Nightfall

Monthly publication of the Huachuca Astronomy Club

JUNE 2015

President's Notes

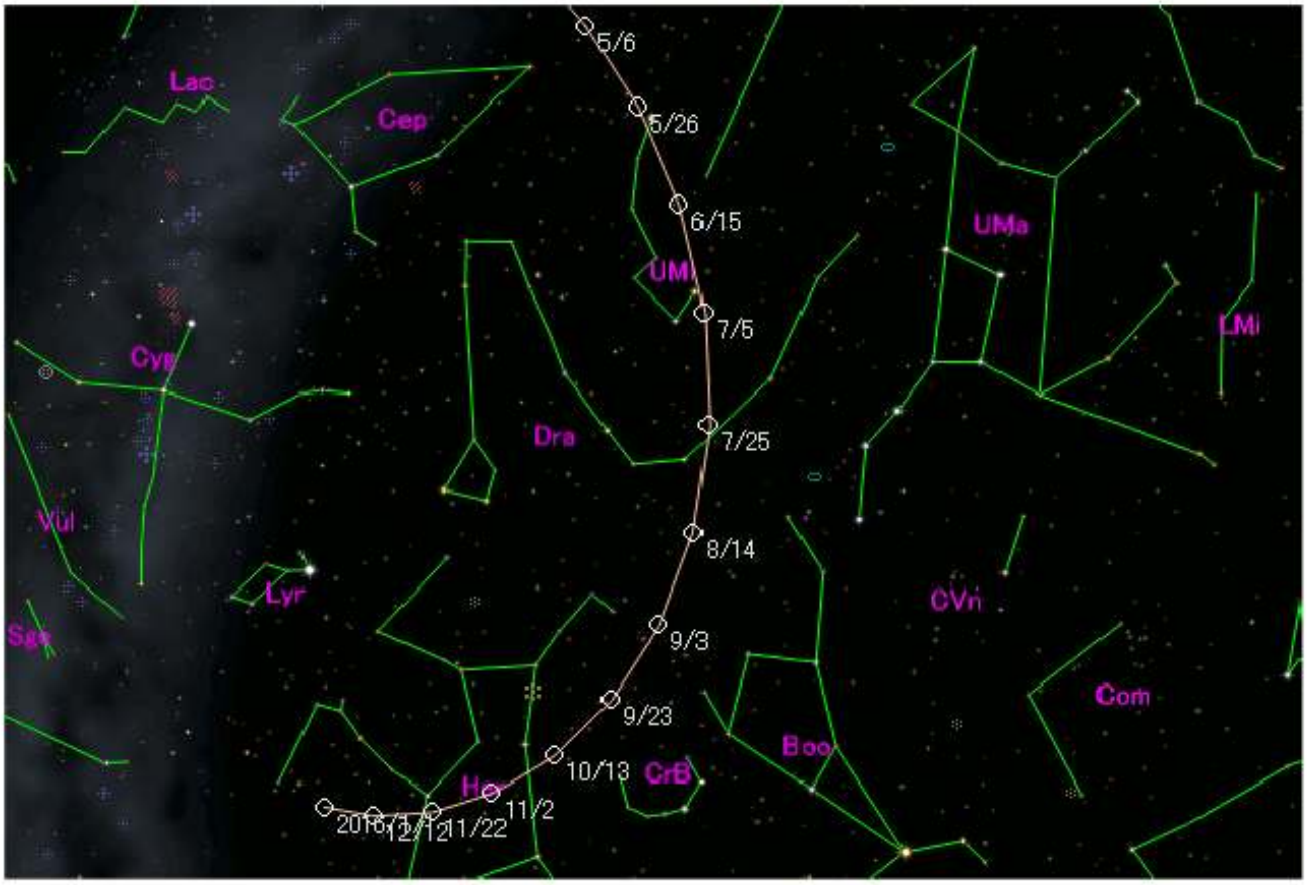
The Little Comet That Could

Last night at The Patterson Observatory (May 21, 2015), a group of about 50 people were treated to a look at C/2014 Q2, the marvelous Comet Lovejoy. The comet was easily visible in small telescopes and large binoculars, less than a degree from Polaris. It was the first time for most of the visitors to see comet Lovejoy, or any comet for that matter. Yes, the same comet Lovejoy we began observing late last year, when it first rose above our southern horizon back in December. It is the same comet that scraped across M79 late that month and the same comet that had the habit of shedding its ion tail several times a night.

