nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

Volume 34 Number 6 ***nightwatch*** **June 2014**

President's Message

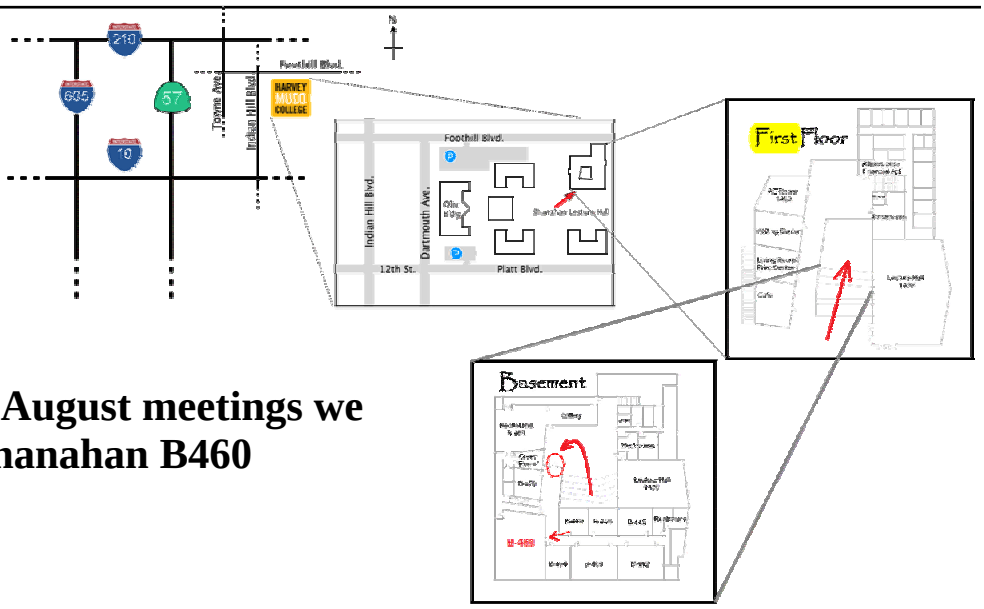
.I haven't done a ton of observing this past month, but I did have an exciting evening at the Webb School observatory on the evening of June 3. See my report farther on in this issue for all the details.

Our scheduled speaker for Friday, June 13, is Dr. Ann Esin, a physics professor at Harvey Mudd, who will speak to us about black holes.

Matt Wedel

We had our annual club elections last month. All of the standing officers were re-elected to their posts:

President – Mathew Wedel
Vice-President – Joe Hillberg
Secretary – Howard Maculsay
Treasurer – Gary Thompson
VP for Facilities – Jeff Felton
Member-at-Large – Karl Rijkse
Member-at-Large – Jim Bridgewater



For the June, July, and August meetings we will convene in Shanahan B460

PVAA General Meeting 5/16/14

Matt Wedel started the meeting with a few announcements, like it is now time to sign up for The Mount Wilson Observatory night. PVAA has rented the 60 inch telescope for the whole night on September 27th. The maximum amount of people that can attend is 25, so sign-up now. There is a fee of $100.00 per person.

Speaking of money, the PVAA annual dues are now due. Dues are $30 per year for adults, $40 per year for families, or $12 for youth under 18.

Our guest speaker for the night was Harvey Mudd's Vatche Sahakian. His presentation was titled: "Peeking under the Cosmic Veil." He started out with a Hubble Deep Field picture, and the statement: "A vacuum weighs something due to quantum fluctuations, which is pushing the universe - The Expansion Hypothesis." Think of it like this: If you have a box with absolutely nothing in it, and another box with the same, and then you have radiation go through one box, while the radiation is traveling through the void in box number two, which box weighs more? Now radiation is everywhere. Even a pure void is not a pure void. The Cosmic Background Radiation has been measured, and we are just now creating instruments for more accurately measuring it. (He joked that Cosmology has historically been very imprecise. Everything in that field is give or take a few billion. The joke he gave was: "How many cosmologists does it take to screw in a light bulb? One, give or take million.") Fortunately we now live in the Golden Age of Cosmology. The measurements are becoming orders of magnitude more accurate - he had a slide that had a lot of stars and the number 10 to the 14th magnitude, which he explained that we now know, using better and more accurate instruments, is really 10 to the 16th magnitude. So the first estimate was off by a factor of 100.

