
Newsletter of the Pomona Valley Amateur Astronomers

It is not in the stars to hold our destiny but in ourselves.
*William Shakespeare*

**Volume 36 Number 10** ***nightwatch*** **October 2016**

## President's Message

This month I want to bring your attention to a couple of cool opportunities. The first is a series of talks on astrophotography given at Garvey Ranch Park Observatory by Vance Tyree and David Nakamoto. The classes covered cover basic equipment, tracking devices, cameras, polar alignment, image processing, and imaging in light polluted skies. The whole series is freely available on the Los Angeles Astronomical Society's YouTube page, here:

https://www.youtube.com/playlist?list=PLVTcgBRERaA36fl9Egn0f4363cKS5VeS9

Many thanks to LAAS member and sometime PVAA speaker Ken Elchert for the heads up.

Next up: AMC Theaters and IMAX are having Space Week on October 14-20. The movies *Gravity*, *Interstellar*, *The Martian*, *Star Trek*, *Star Trek Into Darkness*, and *Star Trek Beyond* will be back on the big screen for that week only. Get details and tickets here:

https://www.amctheatres.com/imax-spaceweek

Our speaker this month is Michael C. Storrie-Lombardi, M.D. He has spoken to us before about astrobiology, and we are fortunate to have him back. The title of his talk will be, "Extraterrestrial Vehicle Instrument Laboratory (EVIL) Harvey Mudd College: From Searching for Life in the Universe to Detecting Cancer in a Human Being".

We'll be back in Shanahan B460, where we've been for the past year, for the rest of this year and all of next spring. I hope to see you there!

***Matt Wedel***

## Club Events Calendar

**Oct 14, 2016 General Meeting**

**Oct 29, 2016 Star Party – Afton Canyon**
**Nov 10, 2016 Board Meeting**
**Nov 18, 2016 General Meeting**

**Nov 30, 2016 Board Meeting**
**Dec 10, 2016 Xmas Party**

**Jan 4, 2017 Board Meeting**
**Jan 13, 2017 General Meeting**
**Jan 28, 2017 Star Party – Salton Sea, Mecca Beach**

**Feb 1, 2017 Board Meeting**
**Feb 10, 2017 General Meeting**
**Feb 25, 2017 Star Party**

**March 1, 2017 Board Meeting**
**March 10, 2017 General Meeting**
**March 25, 2017 Star Party**

**Mar 30, 2017 Board Meeting**
**Apr 7, 2017 General Meeting**
**Apr 22, 2017 Star Party**

**May 3, 2017 Board Meeting**
**May 12, 2017 General Meeting**
**May 25 - 29, Joint RTMC**

**May 31, 2017 Board Meeting**
**June 9, 2017 General Meeting**

## PVAA General Meeting 09/16/16

The meeting started with announcements. PVAA is having a star party on Saturday night October 29th at Afton Canyon. Please visit our website at: http://www.pvaa.us/ for a map to the site. Our Christmas party will be held at the Upland IHOP restaurant on Euclid on Saturday, December 10th. More details at the November general meeting. On another note, PVAA president Mathew Wedel had a book published – on Amazon for $35 – "The Sauropod Dinosaur"! (Since man was not around, did they look up at the stars and wonder?)

Our main speaker was Dr. Elijah Langdon Quetin of Pomona College. The topic for the night was "Searching the Hubble Space Telescope (HST) Archive For Tidal Disruptions of Stars By Supermassive Black Holes". Tidal disruption of a passing star could give the star a quasar effect as the star is torn apart which he terms: "peritypa". A black hole is defined as an object or a point in space that has an escape velocity that exceeds the speed of light. He talked about how the host galaxy can affect the black hole.