While it was not the splashiest of comets, no 30-degree fantail, no daytime visibility predictions, not even naked eye brightness for most, nor were any doomsday stories were attributed to it. Still, it has been a solid telescopic and photographic performer. Well beyond my humble expectations, this comet warmed up and was very active for a very long time, considering it never really got that close to the Sun. Indeed, it never even got as close as the Earth's orbit. Comet Q2 Lovejoy was not on a death march into the Sun, like several recent comets, it was merely "playing thru" this time. However, as it entered the inner solar system, it did get a change of orbital orders. Comet Lovejoy had an orbital period of around 11,500 years coming in, but it did get a bit of a tug and drag this time to reduce its orbit to only about 8,000 years. How close it will come next time I have not seen predicted; but it's not for some time, so be patient.

Continued next page

Yep, we've followed this comet across many constellations on its way to the pole. However, as its journey back out continues, our opportunity to observe its progress also continues. As comet Lovejoy wanders out, it will begin diving southward in our sky, moving across Draco and Hercules, again giving us many more moments of wonder through the eyepiece and wonderful photo opportunities. Brightness estimates have Comet Lovejoy brighter than magnitude 14 even in December so this will truly be the comet of the year.



C/2014 Q2, Lovejoy Chart May 2015 to Jan 2016.

June Meeting Note

At the June meeting of the Huachuca Astronomy Club ....

Growing Pains: the tumultuous youth of stars a talk by Dr. Megan Reiter.

Stars are the fundamental unit of astronomy - galaxies are made up of stars, planets orbit stars, and dying stars make some of the most spectacular explosions in the universe. How stars are born and evolve affects all of these things. Dr.Reiter will describe how new observations reveal just how complicated growing up is for stars.

Dr. Megan Reiter likes big stars, little stars, forming stars, dying stars, accretion, outflows, feedback, and blaming things on magnetic fields. She uses images from the Hubble Space Telescope and spectroscopy from the Magellan Telescope in Chile to study how more massive stars form. She finished her PhD in Astronomy at the University of Arizona in the spring of 2015.

The June meeting will be held at 7PM on June 5, 2015 in the community room of the Student Union Building at Cochise College, 901 Colombo Avenue, Sierra Vista. The meeting is **free** and open to the public. A door prize will be awarded, but you must be present to win.

ScienceNews
MAGAZINE OF THE SOCIETY FOR SCIENCE & THE PUBLIC

News: Astronomy

Dueling studies reveal two ways to trigger stellar explosions

By Christopher Crockett 1:00pm, May 20, 2015

FLASH OF LIGHT Type 1a supernovas, such as the one seen in this Hubble Space Telescope image, can be triggered in at least two different ways, new research shows.

There's more than one way to explode a star. Four recently seen type 1a supernovas show off some of this diversity. One supernova hints at the gas of a partner star fueling the explosion; colliding white dwarfs — the exposed cores of dead stars — probably triggered the other three.

The observations, described in a pair of papers in the May 21 *Nature*, give astronomers a rare look at the first few days of a stellar detonation.

Shrapnel from supernova iPTF14atg appeared to run into another star within hours of the explosion, Yi Cao, an astrophysicist at Caltech, and colleagues report. The presence of this close stellar partner supports the idea that a relatively large star provoked a white dwarf to explode. The companion star may have dumped its gas on the white dwarf until the added weight sparked a thermonuclear detonation.

The blast of gas then slammed into the companion star, creating a shock wave and an ultraviolet glow. The UV flash tipped Cao and colleagues off to the presence of an accomplice.

Astrophysicist Robert Olling of the University of Maryland in College Park and colleagues, however, saw no such bump in the light from three other supernovas captured by the Kepler space telescope. Kepler can't see UV light. But if there was another star lurking nearby, Olling says, the telescope should have seen something in the first few days after the supernova. The lack of a second flash supports another leading idea for what triggers the explosion — the collision of two white dwarfs locked in mutual orbit.

