



Newsletter of the Pomona Valley Amateur Astronomers

When it is dark enough, you can see the stars.
Charles A. Beard



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nightwatch

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President's Message

Lots of rocket launches this month! The biggest news was the launch of SpaceX Crew 1 for NASA's Commercial Crew Program (CCP), which took off on a Falcon 9 on November 15 and docked to the International Space Station a day later. That mission represented several milestones: the 100th successful launch of a rocket in the Falcon 9/Falcon Heavy family--and the 65th successful landing of a Falcon booster; the first time in history that a capsule carrying 4 people has flown; the first operational (versus test) mission of the CCP, and the start of the first 7-person full crew on the ISS. JAXA astronaut Soichi Noguchi became only the third person in history to lift off in three different spacecraft--before his launch in the Crew Dragon, he had also flown in a Soyuz capsule and on the Space Shuttle. The other two people who have flown on three different spacecraft are American astronauts Wally Shirra, who flew in Mercury, Gemini, and Apollo capsules, and John Young, who flew in Gemini and Apollo capsules and on the Space Shuttle (twice on each vehicle!). Also, for people paying attention during the broadcasts, Crew 1 marked the first flight of Baby Yoda into space and onto the ISS!



Other notable flights this month included the launch of a GPS satellite on a Falcon 9 on Nov. 5, and a National Reconnaissance Office spy satellite on an Atlas V on Nov. 13. Barring weather holds or other delays, 2 or 3 more Falcon 9s may fly by the end of the month, carrying an Earth-observation satellite for NASA and more Starlink internet satellites.

The big show in the evening sky right now is the close approach of Jupiter to Saturn as seen from Earth. The King of the solar system only overtakes the ringed planet once every 19.6 years. This year, the closest approach will be on December 21, when the planets will be within 0.1 degree of each other. But they are already within 3.5 degrees of each other, close enough to fit in the same field of view in almost all binoculars, and in some wide-field telescopes.

Our speaker this month is Tim Thompson, who will speak on the stars of Orion, especially Betelgeuse and the new distance that has been measured for it. The meeting is this Friday, Nov. 20, at 7:30 PM, via Zoom. I hope to see you there.

Matt Wedel

Baby Yoda visits the ISS!

The Spectacular Jupiter-Saturn Appulse You Don't Want To Miss

This year we have been treated to some excellent views of Jupiter and Saturn in our evening skies. On May 18 they presented us with a nice appulse and in July they each reached their opposition points. However, they have saved their best show for the end of the year. Since Jupiter and Saturn are the two farthest naked-eye planets, the average time between their conjunctions is nearly 20 years (19.8593 years to be more precise) making them the rarest of all conjunctions that can be seen without optical instruments. Because of this, they have been given the distinction of being called Great Conjunctions. This month's Great Conjunction will live up to that title during their second Jupiter-Saturn appulse this year by appearing to come closer than they have in nearly 400 years -- since July 16, 1623.

Jupiter and Saturn will appear to be separated by only 6.1 arcminutes at 10:11 am PST on Monday, December 21, just 8 hours after the winter solstice in the northern hemisphere. These two gas giants will still be far enough apart so that they will be

distinguishable as two points of light with the naked eye but in a telescope Saturn will appear to be a ringed moon of Jupiter! What a way to start the winter! Since their elongation from the sun will be 30 degrees, the window of opportunity to view this appulse will be fairly short. For us here in the Los Angeles area, the best time to view this once-in-a-lifetime spectacle will be during a 2-hour window starting shortly after 5:00 pm on December 21. The pair will be located 19 degrees above the southwestern horizon at 5:00 pm in Capricorn at RA = 20h 10m, Dec = -20deg 30 min in J2000,0 coordinates. Jupiter will have an apparent magnitude of -2.0 and Saturn will be shining at magnitude 0.5 meaning that Jupiter will be outshining Saturn by a factor of 10. You can watch Jupiter and Saturn getting closer to each other every night prior to closest approach -- they will be 2.2 degrees apart on December 1 and 0.7 degree apart on December 15. So cross your fingers that the skies will be clear and that the planets don't collide!