HST has a 2.5 meter primary mirror, and can observe objects down to magnitude 23. HST photos are available to the public. Hubble has imaged ~10,000,000 galaxies. Looking for tidal disruptions in these galaxies is time consuming. He showed a slide of steps that need to be done to verify they have found tidal disruption. He handled the math with surprising clarity. He sprinkled his talk with little facts like: "If the sun was compacted down to become a black hole, its mass would still be the same, so earth's orbit wouldn't change."

He brought up the LIGO instruments detecting gravity waves of two merging black holes. These are exciting times. He spent this summer at HST headquarters in Baltimore doing SQL queries on the Hubble Source catalog. He expects to find 100 tidal events this year, but he might find nothing. Check out the HST catalog of pictures at: http://hubblesite.org/gallery/

***Gary Thompson***

## PVAA Officers and Board

**Officers**

| | | |
|---|---|---|
| President …..... | Mathew Wedel ..... | 909-767-9851 |
| Vice President .. | Joe Hillberg ..... | 909-949-3650 |
| Secretary ..... | Howard Maculsay .... | 909-624-1667 |
| Treasurer ..... | Gary Thompson ..... | 909-935-5509 |
| VP Facilities ..... | Jeff Felton ..... | 909-622-6726 |

**Board**

| | |
|---|---|
| Jim Bridgewater (2016)..... | 909-599-7123 |
| Karl Rijkse (2016) ..... | 909-428-1884 |
| Ron Hoekwater (2017)..... | 909-391-1943 |
| Cori Charles (2017) ……. | 909-646-0275 |

**Directors**

Membership / Publicity....Gary Thompson ..909-935-5509

| | | |
|---|---|---|
| Outreach ..... | Jeff Schroeder ..... | 909-758-1840 |
| Programs ..... | Ron Hoekwater ..... | 909-391-1943 |
| Nightwatch ..... | John Stover …..... | 909-988-9747 |

## What's Up? - Space Telescopes

In addition to the famous visible-light Hubble Telescope (in orbit since 1990) over sixty other large and small space telescopes have gone in and out of operation in the last forty plus years. Space telescopes were launched by NASA, ESA (European Space Agency), and many other national space exploration agencies. More are planned for the near future.

Besides photographs of visual light rays there are space telescopes that gather radiation in other frequencies. They collect gamma rays, x-rays, ultraviolet, infrared, microwave, and radio waves. There are space telescopes that gather particles and detect gravitational waves. Most are in a close Earth orbit of around 500 km, but many are way out in space at thousands of kilometers where they can collect without interference. But they can't be serviced in distant orbits.

Hubble is the only telescope actually designed to be serviced in space by astronauts. Since Hubble's placement five Space Shuttle missions were needed to repair its systems. Most space telescopes are on their own.

Gamma ray telescopes collect and measure high energy gamma rays from space. There have been a dozen starting in the 1970's. They're sensitive telescopes that last only a few years. Four are currently in operation. Gamma rays are generated by supernovae, neutron stars, pulsars and black holes. Gamma ray bursts with extremely high energy have also been detected but their origin remains mysterious.

Many X-ray telescopes have been put into orbit in the last forty years. These telescopes measure those exotic high-energy photons. X-rays don't travel a long distance in our atmosphere so they're best observed in space. They're are emitted by galaxy clusters, black holes in galactic nuclei, supernova remnants, neutron stars, and other active cosmic objects. Consequently there have been over thirty three X-ray telescopes put use into use since about 1975. Again because of the sensitivity of these telescopes, they last less than a dozen years. Some ten are currently in operation.

Ultraviolet telescopes observe ultraviolet wavelengths. These are also absorbed by Earth's atmosphere and the best studies are made in space. Ultraviolet light is emitted by visible light objects like the Sun, and other solar objects. So optical telescopes often include ultraviolet (and X-ray) observing instruments. This includes the NASA telescopes Uhuru and the Chandra X-ray observatory. Over 45 space telescopes are equipped to observe ultraviolet rays. Five (including Hubble) are currently operating.

