

Vandenberg Amateur Astronomical Society  
presents  
**The Sidereal Times**



Messier 13(see page 5)

**Meeting News:**

At the March meeting we had a presentation by Dr. Bassi and had a short business meeting.

**Reminder: VAAS club meeting April 12th 7:00PM  
Manzanita School Teachers Lounge.**



**Lunar Calendar:**

New Moon Apr 5th  
Full Moon Apr 19th

Youth outreach



**Presidents Message**

Hello, Fellow Orbiting Carbon Units,

We had a good turn-out for our March meeting! Of course, having goodies provided by Louise was an incentive [Thank you, Louise]! Joel brought cookies and even our guest speaker brought Oreos! We missed the presence of our VP, Jana, but are happy she has defeated the flu.

Dr. Joe Bassi delivered a good recap and overview of the Mars InSight mission. He followed his main presentation with a peek at his time spent at Cambridge and touring nearby places of interest. He showed us William Herschel's home, pointing out the area from which Herschel searched the skies. Ironically, a few days later the anniversary of Herschel's discovery of Uranus rolled around. At the meeting Vahan had reminded us that the seventh planet was originally named "George" in honor of the King of England. How odd it is that "George" seems an even more comic name than Uranus.

Our April meeting will feature a presentation by Dave Gibbs of the Central Coast Astronomical Society. He will discuss his attending the annual International Dark Sky Association meeting last November and will show us a video, "Saving the Dark." Increasing numbers of communities and individuals are seeking ways to reduce lighting up the night skies, an obvious benefit to astronomers. Dave's talk is sure to be educational and inspiring.

To conclude, our group's tour of the VAFB Museum is all set. The information each of you gave me has been submitted and final details will be discussed at our meeting on the 12<sup>th</sup>. I look forward to seeing all of you there!  
Tom

**Events**

**April 6<sup>th</sup>** *Star party at the observatory and / or Figueroa Mt.*  
😊

**April 11<sup>th</sup>** Mercury at greatest Western elongation of 27.7° from the Sun. It is the best time to view Mercury since it will be at its highest point above the horizon in the morning sky. Look low in the Eastern sky just before sunrise.

**April 13<sup>th</sup>** *Star Party at the observatory.*  
😊

**April 22<sup>nd</sup> and 23<sup>rd</sup>** The Lyrids meteor shower is an average shower usually producing about 20 meteors per hour. It is produced by dust particles left over from Comet C/1861 G1 Thatcher. It peaks this year on the night of the 22<sup>nd</sup> and the morning of the 23<sup>rd</sup>. Meteors will radiate from the constellation of Lyra but can appear anywhere in the sky.