Ken Elchert

Holiday Party Updates

We have decided to hold a holiday gathering again this year, Virtually on Zoom! There is no need for us to forgo gathering socially again this year, it will just be on our computers instead of in person. There is a date change to Friday, December 11th at 7 PM. Here's a challenge for us all -- let's see if we can make our meeting as festive as possible: wear a holiday sweater or a Santa hat, show us your Christmas tree, figure out how to add a seasonal Virtual Background to the Zoom picture that we see of you during the meeting, and of course feel free to bring some eggnog or a hot cider along with dinner or a snack to the meeting as well. Look forward to seeing you all there!

Claire Stover



Special Offer!!

We have an interesting item on offer for the PVAA member who thinks they already have everything. First, a short history. Way back in the early 2000s when Alper Ates was our President, we had a member who had a little difficulty hearing his presentations. This enterprising member came up with his own solution and purchased a Radioshack Optimus -- the karaoke machine pictured below -- for Alper to use during his presentations to the Club. Here we are a decade or two later and this fine item is no longer being used but is still being stored by later Club President, Ron Hoekwater.

The Board would love for this item to find a new home where it can be used to the fullest instead of gathering dust in Ron's closet. It is available to the highest bidder -- or lacking that, to anyone who can put it to good use. Please express your interest to nightwatch@pvaa.us and you'll be connected with Ron so he can get the machine to you. If we have more than one interested party, maybe we'll need to have a "Sing Off" at our next virtual meeting to determine the winner!

Claire Stover

Club Events Calendar

Dec 5	Star Party – Mesquite Spring in Death Valley National Park	Feb 13	Star Party – Anza-Borrego Desert State Park
Dec 11	General Meeting and Christmas Party	Feb 17	Board Meeting
2021		Feb 26	General Meeting (presentation: TBD)
Jan 16	Star Party – Mecca Beach	Mar 13	Star Party – Culp Valley
Jan 20	Board Meeting	Mar 17	Board Meeting
Jan 29	General Meeting (presentation: TBD)	Mar 26	General Meeting (presentation: TBD)

NASA Night Sky Notes

December 2020



This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Visitors to Both Jupiter and Saturn

David Prosper

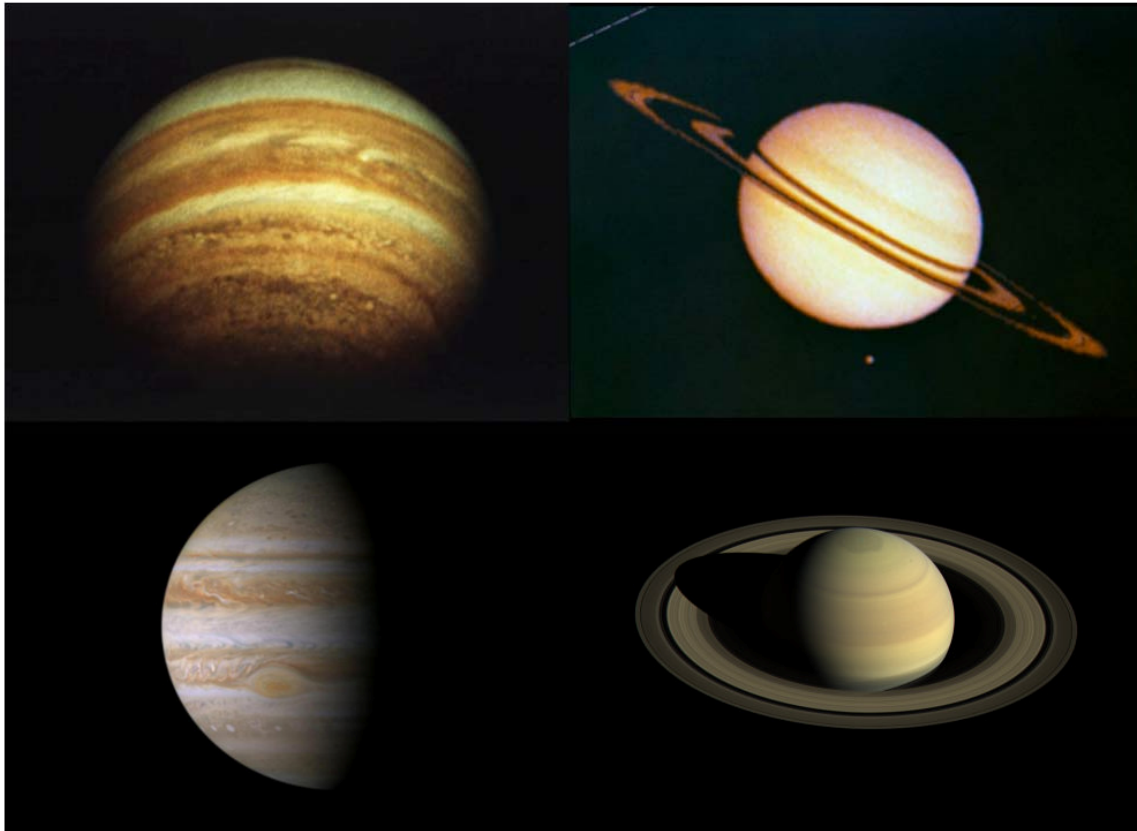
Have you observed Jupiter and Saturn moving closer to each other over the past few months? On December 21, the two worlds will be at their closest, around 1/5 of a full Moon apart! While the two gas giants may *appear* close, in reality they are hundreds of millions of miles apart. Despite this vast distance, a select few missions have visited both worlds by using a gravity assist from giant Jupiter to slingshot them towards Saturn, saving time and fuel.