Evidence for different triggers "doesn't mean there's any problem," says Ryan Foley, an astrophysicist at the University of Illinois at Urbana-Champaign. "They're looking at very different physical systems." Olling's are run-of-the-mill type 1a supernovas that astronomers use to measure distances to other galaxies, Foley says. The explosion that Cao detected, however, "is a weird supernova." It's much less luminous and the debris doesn't fly away as fast.

Perhaps a star drizzling gas onto a white dwarf ends in a subpar supernova. A collision between white dwarfs, on the other hand, might lead to something with a little more oomph.

"If you think the asteroid that wiped out the dinosaurs was bad," Olling says, "imagine two white dwarfs crashing into each other."

Sorting out how many supernovas are caused by one trigger or the other is tricky because type 1a supernovas are rare. On average, only one goes off in a galaxy every 100 years, Olling says. "You have to look at lots of galaxies for a long time to find just a handful."

Olling is doing just that. He and his colleagues are using the revived Kepler telescope to scan tens of thousands of galaxies for type 1a supernovas while conducting simultaneous observations from the ground. They haven't found any yet, he says, but he hopes to build up a large enough sample so that researchers can start to better understand what's driving these powerful explosions.

Y. Cao et al. A strong ultraviolet pulse from a newborn type Ia supernova. *Nature*. Vol. 521, May 21, 2015, p. 328. doi: 10.1038/nature14440.

R.P. Olling et al. No signature of ejecta interaction with a stellar companion in three type Ia supernovae. *Nature*. Vol. 521, May 21, 2015, p. 332. doi: 10.1038/nature14455.

Further Reading

C. Crockett. White dwarf pair will trigger a supernova — in 700 million years. Science News Online, February 9, 2015.

C. Crockett. Wake of nearby supernova hints at explosion's origins. Science News Online, August 27, 2014.

N. Drake. No companion in supernova debris. Science News Online, September 28, 2012.

The "G" in GOES Is What Makes It Go

By Ethan Siegel

Going up into space is the best way to view the universe, eliminating all the distortionary effects of weather, clouds, temperature variations and the atmosphere's airflow all in one swoop. It's also the best way, so long as you're up at high enough altitudes, to view an entire 50 percent of Earth all at once. And if you place your observatory at just the right location, you can observe the *same* hemisphere of Earth continuously, tracking the changes and behavior of our atmosphere for many years.

The trick, believe it or not, was worked out by Kepler some 400 years ago! The same scientist who discovered that planets orbit the sun in ellipses also figured out the relationship between how distant an object needs to be from a much more massive one in order to have a certain orbital period. All you need to know is the period and distance of one satellite for any given body, and you can figure out the necessary distance to have any desired period. Luckily for us, planet Earth has a natural satellite—the moon—and just from that information, we can figure out how distant an artificial satellite would need to be to have an orbital period that exactly matches the length of a day and the rotational speed of Earth. For our world, that means an orbital distance of 42,164 km (26,199 miles) from Earth's center, or 35,786 km (22,236 miles) above mean sea level.

We call that orbit *geosynchronous* or *geostationary*, meaning that a satellite at that distance always remains above the exact same location on our world. Other effects—like solar wind, radiation pressure and the moon—require onboard thrusters to maintain the satellite's precisely desired position above any given point on Earth's surface. While geostationary satellites have been in use since 1963, it was only in 1974 that the Synchronous Meteorological Satellite (SMS) program began to monitor Earth's weather with them, growing into the (GOES)
program the next year. For 40 years now, GOES satellites have monitored the Earth's weather continuously, with a total of 16 satellites having been launched as part of the program. To the delight of NASA (and Ghostbusters) fans everywhere, GOES-R series will launch in 2016, with thrice the spectral information, four times the spatial resolution and five times the coverage speed of its predecessors, with many other improved capabilities. Yet it's the simplicity of gravity and the geostationary "G" in *GOES* that gives us the power to observe our hemisphere all at once, continuously, and for as long as we like!

