



EPHEMERIS

The official newsletter of the Prescott Astronomy Club (PAC)
e-phem-er-is: a time-based listing of future positions of solar system objects

APRIL 2017

UPCOMING EVENTS



Wednesday, April 5 - Regular PAC meeting @ 6:30 PM in Rm. 107, Bldg. 74, Embry-Riddle Aeronautical University. Club member David Viscio will present "The Celestial Sphere: Physics at its Best". David will show a 'perpetual motion' device and, with audience participation, describe the design and physics of its function.

Wednesday, April 12 - METASIG @ 5:00 PM at local restaurant. Sign up at April 5 meeting.

Wednesday, April 19 - Board meeting @ 6:30 PM.

Thursday, April 20 - Third Thursday Presentation @ 6:00 PM in the Founder's Suite, Prescott Public Library. Dr. Lisa Prato, Researcher, Lowell Observatory, will present "Immersion Grating Infrared Spectrometry". Lowell Observatory's Discovery Channel Telescope, in collaboration with the University of Texas, the Korea Astronomy and Space Science Institute (KASI), is working on Immersion Grating Infrared Spectrometry. Dr. Prato will discuss the latest advances in this exciting field of science and how she uses it for her exo-planet survey.

Saturday, April 22 - Starry Nights @ 8:00 PM at Pronghorn Park, Prescott Valley. Sign up at meeting on April 5.

Wednesday, April 26 - Prescott High School @ 8:00 PM. Sign up at meeting on April 5.

Friday, April 28 - Highland Center for Natural History for Girl Scouts. Presentation @ 7:15 PM, star party @ 8:00 PM. Sign up at meeting on April 5.

Saturday, April 29 - International Astronomy Day, Spring edition.

Wednesday, May 3 - Regular PAC meeting @ 6:30 PM in Rm. 107, Bldg. 74, Embry-Riddle Aeronautical University.

Saturday, May 6 - Camp Wamatochick @ 8:00 PM for Kiwanis Kids Kamp. Sign up at meetings on April 5 and May 3.

CLUB EQUIPMENT PURCHASE - PA SYSTEM

At the March 1 regular meeting club members approved the purchase a new PA system to be used at all club meetings. The PA system was purchased for an approximate cost of \$430.00 and is starting to be used at club events.

VOLUNTEERS NEEDED

Volunteers are needed for two club activities: refreshment coordinator and PAC Store Sales coordinator. If you would like to help and need additional information, please contact Jeff Stillman (jstillman50@cableone.net).

WHAT IT'S LIKE ON A TRAPPIST-1 PLANET

By Marcus Woo

With seven Earth-sized planets that could harbor liquid water on their rocky, solid surfaces, the TRAPPIST-1 planetary system might feel familiar. Yet the system, recently studied by NASA's Spitzer Space Telescope, is unmistakably alien: compact enough to fit inside Mercury's orbit, and surrounds an ultra-cool dwarf star—not much bigger than Jupiter and much cooler than the sun.



If you stood on one of these worlds, the sky overhead would look quite different from our own. Depending on which planet you're on, the star would appear several times bigger than the sun. You would feel its warmth, but because it shines stronger in the infrared, it would appear disproportionately dim.

"It would be a sort of an orangish-salmon color—basically close to the color of a low-wattage light bulb," says Robert Hurt, a visualization scientist for Caltech/IPAC, a NASA partner. Due to the lack of blue light from the star, the sky would be bathed in a pastel, orange hue.

But that's only if you're on the light side of the planet. Because the worlds are so close to their star, they're tidally locked so that the same side faces the star at all times, like how the Man on the Moon always watches Earth. If you're on the planet's dark side, you'd be enveloped in perpetual darkness—maybe a good thing if you're an avid stargazer.

If you're on some of the farther planets, though, the dark side might be too cold to survive. But on some of the inner planets, the dark side may be the only comfortable place, as the light side might be inhospitably hot.

On any of the middle planets, the light side would offer a dramatic view of the inner planets as crescents, appearing even bigger than the moon on closest approach. The planets only take a few days to orbit TRAPPIST-1, so from most planets, you can enjoy eclipses multiple times a week (they'd be more like transits, though, since they wouldn't cover the whole star).

Looking away from the star on the dark side, you would see the outer-most planets in their full illuminated glory. They would be so close—only a few times the Earth-moon distance—that you could see continents, clouds, and other surface features.