He has a video Fish in a Pond: From Cosmology to the Anthropic Principle.

https://www.youtube.com/watch?v=-0jt8_f9tdQ

Like his presentation to us, he keeps it flowing, funny & insightful.

Gary Thompson

Club Events Calendar

June 13, General meeting
June 28, Star Party, White Mountain, Bishop

July 3, Board meeting, 6:15
July 11, General meeting
July 26, Star Party, Mt Baldy, Cow Canyon Saddle

August 7, Board meeting, 6:15
August 15, General meeting
August 23, Star Party

September 4, Board meeting, 6:15
September 12, General meeting
September 20, Star Party
September 27, Mt Wilson Observing

October 2, Board meeting 6:15
October 10, General meeting
October 25, Star Party

October 30, Board meeting, 6:15
November 7, General meeting
November 22, Star Party

December 4, Board meeting, 6:15
December 5, Christmas Party, Sizzlin' Skillets 7:00pm
No scheduled Star Party

What's Up? - Asian Space Race

The famous space race between the U.S. and Russia is old 20th century history now. A 21st century space race has begun between new technologically developing Asian countries. China has just become the third nation to land an exploratory mission on the Moon. India has launched an orbiter mission to Mars and Japan was first to land a probe on an asteroid. These three nations plus North Korea, South Korea, Israel, and Iran have launched orbiting satellites. Launches are as much military posturing as space exploration

While the U.S., Russia and the European Space Agency are now wisely sharing their scientific space activities, the programs of China, India, and Japan are competitive and nationalistic. Between U.S. and China there's no cooperation at all.

Of course the big three Asian nations have all had failures. Japan's Venus spacecraft and China's Mars explorer both failed leave Earth orbit correctly. But lets examine the successful programs.

Japan started back with a Halley's Comet probe. China became the first Asian nation to put a man into space. All three had successful Moon orbiters. In 2007, Japan Kaguya (a Moon princess) said it found evidence of water in a permanently shadowed south polar crater. Also Kaguya took the first high definition television pictures. India's lunar orbiter Chandrayann 1 was regarded as a step toward their Mars orbiter.

The Japanese Hayabusa (Peregrine Falcon) mission was the first spacecraft to successfully land on the newly named Itokawa asteroid. It was an edgy landing on the dusty asteroid. Its entry capsule (MINERVA) failed to function, so the probe Hayabusa itself made a rough landing. Not designed to grab a sample it nevertheless picked up swirling dust grains which it brought back to Earth. It did take excellent pictures and scientific studies of the loosely compacted Itokawa.

The recent China's Chang'e 3 became the first object to soft-land on the Moon in nearly forty years. It followed Chang'e 1 and 2 which orbited the Moon. Chang'e 1 crashed into the Moon, but Chang'e 2 eventually went off to make a very close visit to asteroid 4179 Toutatis. Chang'e is a Moon goddess and her rover is Yutu (Jade Rabbit) is her beloved pet.