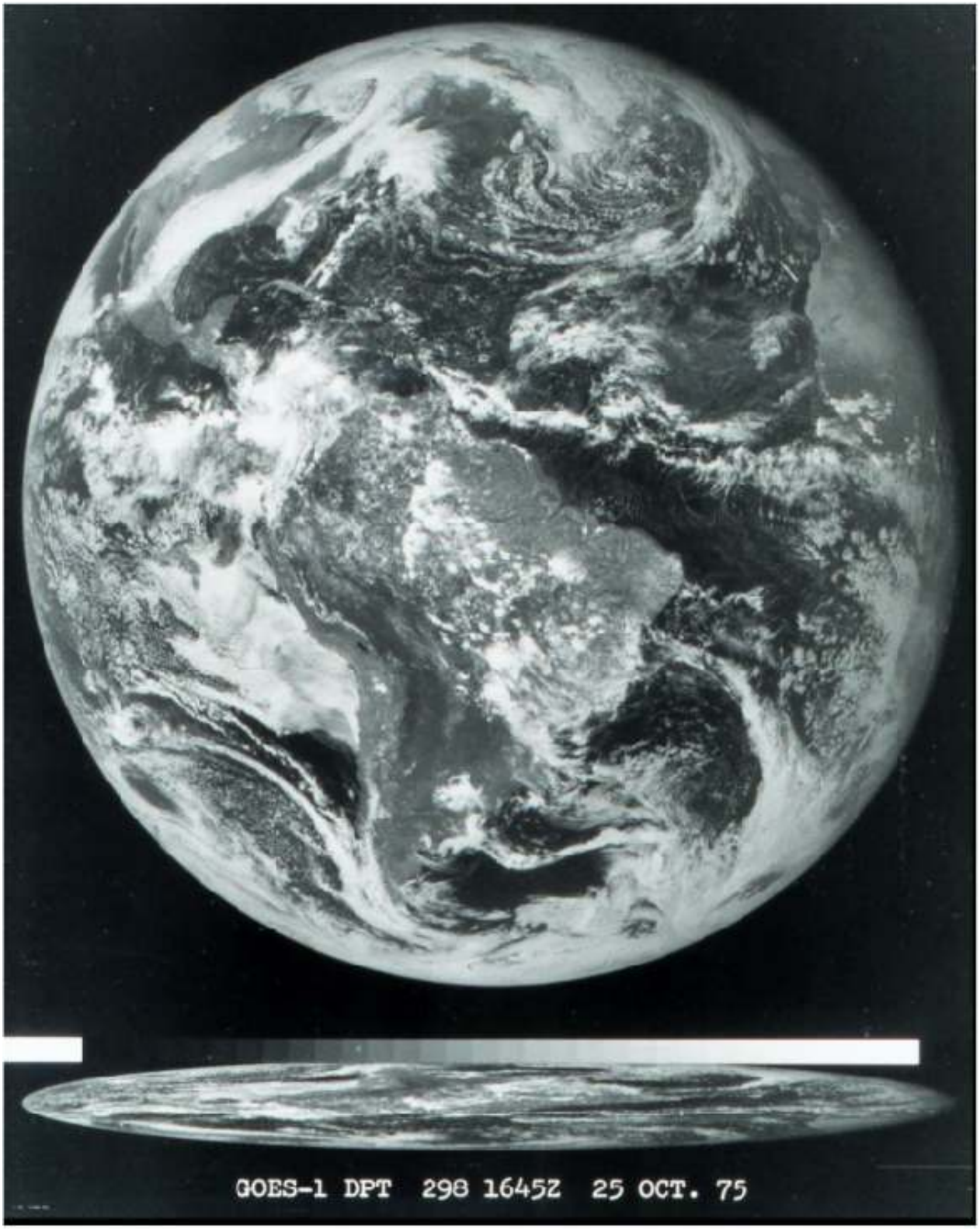


Image credit: National Oceanic and Atmospheric Administration, of the first image ever obtained from a GOES satellite. This image was taken from over 22,000 miles (35,000 km) above the Earth's surface on October 25, 1975.

2015 Spring Observations

Cindy Lund

After going to only two star parties this winter, I went to six parties this spring. Three were at Patterson Observatory. The others were at Kartchner Caverns, Discovery Observatory West, and the Blue Marvel Observatory.