The constellations in the background would appear as if someone had bumped into them, jostling the stars—a perspective skewed by the 40-light-years between TRAPPIST-1 and Earth. Orion's belt is no longer aligned. One of his shoulders is lowered.

And, with the help of binoculars, you might even spot the sun as an inconspicuous yellow star: far, faint, but familiar.



This artist's concept allows us to imagine what it would be like to stand on the surface of the exoplanet TRAPPIST-1f, located in the TRAPPIST-1 system in the constellation Aquarius. Credit: NASA/JPL-Caltech/T. Pyle (IPAC)

IF IT'S CLEAR

By Fulton Wright, Jr., PAC

Celestial events (from Sky & Telescope magazine, Astronomy magazine and anywhere else I can find information) customized for Prescott, Arizona. Remember, the Moon is 1/2 degree or 30 arcminutes in diameter. All times are Mountain Standard Time.



For the comet hunters among you, check out the website: is.gd/4pcometcampaign.

On Monday, April 3, the Moon is at first quarter phase and sets at 2:05 AM (Tuesday).

On Thursday, April 6, at about 3:37 AM (ugh), Europa and its shadow move onto Jupiter. Because Jupiter is at opposition, the satellite and its shadow are near each other. At 6:02 AM they both move off Jupiter. Sunrise is 8 minutes later.

On Thursday, April 6, about 8:20 PM, Callisto is north of Jupiter. Usually the satellites are lined up east and west of the planet, so it is unusual to see one passing north of the planet. About 9:00 PM, the Moon is about 1 degree from Regulus.

On Friday, April 7, at 10:32 PM, Europa disappears in Jupiter's shadow very close to the planet. At 1:08 AM (Saturday) Europa reappears also very close to the planet but on the other side. At 3:56 AM, Io and its shadow move onto Jupiter. They are so close that Io actually covers part of its shadow. They leave Jupiter at 6:07 AM, simultaneously with sunrise. I am sorry that I wasn't able to arrange a more convenient time for these events.

On the night of Sunday, April 9, about 1:35 AM (Monday) the nearly full Moon passes very close to Gamma Virginis, a close double star. By moving south, you can see a grazing occultation. The northern limit of the graze zone passes approximately through Interstate 17 and the 101 freeway. From central Phoenix the star disappears at 1:33 AM and reappears at 1:43 AM.

On Monday, April 10, at 6:40 PM the full Moon rises spoiling any chance of hunting for faint fuzzies for the night.

On Sunday, April 16, from 7:05 PM to 9:55 PM, Europa or its shadow is on Jupiter.

On Tuesday, April 18, the Moon is at third quarter phase and rises at 1:32 AM (Wednesday).

On Sunday, April 23, from 9:20 PM to 12:31 AM (Monday), Europa or its shadow is on Jupiter.

On Tuesday, April 25, from 8:16 PM to 10:51 PM, Io or its shadow is on Jupiter.

On Wednesday, April 26, it is new Moon and you have all night to hunt for faint fuzzies.

Are you ready to observe a daytime occultation of a bright star? On Friday, April 28, at 9:02 AM, the Moon occults Aldebaran. The star reappears at 9:50 AM. The Moon is only 30 degrees from the Sun so be sure you don't point your telescope toward the Sun as you hunt for the Moon. The Moon is down and to the left from the Sun.

On Sunday, April 30, between about 7:45 PM and about 10:00 PM, it is a good time to look at the craters Atlas and Hercules on the northern part of the Moon. Not only is the terminator well placed but libration tips that part of the Moon toward us. You might also want to look at the smooth floor, dark crater, Endymion, located between the pair of craters and the limb. (The area is almost as well presented on April 1, no fooling.)

NEED TO KNOW - ASK A MEMBER

A new 15-minute segment is being added to the regular general meetings where members can have their 'burning' questions answered by other knowledgeable members. If you have an astronomy related question you would like explained, submit the question to Jeff Stillman (jstillman50@cableone.net). You can also bring up the question at the meeting.

BOOKS AND MAGAZINES

Over the years astronomy books have been donated to PAC. Boxes of these books will be available at the regular meetings. For a donation to PAC of \$1 per book, anyone can have a book. Books that are not purchased at a regular meeting will be available at the following Third Thursday programs. Any remaining unsold books will be donated to the Friends of the Prescott Public Library. We also have copies of past Sky and Telescope magazine. These will be available to any member wishing to take them. Unclaimed magazines will be recycled.