**April 27<sup>th</sup>** *Star party at the observatory.*  
😊

Dave



**Star party's and Events**

**March 2<sup>nd</sup>** Star Party at the Observatory. Cancelled due to weather.



**March 9<sup>th</sup>** Star Party at the Observatory. Cancelled due to weather.



**March 30<sup>th</sup>** Star Party at Observatory. No input.



Tom & Vince outreach event



Vince Zaca winery presentation



## April 2019 Moon



Full 19th, New 5th, 1<sup>st</sup> Quarter 12th, Last Quarter 26th

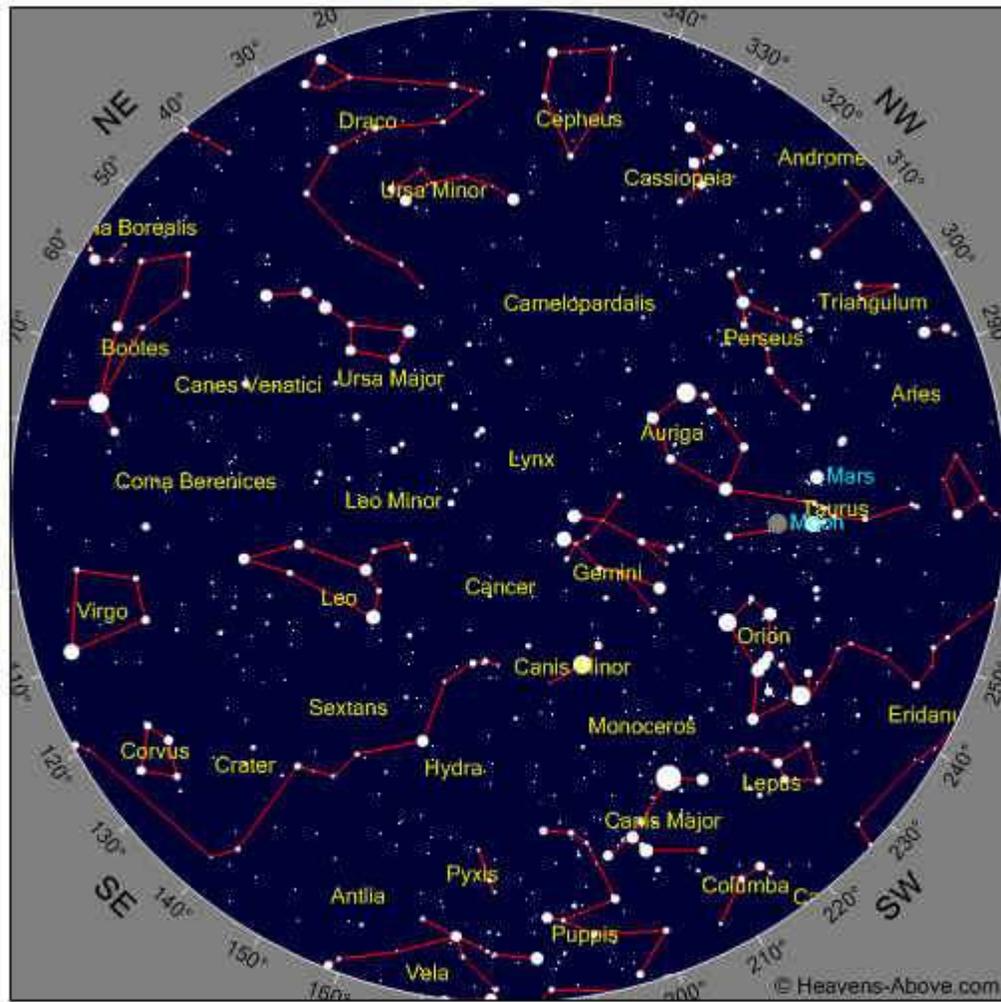
### Moon Facts

Formed 4.6 billion years ago around 30-50 million years after the formation of the solar system.

The Moon makes Earth a more livable planet by moderating our home planets wobble on its axis leading to a relatively stable climate.

## April 2019 Sky

Some Objects of interest M1, M42, Moon



### Time

Year	2019	Month	4	Day	9	Hour	20	Minute	20
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Eclipse 2017



Photo Courtesy Gary Satterfield



Messier 13, NGC 6205, also known as the Great Globular Cluster in the constellation of Hercules. M13 is one of the brightest and best known globular in the northern sky. It has an apparent magnitude of 5.8 and lies at a distance of 25,100 light years from Earth. It has an age estimated to be 11.65 billion years and contains about 300,000 stars. The estimated mass is half a million solar masses. M13 stretches across 20 arc minutes of sky that corresponds to a linear diameter of 145 light years. The brightest star in M13 is V 11, a red giant classified as a Cepheid variable and has a visual magnitude of 11.95. The cluster contains an unusually young B2 type star designated Barnard 29. The star does not really belong to the globular cluster but was presumably picked up by M13 on its orbit around the Milky Way. Other stars in the cluster are very old and only have about 5% of the Sun's iron content as they were formed before stars in our galaxy created metals. M13 also contains about 15 blue stragglers, old stars that appear younger and bluer than their neighbors. M13 is a class V globular cluster, one with an intermediate concentration of stars toward the center. It has a densely packed central region with up to a hundred stars populating a cube only 3 light years on a side. To illustrate, Alpha Centauri the nearest star system to Earth, is just over 4 light years away. In other words stars in the cluster's core region are about 500 times more concentrated than those in our immediate stellar neighborhood. Globular clusters orbit the Milky Way Galaxy outside the galactic disk at tens of thousands of light years away.

Image capture was with a 8 inch RC scope, canon 500D camera, hypertuned CGEM mount and images plus camera control and guiding with Mini Borg and PHD guiding. Integration time 0.7 hrs.

Vince YMCA outreach 2018



## **For what its Worth**

### **Some types of stars:**

#### **Wolf-Rayet Stars:**

Often abbreviated as WR stars are a rare heterogeneous set of stars with unusual spectra showing prominent broad emission lines of highly ionized helium and nitrogen or carbon. The spectra indicate a very high surface enhancement of heavy elements, depletion of hydrogen, and strong stellar winds. The surface temperatures range from 30,000 K to around 200,000 K, hotter than almost all other stars. Classic or population 1 Wolf Rayet stars that have completely lost their outer hydrogen and are fusing helium or heavier elements in the core. A subset of the population WR stars show hydrogen lines in their spectra and are known as WNh stars, they are young extremely massive stars still fusing hydrogen at the core with helium and nitrogen exposed at the surface by strong and radiation-driven mass loss. A separate group of stars with WR spectra are the central stars of planetary nebulae, post asymptotic giant branch stars that were similar to the Sun while on the main sequence but have now ceased fusion and shed their atmospheres to reveal a bare carbon-oxygen core. All Wolf Rayet stars are highly luminous objects due to their high temperatures, thousands of times the luminosity of the Sun. Not exceptionally bright visually since most of their radiation output is in the ultraviolet.