I observed many different objects this spring including the moon, Venus, Saturn, and Jupiter with its Galilean Moons and Great Red Spot. I also saw the star Sirius. I observed four open clusters: M45 (Pleiades), M36, M37, and M38 as well as three globular clusters: M3, M13 (Hercules Cluster), and NGC 5139 (Omega Centauri). I saw several galaxies including M100, M81 (Bode's Galaxy) M82 (Cigar Galaxy), M51 (Whirlpool Galaxy) and its companion NGC 5195. My favorite observation of the spring was seeing the three galaxies of the Leo Triplet (M65, M66 and NGC 3268) in the same field.

March 15, 2015 at Kartchner Caverns		
M42 Orion Nebula	Diffuse Nebula	Saw a band of gray nebulosity, curving like a J to the right and like a upside down a backward J to the left. The band spread out at either end. The Trapezium was just under the center of the band.
M45 Pleiades	Open Cluster	Noticed that the bright stars formed a dipper shape, are these the naked-eye stars? Dimmer stars were scattered throughout.
Venus	Planet, Inner	Bright yellow-white "flat circle". Shaped like a capital 'D'
Jupiter	Planet, Gas Giant	Yellow disk with brown horizontal stripes, one above the equator, one below. The Great Red Spot was visible on the upper stripe, near the left edge.
4 Galilean Moons	Moons of Jupiter	Saw one moon coming out from behind Jupiter. Another moon formed a shadow near the center of Jupiter's disk (small black dot). Another moon was to the left of Jupiter, and the fourth was far to Jupiter's right.

March 26, 2015 at Patterson Observatory		
M81 Bode's Galaxy	Spiral Galaxy	Seen in the same field as M82. Appeared in lower left corner of the field. Vertical lens shaped with a bright core.
M82 Cigar Galaxy	Irregular Galaxy	Seen in the same field as M81. Fuzzy horizontal line in upper left corner of the field. Smaller and dimmer than M81.
M45 Pleiades	Open Cluster	Brightest stars formed a dipper shape. Dimmer stars formed two parallel zigzag lines and a handle extension for the dipper.
M51 Whirlpool Galaxy	Spiral Galaxy	Core appeared as fuzzy dot. Brighter than core of NGC 5195. Appeared on the left of NGC 5195. Very faint hints of nebulosity around both cores.
NGC 5195	Companion to Whirlpool Galaxy	Core appeared as fuzzy dot. Dimmer than core of M51 Appeared on the right of M51. Very faint hints of nebulosity around both cores.
Venus	Planet, Inner	Seen when low in the sky. Still in Gibbenous phase. Appeared as a backward capital 'D'. The straight edge was blurry.
Comet Lovejoy	Comet	Fuzzy cotton ball with bright dot at the center. No notable tail.

April 18, 2015 at Discovery Observatory West		
Sirius	Star	Very bright, appeared to have four spikes.
M42 Orion Nebula	Diffuse Nebula	A band of green nebulosity that started as a horizontal line, wrapped above the Trapezium and then split in two. One part continued the horizontal line, the other curved up and to the right. Below the band was a star surrounded by a ring of nebulosity.
M38	Open Cluster	Stars appeared to be grouped in short lines. Most were similar in brightness. There were two notably brighter stars, in the lower right of the cluster and the other star further down and to the right.
M37	Open Cluster	Many stars in groups of three to six. A red star, not much brighter than the others, appeared near the center.
M36	Open Cluster	More open than M38 or M37 (stars further apart). The stars appeared to be grouped in circles, or ovals. The cluster appeared star-shaped overall.
M3	Globular Cluster	Appeared to have a square shape. Core was very dense, white with stars, and the core was about one-third the size of the cluster.

April 26, 2015 at Patterson Observatory		
M82 Cigar Galaxy	Irregular Galaxy	Thick line of bright nebulosity. Cut across by two dust lanes. One in the middle going straight across, the other near the top at a slight angle (higher on the left, lower on the right)
M100	Spiral Galaxy	Could only see the core which appeared as a bright fuzzy dot.
M65	Spiral Galaxy	Bright core, with nebulosity seeming to radiate from either side of the core.
Venus	Planet, Inner	Very bright, almost half full, like a D. Slightly crescent shaped.
Jupiter	Planet, Gas Giant	Yellow disk with two brown horizontal stripes. Great Red Spot was not visible.
4 Galilean Moons	Moons of Jupiter	Three on Jupiter's left. Two of them far from Jupiter, but close together, the other about half way between them and Jupiter. One on Jupiter's right, slightly red.

