



PAStimes

Phoenix Astronomical Society

www.pasaz.org

October 2020

Volume 72 Issue 2

PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

Steven Desch to Speak at Virtual PAS Meeting Via Zoom on October 15th

"1I/'Oumuamua: the nearest exoplanet? "

When 'Oumuamua passed by Earth in October 2017, the only thing certain about it was that it was not from this Solar System. Because of its high velocity, it was the first confirmed interstellar object. The next year the object 2I/Borisov was the second confirmed interstellar object. But whereas Borisov behaved very much like a comet (albeit an unusual one), mysteries remain about what 'Oumuamua actually is. Although it pushed away from the Sun by a rocket effect, like comets, it could not be made of water, or contain much carbon monoxide or dust, making it very unlike a comet. The acceleration it experienced was very large, and from the variations in sun-

light it reflected, it was more elongated than any other solar system object: either a very skinny pancake or a very long cigar. Dozens of explanations have been proposed to explain these oddities, and speculation has run rampant, with some astronomers even suggesting it was alien technology. The truth is more mundane but no less exciting. In a paper we've recently submitted, my colleague Alan Jackson and I demonstrate that 'Oumuamua is consistent in every way with being a small fragment resembling the surface of Pluto. Our own solar system must have ejected trillions of fragments like 'Oumuamua in its early days, and a population of fragments from the surfaces of Pluto-like exoplanets must be common throughout the Galaxy. 'Oumuamua itself

may have been ejected about 400 million years ago, from a Pluto-like exoplanet in a young system in the Perseus arm of the Galaxy. 'Oumuamua is arguably the closest we've ever come to directly observing the surface of an exoplanet.

Steve Desch is a Professor of astrophysics in the School of Earth and Space Exploration at Arizona State University. He studies the formation and evolution of planets, the origins of the Solar System, exoplanets, and meteorites. He has written about 'Oumuamua in the popular press and is thrilled to have contributed to our scientific understanding of this unique object.

<https://slate.com/technology/2019/01/oumuamua-alien-ship-anthropomorphize-space.html>

(See Oct 15 Meeting on page 2)

Sept 3 PAS Meeting Review

By Don K. Boyd, PAStimes NL Editor

For the September 3 PAS online monthly meeting, there were about 25 people present (since more than one person can be watching on zoom it is hard to say exactly how many). People started checking in at about 7:15 and we chatted until 7:30 when President Mike called the meeting to order and introduced the speaker, Klaus Brusch of Lowell Observatory, who gave a very nice slide show and lecture on the history of Mr. Lowell, the Observatory, and some of the telescopes that are there. Since there was no other business that needed to be discussed, the meeting was dismissed just after 9pm. The meeting was recorded and it should be available on the PAS website, in the near future, for your viewing pleasure.

Klaus Brusch was the Fantastic Guest Speaker at the September 3rd PAS Meeting. The meeting was successfully conducted via Zoom. Photo of computer screen taken by Don Boyd.



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Oct 15 Meeting

By Terri, Event Manager

Please Join PAS in welcoming Professor Desch to the October PAS Meeting. The meeting will be held Virtually through Zoom on October 15th. Join the meeting as early as 7pm. The Meeting opens at 7:30pm with a few brief announcements and Prof. Desch will be providing his presentation about 7:40pm. Everyone is welcome to tune in. Let's make this a meeting to remember.

Please mute your device and turn off your image during the presentation. Once Q&A has concluded, you may turn on your sound and image. We wish to give Prof. Desch the floor for his entire presentation. PAS hopes to see you there!



PAS welcomes Steven Desch to talk at the Oct 15th Virtual PAS Meeting. Photo provided by Steven.

2020 PAS GUEST SPEAKERS

By Terri Finch, Event Manager
Events@pasaz.org

Due to the Covid-19 pandemic, PAS Meetings are being held via Zoom over the internet. It is planned that a few days before the meeting, the Zoom link will be added to the calendar listing for that night's meeting. Please visit the PAS calendar to find out more about these upcoming Virtual Meetings and Guest Speakers.

Do you have an idea for a guest speaker? Email Terri Finch, Paul Facuna, or Mike Marron the details (their email addresses are at the top of page 2 of this newsletter).

Here is the next scheduled guest speaker at PAS:

Nov 5: Vincenzo Cataldo: "Use light instead of a pick axe to unravel planetary surfaces"

What's Up For October?

