



THE OBSERVER

The Newsletter of Central Valley Astronomers of Fresno

March-April 2020

Betelgeuse Ready to Blow, or Merely Shifting its Shape? Scientists Keeping Close Eye on It



Astronomers have known for some time that Betelgeuse, the brightest star in Orion, is a red supergiant in its last stages of evolution. But over the past several months they have detected a long term dimming trend which they thought might be an indication that it could go supernova. Now, though, evidence shows that Betelgeuse's shape is changing, from a sphere into an ovoid. Scientists, admitting that they still don't know a lot about red giants, are not sure what this means or exactly how it is being done. Betelgeuse is about 600 light years from Earth, so it presents no danger no matter what happens. But this is a new stellar discovery and a new mystery. Betelgeuse will be watched closely from now on, possibly shedding new light(literally) on red giant evolution.

"At Confirmation, most German boys get their first pair of long pants. I got a telescope..."

-Wernher von Braun (1912-1977)

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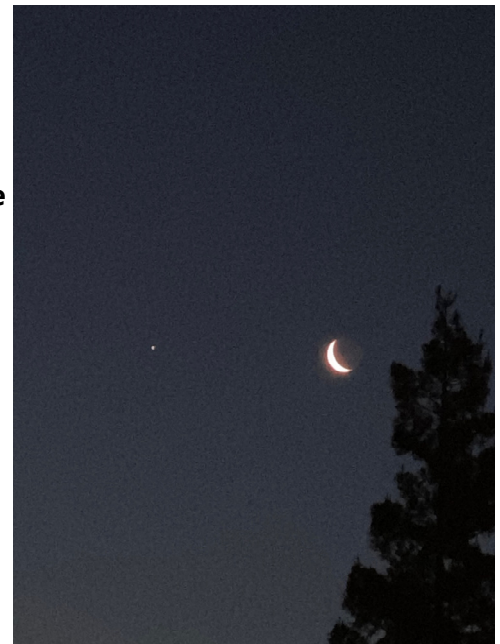
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The occultation of Mars by the Moon, taken on February 18 by Dan Del Campo. Unfortunately, much of the Fresno area was clouded out on the morning of the occultation

Another image by Dan, showing the Moon and Jupiter



**Number of exoplanets found as February 2020-
4,187**

How many more are out there?

Tens of thousands? Hundreds of thousands?

Profiles in Astronomy

Yuji Hyakutake 1951-2002

Hyakutake was born and raised near Nagasaki, Japan, and majored in photography at Kyushu Sango University, afterwards becoming a newspaper photographer. He always had an interest in astronomy, and after seeing comet Ikeya-Seki in 1965, he decided that, when he had the money and the time, he would become a comet hunter. In 1990, he moved from Fukuoka, where he had been living and working, to Hayato, because of clearer and darker skies there. In December 1995, he found his first comet, today known as C/1995 Y1. Only a month later, he discovered Comet C/1996 B2, which became world famous as Comet Hyakutake, which he found with a pair of 25 x 150 binoculars. Tragically, he died only a few years later from an aortic aneurysm. An asteroid, 7291 Hyakutake, is named for him.



Comet Hyakutake, discovered on January 30, 1996. With its 100° tail, it was one of the brightest comets found in the 20th century, and was seen and studied by astronomers throughout the world.

Source-Wikipedia



New Telescope Named for Vera Rubin.