May 16, 2015 at Blue Marvel Observatory		
M65	Spiral Galaxy	Seen in the field with M66 and NGC 3628, in lower left corner. Horizontally oriented. Brightest of the three galaxies. Lens shape with nebulosity to the sides.
M66	Spiral Galaxy	Seen in the field with M65 and NGC 3628, in center left. Horizontally oriented. Dimmer than M65, bright core with nebulosity to the sides.
NGC 3628	Spiral Galaxy	Seen in the field with M65 and M66, in the upper right. Appeared as a long thin bright line, vertically oriented. No notable core, smallest of the galaxies.
NGC 5139 Omega Centauri	Globular Cluster	Core seemed to have nebulosity. Lines of stars appeared to radiate from the core, filling the field. Stars in lines of three or four. Was less dense further from the core.
M51 Whirlpool Galaxy	Spiral Galaxy	Saw faint arms of nebulosity wrapping around a small bright core.

NGC 5195	Companion to Whirlpool Galaxy	Core smaller and fainter than M51's core. Saw faint nebulosity around the core. About a quarter the size of M51.
Jupiter	Planet, Gas Giant	Yellow disk with a well-defined dark brown stripe on each side of the equator. Appeared darker yellow between the stripes than by the poles.
3 Galilean Moons	Moons of Jupiter	All on the left side of Jupiter. The second closest was twice as far from Jupiter as the first, and the third was twice as far away as the second moon.

May 21, 2015 at Patterson Observatory		
M13 Hercules Globular Cluster	Globular Cluster	Shaped a bit like an hour glass, but a short hourglass with a thick middle. Large round core in the center.
Earth's Moon	Moon	Noticed a flat, circular plain surrounded by mountains near the center of the terminator.
Saturn	Planet, Gas Giant	Rings almost fully visible. Notice a faint line across the equator, a bit darker than the rest of the planet.
Jupiter	Planet, Gas Giant	Yellow disk with a thick brown stripe on each side of the equator. Thin stripe below the lower, thick stripe. Great Red Spot visible on the thin stripe near the left edge.
4 Galilean Moons	Moons of Jupiter	Three on left side, equally spaced, one on the right.

M100 and neighbors by David Roemer

Members Photos

Trifid Nebula, M20 by Glen Sanner

Comet 29P/Schwassmann–Wachmann by David Roemer

Members Photos
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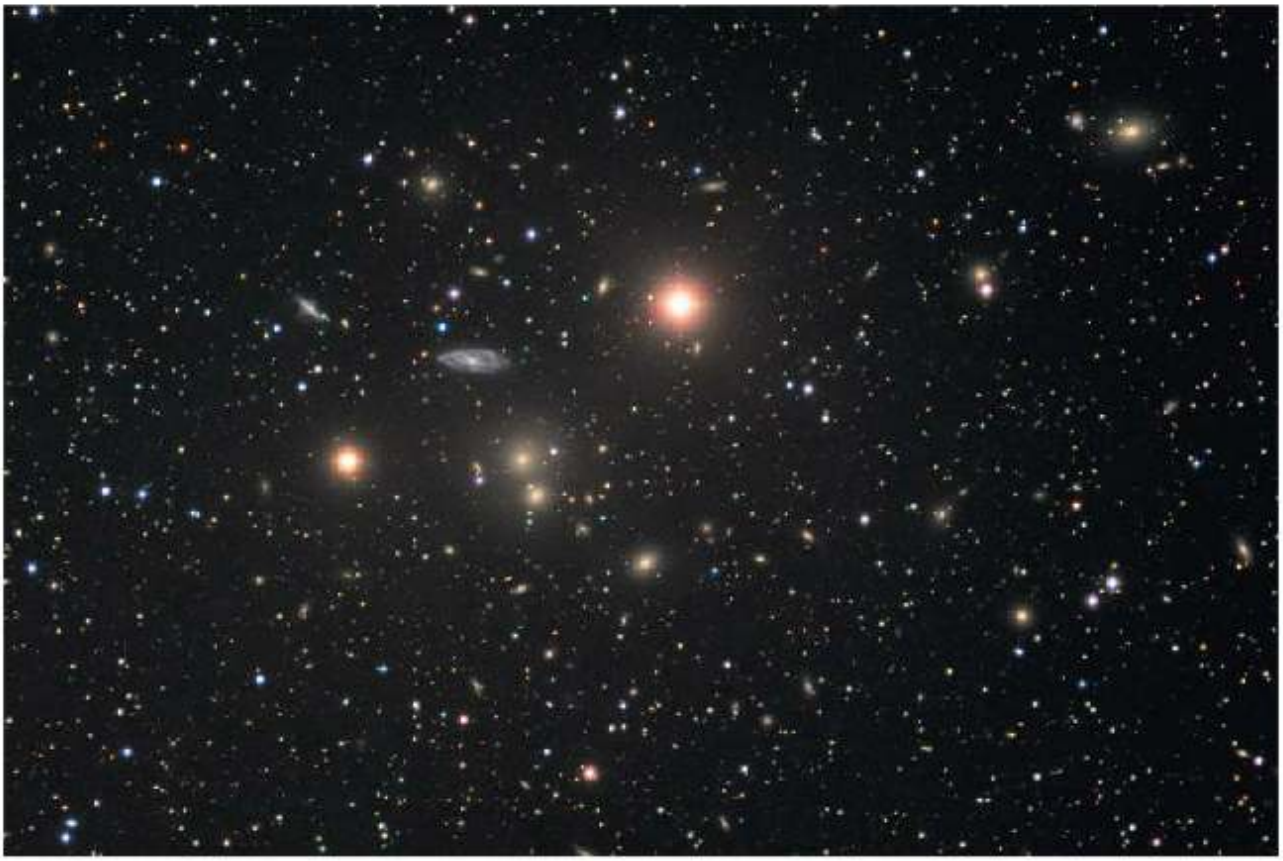