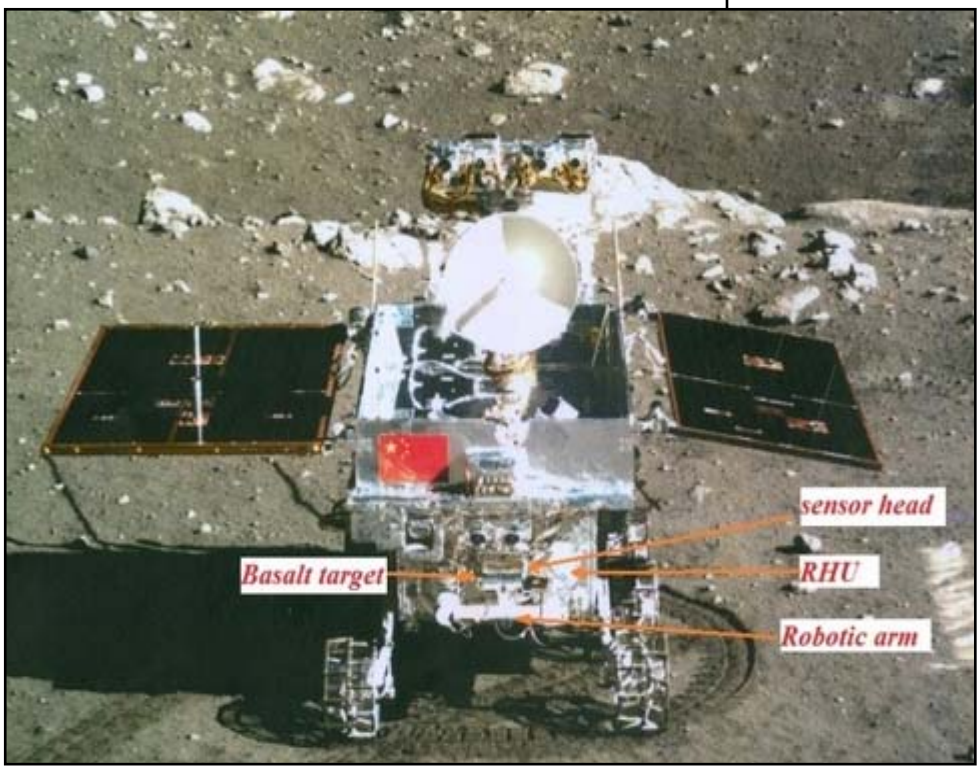
Chang'e landed in December 2013 on the Mare Imbrium (Sea of Rains). The last moon rover, the Soviet Lunokhod 2, had problems with lunar temperatures. It's one reason the U.S. never tried a Moon rover. The nights are two weeks long (half a month) during which it gets extremely cold. While Chang'e lander has a radioisotope heater unit to heat and power operations, the Yutu rover doesn't and so after its second 14 day night it was unable to move yet it continued to gather data. The Jade Rabbit has ground penetrating radar and spectrometers to inspect the composition of the soil and structure of the lunar crust beneath it. It has an alpha particle X-ray spectrometer plus an infrared spectrometer intended to analyze the chemical composition of lunar samples. It was intended to explore a square mile or more and gather a variety of results, but now it's paralyzed. Temperature differences, because of the complete lack of atmosphere, are much more destructive than those on Mars.

However, upon arrival both the lander and the rover were able to photograph each other. Yutu, the Jade Rabbit starts out across the surface (pictured). NASA's Lunar Reconnaissance Orbiter took overhead pictures of the two craft on the lunar surface.

Being China's foremost competitor, India has just made a long shot toward Mars. Their Mars Orbiter Mission (MOM) also called Mangalyaan (Mars Craft) was launched in 2013. If it succeeds it would be the fourth agency (after NASA, Russia and the European Space Agency) to reach Mars. It's expected to enter orbit around Mars in September 2014. It's aim is to design and plan a future Mars landing. It has a methane sensor to search for and measure that life indicative gas. There are other environmental analysers to study the compostion of particles in the atmosphere. A Thermal Infrared Imaging Spectrometer and a Color Camera to map the surface.

China is still a leader with the highest number of explorations. It says it has no competition in any space race. But a race does exist in a solar system that has more than enough unknowns for all explorers.

Lee Collins



A Glorious Gravitational Lens

As we look at the universe on larger and larger scales, from stars to galaxies to groups to the largest galaxy clusters, we become able to perceive objects that are significantly farther away. But as we consider these larger classes of objects, they don't merely emit increased amounts of light, but they also contain increased amounts of **mass**. Under the best of circumstances, these gravitational clumps can open up a window to the distant universe well beyond what any astronomer could hope to see otherwise.

The oldest style of telescope is the refractor, where light from an arbitrarily distant source is passed through a converging lens. The incoming light rays—initially spread over a large area—are brought together at a point on the opposite side of the lens, with light rays from significantly closer sources bent in characteristic ways as well. While the universe doesn't consist of large optical lenses, **mass itself** is capable of bending light in accord with Einstein's theory of General Relativity, and acts as a gravitational lens!

The first prediction that real-life galaxy clusters would behave as such lenses came from Fritz Zwicky in 1937. These foreground masses would lead to multiple images and distorted arcs of the same lensed background object, all of which would be magnified as well. It wasn't until 1979, however, that this process was confirmed with the observation of the Twin Quasar: QSO 0957+561. Gravitational lensing requires a serendipitous alignment of a massive foreground galaxy cluster with a background galaxy (or cluster) in the right location to be seen by an observer at our location, but the universe is kind enough to provide us with many such examples of this good fortune, including one accessible to astrophotographers with 11" scopes and larger: Abell 2218.