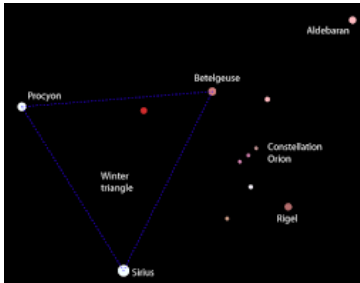
In December 2019, the National Science Foundation announced that its new Large Synoptic Survey Telescope, currently being built in the Chilean Andes, will be named the Vera Rubin Observatory. Rubin, who died in 2017, worked at the Carnegie Institute in Washington, D.C. all of her career, and made substantial contributions to research into dark matter (Some recent articles have claimed that Rubin discovered dark matter. She did not; dark matter was first found by Fritz Zwicky of Caltech in 1933, who called it the “missing mass.” However, very few scientists took Zwicky seriously, and his research was dismissed and forgotten for over forty years. In the 1950s and 60s, several other scientists found evidence of dark matter, but ignored it. Rubin, along with her colleague Kent Ford, rediscovered it in the 1970s, brought a clearer picture of it to the scientific world, and made it a valid field of study). The main LSST is an 8.4 meter reflector which will see first light in 2022, and will initially carry out a ten year program which is also called LSST, for Legacy Survey of Space and Time. It will involve detailed studies of dark matter and dark energy, mapping the Milky Way and the Solar System, and conducting large scale surveys of the universe.



Star Stories

Procyon

Procyon, also known as Alpha Canis Minor, is the brightest star in Canis Minor. It is actually a binary star system, consisting of a main sequence star in orbit with a white dwarf star. Together, the two have an apparent magnitude of .34, making the system the eighth brightest stellar object in the sky. Its absolute magnitude is 2.66, and it is about 11.5 light years from our solar system, one of the closer star systems to our own. Procyon is one of the three stars that make up the Winter Triangle, the other two being Sirius and Betelgeuse.



Procyon A, as the main star is called, is an F5 whitish star which is about twice the size of our Sun, and has about 1.5 times its mass. Scientists believe that it is near the end of its main sequence lifetime, and sometime in the next few million years will start evolving into a red giant. Scientists have also noted that Procyon A has variable properties, as it sometime brightens and dims, although they are hesitant to call it a true variable. Procyon B is a white dwarf which is about the size of the Earth and has about half the mass of the Sun. The existence of Procyon B was first calculated by Frederick Bessel in 1844, but was not visually seen until 1896, by John Schaeberle at Lick Observatory.

The name Procyon comes from Greek and means "before the dog," as the star rises ahead of Canis Major in the winter and spring skies. Being one of the brightest stars in the sky, it was well known to the ancients. The Babylonians called Procyon "Nangar," the carpenter; in their mythology it played a major role in the construction of the heavens. To the Chinese, it was "Nan He San," the Third Star of the South River, along with two other stars in Canis Minor. The Hawaiians named Procyon "Pauna," blossom, and used it as one of their guide stars when navigating across the Pacific Ocean. In modern times, Procyon is depicted on the national flag of Brazil and represents the state of Amazonas. The indigenous peoples of the Matto Grosso of Brazil call it and Canopus collectively "The Duck," and symbolize it as the coming of the wet season, which means more food can be grown.

Part of a continuing series on lesser known-but still important-astronomical observatories throughout the world

Pine Mountain Observatory

Pine Mountain Observatory, established in 1965, is owned and administered by the physics and astronomy department at the University of Oregon. It is located at the top of Pine Mountain, at 6,300 feet, about 25 miles outside of the town of Bend in the Deschutes National Forest. Since its inception the observatory has been used by professors and students at the University, but it also has a strong outreach program, with regular starwatching events for the public, as well as a remote observing program for K-12 schools.

Pine Mountain currently has three telescopes: a .82 m Cassegrain reflector, a .38m Cassegrain reflector, and a .36m Schmidt-Cassegrain reflector. Much of the academic research at the observatory has focused on stars, especially dwarf stars, and also on galaxies.



What's New in Space

Onward to Mars

Starting in 2020, a whole flotilla of spacecraft will be heading to Mars. The U.S.'s 2020 Mars rover will be launched in July for a landing on the Red Planet in February 2021. It is based on the Mars Science Laboratory-Curiosity, and will carry a semi-autonomous drone which will fly above the surface and test the technology for future Martian aircraft. ESA's Franklin Mars rover will also be launched in 2020 after a two year delay. About the size of the twin Spirit and Opportunity rovers, it is named after the British biologist Rosalind Franklin and will search for water and life on Mars. The United Arab Emirates will launch its first planetary spacecraft, called Hope Mars; it will be an orbiter which will study the Martian atmosphere. China is also launching a Mars mission in 2020, known as the Mars Global Sensing Spacecraft. It will consist of both an orbiter and a lander which will carry a small Sojourner-sized rover. Japan is also sending the Mars Terahertz Microsatellite to Mars in 2020. So the skies above the Red Planet will be crowded over the next few years. It's the beginning of a busy decade.