#### **RR Lyrae Variables:**

These are periodic variable stars commonly found in globular clusters. They are used as standard candles to measure extra galactic distances as part of the cosmic distance ladder. This class of variable star is named after the prototype and brightest example RR Lyrae. RR Lyrae are pulsating horizontal branch ageing stars of spectral class A or F with a mass around half the Sun's. They are thought to have previously shed mass during the Red Giant branch phase and consequently they were once stars with similar or slightly less mass than the Sun, around 0.8 solar masses. The period of pulsation and absolute magnitude of RR Lyrae make them good standard candles for relatively nearby targets especially within the Milky Way and Local Group. Beyond the Milky Way they are difficult to detect due to their low luminosity. They are extensively used in globular cluster studies and also used to study chemical properties of older stars. RR Lyrae were formerly called "cluster variables" because of their strong but not exclusive association with globular clusters, conversely over 80% of all variables known in globular clusters are RR Lyrae. They are found at all galactic latitudes as opposed to classical Cepheid that are strongly associated with the galactic plane. Although binary star systems are common for typical stars, RR Lyrae are very rarely observed in pairs. RR Lyrae stars pulse in a manner similar to Cepheid variables but the nature and histories of these stars is thought to be rather different. Like all variables on the Cepheid instability strip pulsations are caused by the  $\kappa$  mechanism when the opacity of ionized helium varies with temperature. RR Lyrae stars are relatively low mass population II stars in common with W Virgins and BL Hercules variables, the type II Cepheids, classical Cepheid variables are higher mass population I stars. RR Lyrae variables are much more common than Cepheids but also much less luminous. The absolute magnitude of an RR Lyrae star is about +0.75, only 40 to 50 times brighter than our Sun. Their period is shorter typically less than one day, sometimes ranging down to 7 hours.

#### **Classical Cepheids:**

Are also known as population I or Delta Cepheid variables undergo pulsations with very regular periods on the order of days to months. These Cepheids are population I variable stars that are 4-20 times more massive than our Sun and up to 100,000 times more luminous. They are yellow bright giants and supergiants of spectral class F6-K2 and their radii change by 1-25% for the longer period and millions of kilometers during a pulsation cycle. Classical Cepheids are used to determine distances to galaxies within the local group and beyond and are a means by which the Hubble constant can be established. They have also been used to clarify many characteristics of our galaxy and the Sun's height above the galactic plane and the galaxies spiral structure.

#### **Type II Cepheids:**

Are population II variable stars which pulsate with periods typically between 1 and 50 days and are typically metal poor old low mass objects half the mass of the Sun. They are divided into several subgroups by period. Stars with pulses between 1 and 4 days are of the BI Her subclass. 10 to 20 days being to the W Virginis subclass and stars with periods greater than 20 days being in the RV Taurus subclass. Type II Cepheids are used to establish the distance to the galactic center, globular clusters and galaxies.

#### **Anomalous Cepheids:**

A group of pulsating stars on the instability strip have periods of less than 2 days, similar to RR Lyrae variables but with higher luminosities. Anomalous Cepheid variables have masses higher than type II Cepheids, RR Lyrae variables and our Sun. It is unclear whether they are young stars on a turned back horizontal branch blue stragglers formed through mass transfer in binary systems or a mix of both.

#### **Double mode Cepheids**

A small population of Cepheid variables have been observed to pulse in 2 modes at the same time, usually the fundamental and first overtone and occasionally the second overtone. A very small number pulsate in 3 modes or an unusual combination of modes including higher overtones.

#### **Cepheid variable:**

Is a type of star that pulsates radially, varying both in diameter and temperature producing changes in brightness with a well defined stable period and amplitude. A strong direct relationship between a Cepheids variables luminosity and pulsation period established Cepheids as important indicators of cosmic bench marks for scaling galactic and extragalactic distances. This Classical Cepheids robust characteristic allows one to know the true luminosity of a Cepheid by simply observing the pulsation period. This in turn allows one to determine the distance to the star by comparing the known luminosity to its observed brightness.

## Club Officers



President  
Tom Gerald

Vice president  
& Treasurer  
Jana Hunking



News Letter Editor  
Vahan Yeterian

*“Astronomy compels the soul to look upward,  
and leads us from this world to another”.*  
(Plato 428 - 347 BC)

*When I trace at my pleasure the windings to and fro of  
heavenly bodies I no longer touch Earth with my feet, I  
stand in the presence of Zeus himself and take my fill  
of Ambrosia.*

(Ptolemy 100 – 170 AD)



## Club Meeting

**Reminder** Club meeting Apr 12th at 7:00Pm  
Manzanita School.

**Star Parties (as always weather permitting)**

## Other Astronomy Club Meetings

### **Central Coast Astronomical Society**

Link to web site...

<http://www.centralcoastastronomy.org/>

### **Santa Barbara Astronomical Unit**

Link to web site...

[http:// www.sbau.org/#AU\\_EVENTS\\_Calendar](http://www.sbau.org/#AU_EVENTS_Calendar)

## Night Time Bright Objects (no scope required)

Link to “Heavens Above” web site

[http:// www.heavens-above.com/](http://www.heavens-above.com/)

(Iridium Satellite)

(ISS Visible Pass)

Be sure to set the nearest location from their  
pull-down menu.

The web site link below will take you to some  
Great Milky Way interactive images and how  
It was developed. (Type it in the search box.)

<http://skysurvey.org/>

VAAS.

Dave McNally is the VAAS Web Site Serf/Minion

Dave