Located in the Constellation of Draco at position (J2000): R.A. 16h 35m 54s, Dec. +66° 13' 00" (about 2° North of the star 18 Draconis), Abell 2218 is an extremely massive cluster of about 10,000 galaxies located 2 billion light years away, but it's also located quite close to the zenith for northern hemisphere observers, making it a great target for deep-sky astrophotography. Multiple images and sweeping arcs abound between magnitudes 17 and 20, and include galaxies at a variety of redshifts ranging from z=0.7 all the way up to z=2.5, with farther ones at even fainter magnitudes unveiled by Hubble. For those looking for an astronomical challenge this summer, take a shot at Abell 2218, a cluster responsible for perhaps the most glorious gravitational lens visible from Earth!

Dr. Ethan Siegel

Learn about current efforts to study gravitational lensing using NASA facilities:
http://www.nasa.gov/press/2014/january/nasas-fermi-makes-first-gamma-ray-study-of-a-gravitational-lens/

Kids can learn about gravity at NASA's Space Place: http://spaceplace.nasa.gov/what-is-gravity/

Abel 2218. Image credit: NASA, ESA, and Johan Richard (Caltech).
Acknowledgement: Davide de Martin & James Long (ESA/Hubble).

A Birthday Observing Run at the Webb Schools

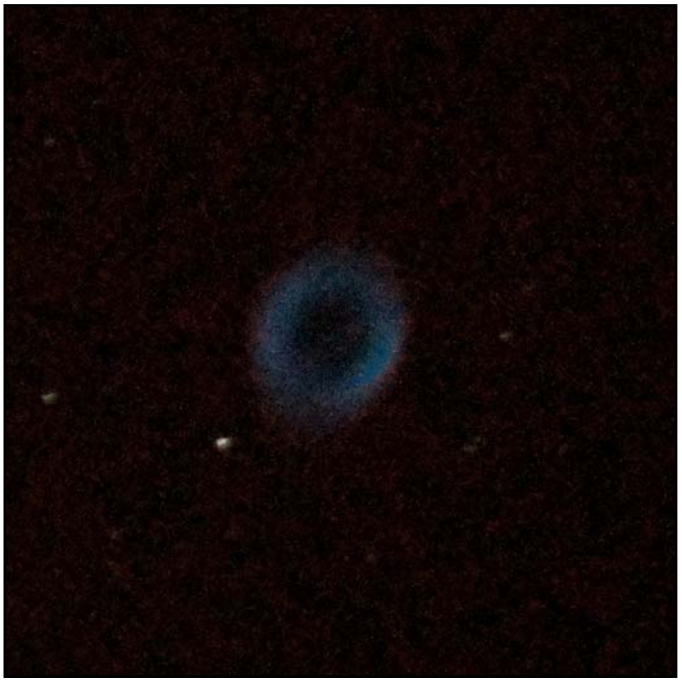
My birthday was June 3. That evening, PVAA member Steve Sittig invited me up to the observatory at the Webb Schools in north Claremont. The observatory dome there houses an orange-tube C14 Schmidt-Cassegrain. Observing with us were two other Webb faculty members, Andy Farke and Andrew Hamilton. Andrew Hamilton had brought along his DLSR—this would turn out to be important.

We got started a little after 9:00 PM with a look at Jupiter, which was low in the west. We noticed right away that the seeing was pretty darned good. We went on to the waxing crescent moon and then Mars and Saturn. After that we turned to the deep sky. M81 and M82 looked great, so we hooked up Andrew's DSLR and attempted some photography. We didn't have a remote shutter or computer control, so we were using only the camera's native controls, and assessing the results on the LCD screen.

After the galaxies, we went on to the Ring Nebula, M57, and then the Great Globular Cluster in Hercules, M13. Even with the 30-second exposures that the camera was natively limited to, we were getting very respectable images. I am including a couple here.

Our results were pretty primitive compared to what people can do with dedicated astro cameras and post-processing, but we still had a grand time, and the process was sufficiently rewarding that we stayed out until almost two in the morning. All in all, a pretty darned good birthday present!

Matt Wedel



Photos by Andrew Hamilton

PVAA Officers and Board

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Vice President ..	Joe Hillberg	909/949-3650
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Membership / Publicity.....		
	Gary Thompson	909/935-5509
Outreach	Jeff Schroeder	818/298-3965
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Nightwatch	John Stover ….....	909/988-9747