Hydra I Galaxy Cluster by Rick Burke

Black Eye Galaxy (M64) by David Roemer

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Or See Craigslist at at http://sierravista.craigslist.org/bar/4523742100.html

FOR SALE: Older Optical Guidance Systems 12.5" f/9 Ritchey-Chretian telescope. Very good Paul Jones ceramic optics, Robofocus secondary focuser, will include Takahashi collimating telescope. Some of the image through the scope are at Mshadephotography.com.
Contact Mike J. Shade at mshade@q.com

FOR SALE: Mae Childs has an 8" Celestron Nex Star Good condition with all original accessories.
Please contact Mae maechilds2014@aol.com

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HAC Calendar of Events for June-July 2015

SU	MO	TU	WE	TH	FR	SA
24 May Jupiter5° north of the moon	**25** 1:19PM Memorial day	**26** Patterson hosts home school group. 7:00PM	**27**	**28** Sierra Vista City Council meeting Signs/Lighting	**29**	**30**
31	**1 June** Saturn 1.9° south if Moon	**2** 12:19PM	**3**	**4**	**5** HAC Meeting Student Union 7P Dr. Megan Reiter	**6** Venus at greatest eastern elongation.
7	**8**	**9** 11:42AM	**10**	**11** Pallas at opposition. Uranus .05° north of Moon	**12**	**13** Member Star Party
14 Mercury .04° north of Moon	**15**	**16** 10:05AM	**17**	**18**	**19** Patterson Teacher summer workshop 7PM	**20**
21 Summer Solstice 12:38PM	**22**	**23**	**24** 7:05AM Mercury at greatest western elongation	**25** Patterson Public Night 8PM	**26**	**27**
28 Saturn 2° south of Moon	**29**	**30** **Asteroid Awareness Day**	**1 July** 10:20PM	**2**	**3** HAC Meeting Student Union 7P	**4** 
5	**6** Pluto Opposition	**7**	**8** 4:24PM	**9** Venus greatest brilliancy	**10**	**11**
12	**13**	**14**	**15** 9:24PM	**16**	**17**	**18**
19	**20**	**21**	**22**	**23**	**24** 12:04AM	**25** Ceres Opposition
26	**27**	**28**	**29** Delta Aquarid Meteors	**30** Delta Aquarid Meteors	**31** 6:43AM Delta Aquarid Meteors	

All times MST. Join Haclist to keep up to date with all of the Huachuca Astronomy Club events

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