By Don K. Boyd, PAStimes Editor

Name	Date	Rise	Set
Mercury	10-15-20	08:10	18:33
Venus	10-15-20	03:37	16:27
Mars	10-15-20	17:52	06:27
Jupiter	10-15-20	13:13	23:10
Saturn	10-15-20	13:36	23:41
Uranus	10-15-19	18:36	08:00
Neptune	10-15-20	16:21	03:59
Pluto	10-15-20	13:29	23:25

All Times Arizona Time

Bold means the object is "visible" in the evening

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October 15, 2020

Sunrise: 6:33

Sunset: 17:54

Full: October 1 & 31

Q3: October 9

New: October 16

Q1: October 23





Summer Triangle Corner: Vega

David Prosper and Vivian White

If you live in the Northern Hemisphere and look up during June evenings, you'll see the brilliant star **Vega** shining overhead. Did you know that Vega is one of the most studied stars in our skies? As one of the brightest summer stars, Vega has fascinated astronomers for thousands of years.

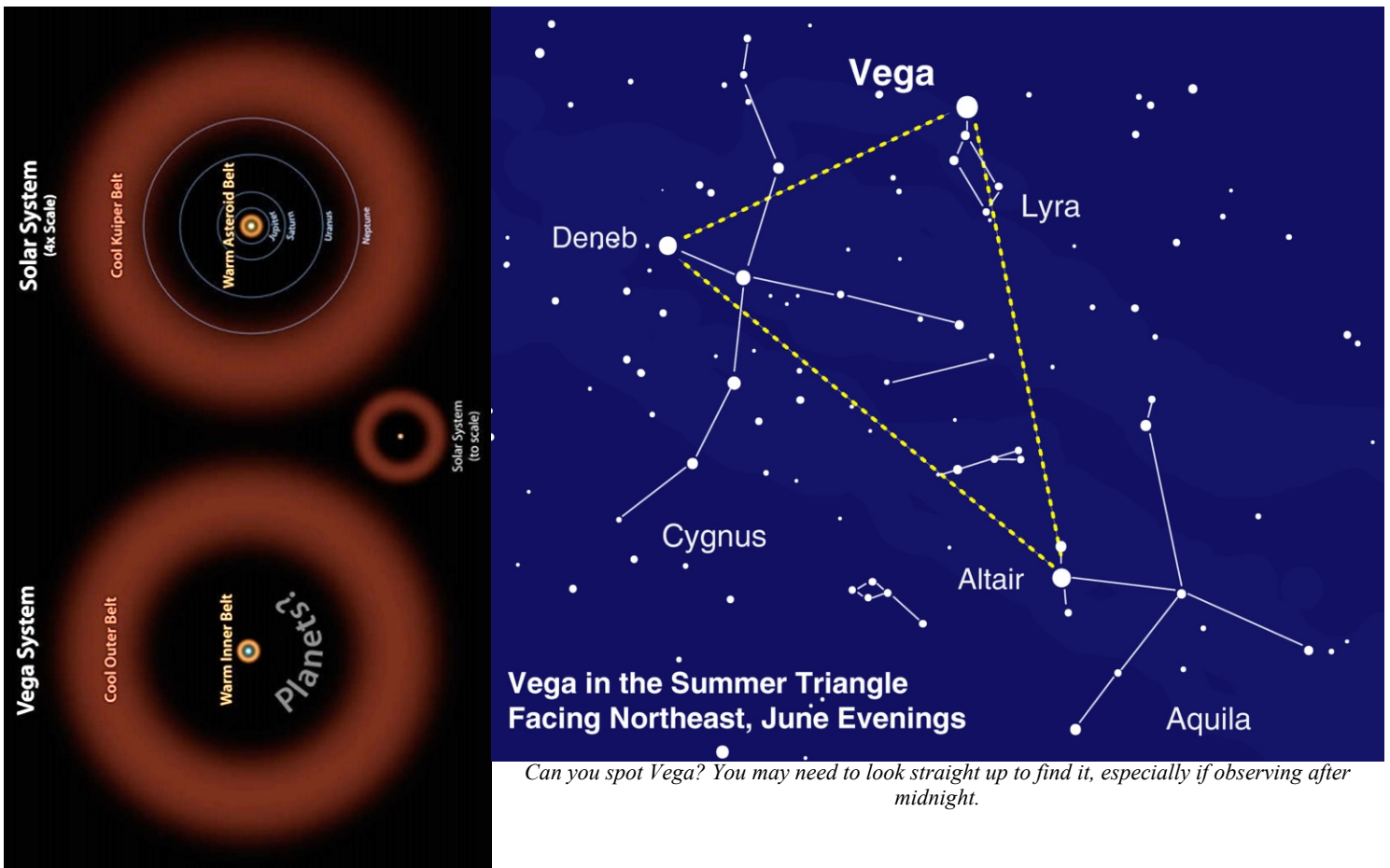
Vega is the brightest star in the small Greek constellation of Lyra, the harp. It's also one of the three points of the large "Summer Triangle" asterism, making Vega one of the easiest stars to find for novice stargazers. Ancient humans from 14,000 years ago likely knew Vega for another reason: it was the Earth's northern pole star! Compare Vega's current position with that of the current north star, Polaris, and you can see how much the direction of Earth's axis changes over thousands of years. This slow movement of axial rotation is called **precession**, and in 12,000