Speaking of Busy Decades...

Here's a calendar of a few of the major space missions over the next decade-planned or tentative

2020-NASA's Mars 2020 rover

ESA's Franklin Mars rover

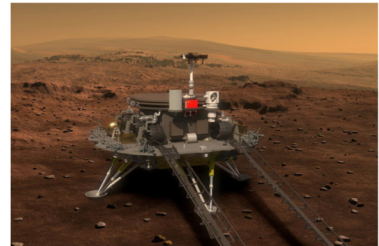
United Arab Emirates' Mars Hope orbiter

China's Mars Global Sensing orbiter and rover(right)

Japan's Mars Terahertz Microsatellite

Galactic Virgin's first paying commercial flights

First crewed flights by Dragon V2 and Boeing Starliner(maybe)



2021-NASA's Artemis 1-unmanned Orion/MPCV circumlunar mission

James Webb Space Telescope launch

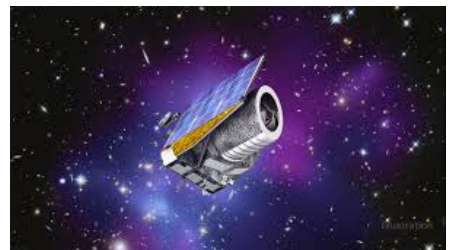
India's first crewed mission-Gaganyaan 1

2022-India's Mangalyaan 2 Mars orbiter

Space-X crewed Starship lunar orbiting mission

NASA's Psyche asteroid probe

ESA's Euclid dark matter mission(above right)



2023-NASA's Artemis 2-crewed Orion/MPCV lunar orbiting mission

2024-Japan's Martian Moons Explorer soil return mission

NASA's Artemis 3-Crewed lunar landing mission

Space-X Starship crewed lunar landing mission

2025-NASA's Europa Clipper mission(right)

2026-NASA's Mars Soil Sample Retrieval mission

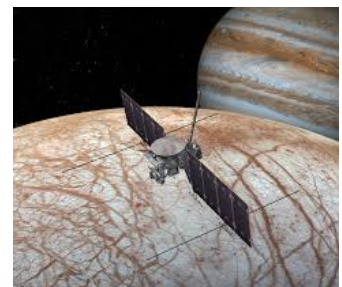
ESA's Soil Sample Return spacecraft(in conjunction with NASA's)

ESA's Plato exoplanet mission

2028-NASA's Mars NeMO mission

ESA's ARIEL Exoplanet Observation mission

2029-China's Mars soil sample return mission



More of What's New in Space

Dragon V2 Abort Test a Complete Success

On January 19, Space-X conducted a critical test of the Dragon V2's abort systems, deliberately destroying one of its Falcon rockets. The craft lifted off from Pad 39A at the Kennedy Space Center, then, two minutes into the flight, the Dragon's abort rockets fired, pulling it away from the booster rocket, which shut down and then exploded (as it was expected to do). The Dragon capsule landed without incident in the Atlantic Ocean eight minutes later, where it was recovered by several waiting vessels. On January 20, it came back ashore to the space center and over the next month or so will be examined by scientists and engineers. Unless something seriously wrong is found with it, and according to initial reports there were no problems, the next Dragon V2 launch, which may come as early as April, will carry two astronauts to the International Space Station for a two week stay, the first NASA manned American space launch in almost nine years.



It's about time! No more delays or excuses.-editor's note

In Late February, sources with NASA and Space-X indicated that the first crewed Dragon V2 mission will be at the end of April or early May.