Pioneer 11 was the first mission to visit both worlds! Launched in 1973, the probe flew past Jupiter in late 1974, passing just 26,4000 miles above its stormy clouds. In 1979, it became the first spacecraft to encounter Saturn. Pioneer 11 took the first up-close photos of Saturn and its satellites, and made many exciting discoveries, including the detections of its magnetic field and a faint “F” ring, before departing Saturn and eventually, the solar system.

The Voyager missions quickly followed up, taking a “Grand Tour” of the four largest and most distant planets in our solar system. Both probes were launched within two weeks of each other in 1977. Voyager 1 flew past Jupiter in March 1979, discovering Jupiter’s faint ring and two new moons, along with active volcanoes on Io’s surface! The probe then flew past Saturn in November 1980, discovering five new moons, a new “G” ring, mysterious ring “spokes,” and “shepherd moons” shaping the rings. After a brief encounter with Titan revealed evidence of complex organic chemistry and liquid on the moon’s frigid surface, Voyager 1 was flung out of the plane of the solar system. Following close behind, Voyager 2 took detailed photos of Jupiter’s moons and cloud tops in July 1979. Flying past Saturn in August 1981, Voyager 2 measured the thickness of Saturn’s rings and took detailed photos of many of its moons. This second explorer then captured images of Uranus and Neptune before leaving our solar system.

Cassini-Huygens was the last mission to visit both worlds. Launched in 1997, the mission flew past Jupiter in late 2000 and took incredibly detailed photos of its stormy atmosphere and faint rings. Cassini entered into Saturn’s orbit on July 1, 2004. The Huygens probe separated from Cassini, landing on Titan to become the first probe in the outer solar system. Cassini discovered geysers on Enceladus, fine details in Saturn’s rings, many more moons and “moonlets,” the changing oceans of Titan, and seasonal changes on Saturn itself. After revolutionizing our understanding of the Saturnian system, Cassini’s mission ended with a fiery plunge into its atmosphere on September 15, 2017.

What’s next for the exploration of the outer worlds of our solar system? While Juno is currently in orbit around Jupiter, there are more missions in development to study the moons of Jupiter and Saturn. Discover more about future NASA missions to the outer worlds of our solar system at nasa.gov.



The difference in technology between generations of space probes can be stunning! The top two photos of Jupiter and Saturn were taken by Pioneer 11 in 1974 (Jupiter) and 1979 (Saturn); the bottom two were taken by Cassini in 2000 (Jupiter) and 2016 (Saturn). What kinds of photos await us from future generations of deep space explorers?