FOR SALE

Please visit the Classified Ads section of the club website to view the items posted there for sale:

<http://prescottastronomyclub.org/classified-ads/>

New items are added now and then, so don't miss out on something that you would like to get for yourself...or a friend.



PAC MENTORS

If you need advice on the purchase of astronomy equipment, setting up equipment, astrophotography, etc., contact a PAC mentor.

Jeff Stillman - Astrophotography - 928-379-7088

David Viscio - General - 928-775-2918

Greg Lutes - Visual Observing - 928-445-4430



OBSERVING LISTS

Observing lists are available on the PAC website to provide guidance and goals for visual and astrophotography programs. Current lists are:

Astroleague Lunar 100

Bright Nebulae

Dunlop 100

Globular Clusters

Herschel II

Messier

Planet Maps

Royal Astronomical Society of Canada Finest NGC

Saguaro Astronomy Club Best NGC

Telescope Showpieces

Binocular Showpieces

Caldwell

Face-On Spiral Galaxies

Herschel 400

Hidden Treasures

Open Clusters

Planetary Nebulae

The Secret Deep



The lists are in PDF format and can be downloaded and printed for use.

PAC WEBSITE & YAHOO GROUPS

Website: <http://www.prescottastronomyclub.org>

E-mail: <mailto:pacinfo@prescottastronomyclub.org>



Astrophotography special interest group:

<https://groups.yahoo.com/neo/groups/pacastrophotography/info>

BOARD OF DIRECTORS

President: Jeff Stillman
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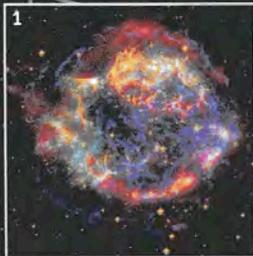


PAC COORDINATORS

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Facebook: Jeff Stillman & Pam Shvak
Highland Center Coordinator: David Viscio
Hospitality: Corinne Shaw & Dick Lewis
Magazine Subscriptions: Stephen Eubanks
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PAC Affiliate Partner w/ NAU Space Grant Program – Jerry & Corinne Shaw
PAC Store Sales: Open
Property Records: Doug Tilley
Schools & Camps Outreach: Pat Birck
Third Thursday Coordinator: Corinne Shaw & Pat Birck

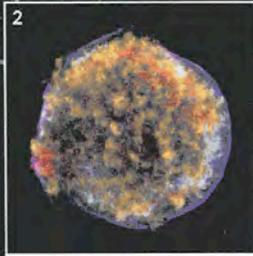
Membership: Stephen Eubanks
Newsletter: David Viscio
Refreshments: Janie Thompson
Publicity: Stephen Eubanks
Starry Nights Coordinator: Open
Webmaster: Russell Chappell





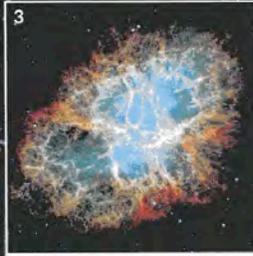
Cassiopeia A

11,000 light-years away
It should have been observed around 1680, but there are no definitive records. Stellar dust clouds might have blocked Earth's view of the explosion.



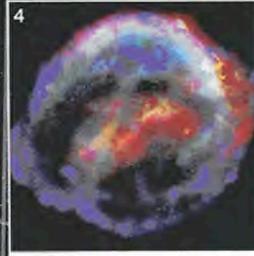
Tycho's supernova

9,000 light-years away
First observed: 1572
This explosion was named after astronomer Tycho Brahe, who studied it extensively.