years Vega will return to the northern pole star position. Bright Vega has been observed closely since the beginning of modern astronomy and even helped to set the standard for the current magnitude scale used to categorize the brightness of stars. Polaris and Vega have something else in common, besides being once and future pole stars: their brightness varies over time, making them **variable stars**. Variable stars' light can change for many different reasons. Dust, smaller stars, or even planets may block the light we see from the star. Or the star itself might be unstable with active sunspots, expansions, or eruptions changing its brightness. Most stars are so far away that we only record the change in light, and can't see their surface.

NASA's TESS satellite has ultra-sensitive light sensors primed to look for the tiny dimming of starlight caused by transits of extrasolar planets. Their sensitivity also allowed TESS to observe much smaller pul-

sations in a certain type of variable star's light than previously observed. These observations of **Delta Scuti** variable stars will help astronomers model their complex interiors and make sense of their distinct, seemingly chaotic, pulsations. This is a major contribution towards the field of astroseismology: the study of stellar interiors via observations of how sound waves "sing" as they travel through stars. The findings may help settle the debate over what kind of variable star Vega is. Find more details on this research, including a sonification demo that lets you "hear" the heartbeat of one of these stars, at: bit.ly/DeltaScutiTESS

Interested in learning more about variable stars? Want to observe their changing brightness? Check out the website for the American Association of Variable Star Observers (AAVSO) at aavso.org. You can also find the latest news about Vega and other fascinating stars at nasa.gov.



Can you spot Vega? You may need to look straight up to find it, especially if observing after midnight.

Vega possesses two debris fields, similar to our own solar system's asteroid and Kuiper belts. Astronomers continue to hunt for planets orbiting Vega, but as of May 2020 none have been confirmed. More info: bit.ly/VegaSystem Credit: NASA/JPL-Caltech



Observe the Skies Near Mars

David Prosper

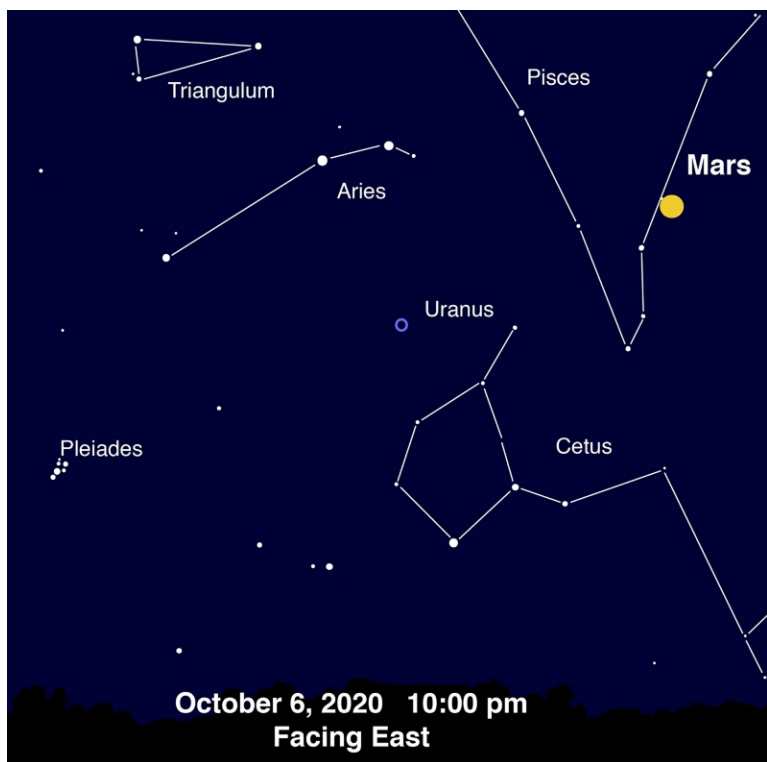
October is a banner month for Mars observers! October 6 marks the day Mars and Earth are at closest approach, a once-every-26-months event. A week later, on October 13, Mars is at opposition and up all night. Mars is very bright this month, and astronomers are eager to image and directly observe details on its disc; however, don't forget to look at the space around the planet, too! By doing so, you can observe the remarkable retrograde motion of Mars and find a few nearby objects that you may otherwise overlook.