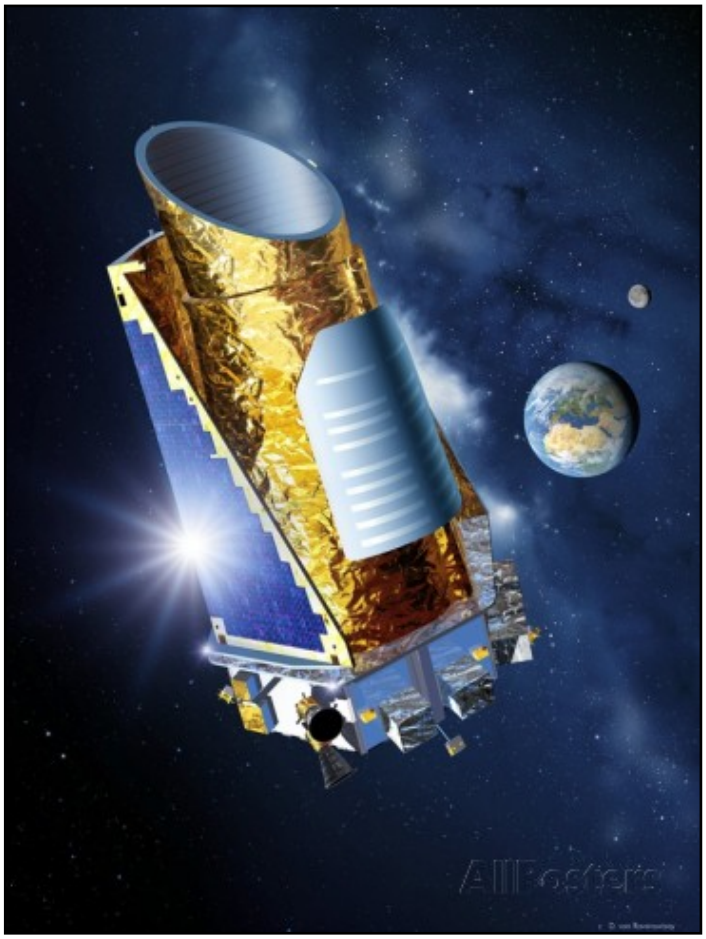
Infrared and sub millimeter telescopes study infrared light radiated from cooler objects like the extremely numerous red and brown dwarf stars. Distant red shifted galaxies and cooler dark nebulae are also observed. Of the over ten telescopes devoted to the infrared the largest is the Herschel Space Observatory sent up by NASA and ESA. Also there's the Spitzer Space Telescope still in operation.

Microwave telescopes primarily measure the cosmological parameters of the Cosmic Microwave Background. Several have been put into operation and one is currently operational.

Although not specifically telescopes, there are also numerous instruments for particle detection.

But visible light rays are the oldest basic form of astronomy. These light gathering space telescopes are orbiting above the interference of atmospheric effects. They provide a high resolution photograph of any object that emits visible light. Some ten have been orbited and eight are currently in operation. They include NASA's Hubble and the Kepler.

Kepler (named after pioneer astronomer Johannes Kepler) is NASA's space observatory designed to discover Earth-sized planets orbiting other stars. Kepler's main science instrument is a photometer that looks at the brightness of over a hundred thousand main sequence stars in an limited area about the same distance from the galactic center as Earth. The data is then transmitted to Earth to be studied for a periodic dimming caused by any exoplanets that cross in front of the stars. Sadly in 2012 one of Kepler's four traction wheels stopped working. When a second wheel failed the program was switched to the many more available red dwarf stars.



Nevertheless, Kepler (pictured) has found more than a thousand confirmed exoplanets in over five hundred star systems in its limited area. It's been estimated that there are as many as 40 billion Earth-sized exoplanets orbiting habitable zones of Sun-like stars (and red dwarfs) in the Milky Way Galaxy. That's a lot of planets. Something think about. .

***Lee Collins***