I Spoke Too Soon...Investigation Reveals Major Problems with Boeing's Starliner

On February 7, NASA and Boeing announced that the Starliner spacecraft's next flight will be delayed (again!) due to a previously undisclosed near disaster during the test flight in December. It was revealed that not only did the timer clock software fail, causing the mission to end prematurely, but another software glitch shortly before reentry caused the reentry rockets to misfire, in turn causing the service module to almost crash into the crew module after separation. If it had, and astronauts had been aboard, it probably would have meant the loss of the crew along with the craft. Boeing said that this problem was discovered only shortly before reentry, too late to correct. The problems have led NASA to demand a complete reevaluation of the Starliner program, in particular its software system, which number almost a million lines of code. All of this means that the next Starliner mission will probably be delayed for at least several months, maybe up to a year, until the software is completely examined, tested, and verified.

Spitzer Infrared Telescope Mission to be Ended

In January 2020, NASA announced that the Spitzer Infrared Observatory, which has been in orbit since 2003, will be shut down due to obsolescence and lack of funding. A review panel of senior scientists determined that the satellite, which was one of NASA's four Great Observatories,* had essentially completed its mission, and many of its jobs can be taken over by the upcoming (hopefully) James Webb Telescope, which is now scheduled to be launched in 2021. The Spitzer Telescope, named after physicist Lyman Spitzer, who was an early advocate for space based observatories, was first proposed in the 1960s, but did not receive serious consideration until about 1990. It was originally scheduled to be shut down in 2011, but additional funding was found for it, then scheduled to be shut down again in 2014, then in 2017. During its seventeen year operational lifetime, the Spitzer Telescope made many astronomical discoveries dealing with the infrared part of the electromagnetic spectrum.

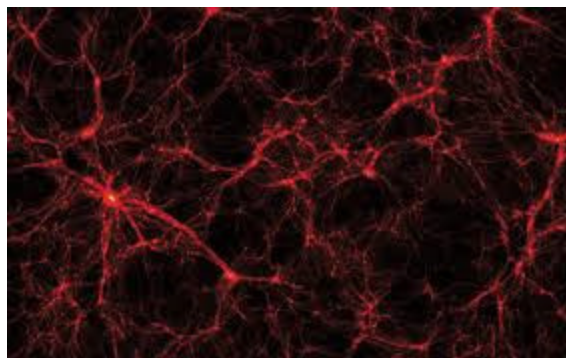


* The other three are (were) the Hubble Space Telescope, the Compton Gamma Ray Observatory, and the Chandra X-Ray Telescope. Hubble and Chandra are still operational.

From the Observer Archives

"Missing-95% of the Universe

Reward for finding the missing portion of the universe. Possible fame, no fortune. Where is this missing mass? If we knew, we wouldn't have to look for it! It may be in dwarf stars or in black holes at the edge of the galaxies(I personally feel that that at the center of each galaxy there is a black hole that holds the whole thing together all of us are falling into it), or some place that we have not yet thought to look. If you have any idea or clue as to where it is, please call the nearest observatory and let them know. "



From the *Observer*, January 1982

Thirty-eight years later, we still don't know what the missing mass, or as it's now called, dark matter, is. All we know is that it's everywhere around us. Comforting, isn't it?

Astronomy Short Saturn Naked?

Based on ongoing examination of the data from the Cassini mission, scientists now



believe that, as recently as 20 million years ago, Saturn probably did not have its iconic rings, and looked pretty much like the other gas giants in the outer solar system. According to the latest hypothesis, a now vanished moon, estimated to be about 200 miles in diameter and made up almost entirely of ice, strayed too close to Saturn and was torn apart by its gravitational forces. The debris coalesced around the planet like millions of tiny satellites, and, over time, smoothed out into regular strands that make up the rings today. As one Cassini investigator put it, if the dinosaurs had telescopes, they would not have seen rings around Saturn. Even more so, some scientists believe that the rings, millions of years from now, will eventually dissipate, leaving Saturn looking like it was before it ripped up one of its children.

We're fortunate to live in that brief window in universal time when Saturn can be seen as a ringed jewel in the sky.

Astronomy(bad) Joke

How do astronomers see in the dark?

They use standard candles

From stargazerslounge.com