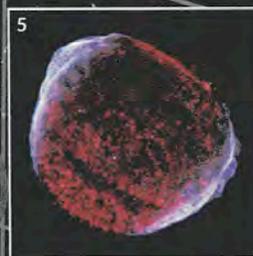
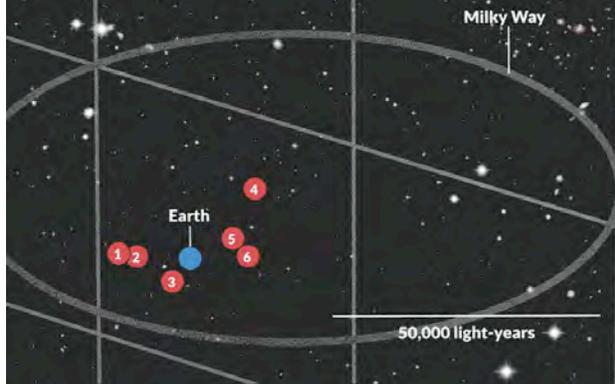
Crab Nebula

6,500 light-years away
First observed: 1054
Stargazers in China, Japan and elsewhere witnessed the supernova. It is home to a powerful pulsar.



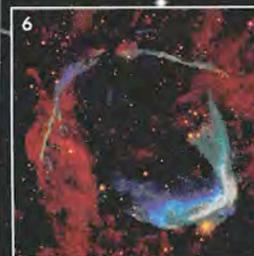
Kepler's supernova

20,000 light-years away
First observed: 1604
Named after astronomer Johannes Kepler, it is the most recent supernova witnessed in the Milky Way.



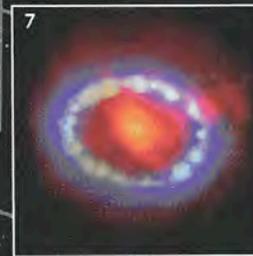
SN 1006

7,200 light-years away
First observed: 1006
It was seen around the world as probably the brightest stellar event on record, about 15 times as bright as Venus.



SN 185

9,100 light-years away
First observed: 185
Chinese historians recorded it in the book *Hou Hanshu* as a "guest star" with "scintillating, variegated colors."



SN 1987A

166,000 light-years away
First observed: 1987
The last supernova bright enough to be directly seen exploded in the Large Magellanic Cloud, a Milky Way satellite.

The stellar shreds of supernovas

In A.D. 185, Chinese records note the appearance of a "guest star" that then faded away over the span of several months. In 1572, astronomer Tycho Brahe and many others watched as a previously unknown star in the constellation Cassiopeia blasted out gobs of light and then eventually disappeared. And 30 years ago, the world witnessed a similar blaze of light from a small galaxy that orbits the Milky Way (see Page 20). In each case, humankind stood witness to a supernova — an exploding star — within or relatively close to our galaxy (representative border in gray, above).

Here's a map of six supernovas directly seen by human eyes throughout history, and one nearby explosion that went unnoticed. Some were type Ia supernovas, the detonation of a stellar core left behind after a star releases its gas into space. Others were triggered when a star at least eight times as massive as the sun blows itself apart. — *Christopher Crockett*

IN NUMERICAL ORDER: JPL/CALTECH/NASA; J. WARREN AND J. RUGHES ET AL./CXC/NASA; BUTIGERS, J., HESTER AND A. LOLLASU/NASA, ESA, R. SANKRIT AND W. BLAIR/JHU, NASA; ESA; CXC/NASA, JPL/CALTECH/NASA; ESA; CXC/NASA, SAO, UCL/A; ALMA/ESO, NAOJ, NRAO; A. ANGELICH, VISIBLE LIGHT IMAGE; HUBBLE/NASA AND ESA; X-RAY IMAGE: CXC/NASA; BACKGROUND: ESO (CC BY 4.0)

APOD MARCH 14, 2017
A DARK WINTER SKY OVER MONFRAGÜE NATIONAL PARK IN SPAIN
Image Credit & Copyright: José Luis Quiñones (Entre Encinas y Estrellas)



Explanation: You, too, can see a night sky like this. That is because Monfragüe National Park in Spain, where this composite image was created, has recently had its night sky officially protected from potential future light pollution. Icons of the night sky that should continue to stand out during northern winter -- and are visible on the featured image -- include very bright stars like Sirius, Betelgeuse, and Procyon, bright star clusters like the Pleiades, and, photographically, faint nebulae like the California and Rosette Nebulae. Even 100 years ago, many people were more familiar with a darker night sky than people today, primarily because of the modern light pollution. Other parks that have been similarly protected as dark-sky preserves include Death Valley National Park (USA) and Grasslands National Park (Canada). Areas such as the city of Flagstaff, Arizona and much of the Big Island of Hawaii also have their night skies protected.