Since ancient times, Mars stood out to observers for its dramatic behavior. Usually a noticeable but not overly bright object, its wandering path along the stars showed it to be a planet instead of a fixed star. Every couple of years, this red planet would considerably flare up in brightness, for brief times becoming the brightest planet in the sky before dimming back down. At these times, Mars would also appear to slow down its eastward motion, stop, then re-

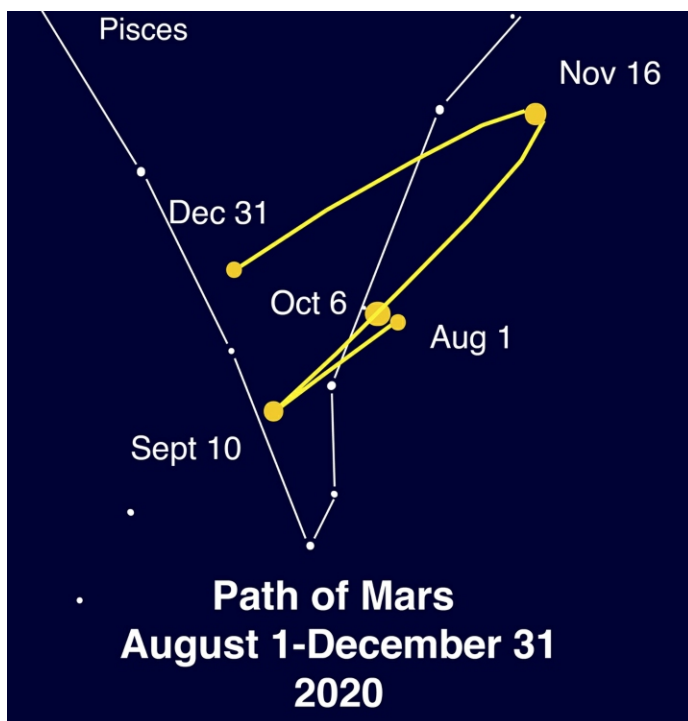
verse and head westward against the stars for a few weeks, before again stopping and resuming its normal eastward movement. This change in the planet's movement is called "apparent retrograde motion." While all of the planets will appear to undergo retrograde motion when observed from Earth, Mars's retrograde appearances may be most dramatic. Mars retrograde motion in 2020 begins on September 10, and ends on November 16. You can observe its motion with your eyes, and it makes for a fun observing project! You can sketch the background stars and plot Mars as you observe it night after night, or set up a photographic series to track this motion. Does the planet move at the same rate night after night, or is it variable? As you observe its motion, note how Mars's brightness changes over time. When does Mars appear at its most brilliant?

NASA has tons of great Mars-related resources! Want to know more about apparent retrograde motion? NASA has an explainer at: bit.ly/marsretromotion. Find

great observing tips in JPL's "What's Up?" videos: bit.ly/jplwhatsup. Check out detailed views with NASA's HiRISE satellite, returning stunning closeups of the Martian surface since 2006: hirise.lpl.arizona.edu. NASA's Curiosity Rover will be joined in a few months by the Perseverance Rover, launched in late July to take advantage of the close approach of Mars and Earth, a launch window that opens two years: nasa.gov/perseverance. Calculate the ideal launch window yourself with this handy guide: bit.ly/marslaunchwindow. The Night Sky Network's Exploring Our Solar System handout invites you to chart the positions of the planets in the Solar System, and NSN coordinator Jerelyn Ramirez recently contributed an update featuring Mars opposition! You can download both versions at bit.ly/exploresolarsystem. Young astronomers can find many Mars resources and activities on NASA's Space Place: bit.ly/spaceplacemars. Here's to clear skies and good seeing for Mars's best appearance until 2033!



If you are paying this much attention to Mars, you're likely curious about the skies surrounding it! Find Mars in the constellation Pisces, with constellations Aries, Triangulum, and Cetus nearby. Aries may be the only one of these dimmer patterns readily visible from light-polluted areas. The Pleiades rises shortly after Mars. Dim Uranus is found close by, in Aries. If you are observing Mars up close, use the same eyepiece to check out Uranus's tiny blue-green disc. If you are uncertain whether you spotted Uranus, you didn't see it! Unlike stars, Uranus doesn't resolve to a point at high magnifications.



The path of Mars during the last five months of 2020. Notice the retrograde motion from September 10 to November 16, with prime Mars observing time found in between. October 6 is the day of closest approach of Earth and Mars, "just" 38.6 million miles apart. Images created with help from Stellarium: stellarium.org