pass through one another, resulting in a displacement of the cluster's mass from its center. This has been observed before in objects like the Bullet Cluster, but El Gordo is much younger and farther away. At 10 billion light-years distant, the light reaching us now was emitted more than 7 billion years ago, when the universe was less than half its present age.

It's a good thing, too, because about 6 billion years ago, the universe began accelerating, meaning that El Gordo just might be the largest cosmic heavyweight of all. There's still more universe left to explore, but for right now, this is the heavyweight champion of the distant universe!

Learn more about "El Gordo" here: <http://www.nasa.gov/press/2014/april/nasa-hubble-team-finds-monster-el-gordo-galaxy-cluster-bigger-than-thought/>

El Gordo is certainly huge, but what about really tiny galaxies? Kids can learn about satellite galaxies at NASA's Space Place <http://spaceplace.nasa.gov/satellite-galaxies/>.



Image credit: NASA, ESA, J. Jee (UC Davis), J. Hughes (Rutgers U.), F. Menanteau (Rutgers U. and UIUC), C. Sifon (Leiden Observatory), R. Mandelbum (Carnegie Mellon U.), L. Barrientos (Universidad Catolica de Chile), and K. Ng (UC Davis). X-rays are shown in pink from Chandra; the overall matter density is shown in blue, from lensing derived from the Hubble space telescope. 10 billion light-years distant, El Gordo is the most massive galaxy cluster ever found.

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Space Place is provided by NASA [-ed]