



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

MARCH 2016

UPCOMING EVENTS

Wednesday, March 2 - Regular PAC meeting @ 6:30 PM in Rm 107, Bldg 74, Embry-Riddle Aeronautical University. Bill Cadwallender will present "Telescope Optics: Galileo to Ritchey-Chretien" - an overview of telescope types and their history.



Wednesday, March 9 - METASIG @ 5:00 PM at a local restaurant. Sign up at meeting on March 2.

Saturday, March 12 - Starry Nights @ 7:30 PM at the Highland Center for Natural History. Sign up at meeting on March 2.

Wednesday, March 16 - Board Meeting @ 6:30 PM.

Thursday, March 17 - Third Thursday Presentation @ 6:00 PM in the Founder's Suite, Prescott Public Library. Christopher Corbally, S.J., Vice Director, Vatican Observatory, will present "Through Compact Telescopes to New Research Realms". Not always the biggest telescopes count in space science discoveries. Often it is imagination, innovative technology, prime location, and persistence, coupled with compact telescopes. These include ones from the Vatican, Toronto, and Arizona - and your backyard.

THE CLOSEST NEW STARS TO EARTH

By Ethan Siegel

When you think about the new stars forming in the Milky Way, you probably think of the giant star-forming regions like the Orion Nebula, containing thousands of new stars with light so bright it's visible to the naked eye. At over 400 parsecs (1,300 light years) distant, it's one of the most spectacular sights in the night sky, and the vast majority of the light from galaxies originates from nebulae like this one. But its great luminosity and relative



proximity makes it easy to overlook the fact that there are a slew of much closer star-forming regions than the Orion Nebula; they're just much, much fainter.

If you get a collapsing molecular cloud many hundreds of thousands (or more) times the mass of our sun, you'll get a nebula like Orion. But if your cloud is only a few thousand times the sun's mass, it's going to be much fainter. In most instances, the clumps of matter within will grow slowly, the neutral matter will block more light than it reflects or emits, and only a tiny fraction of the stars that form—the most massive, brightest ones—will be visible at all. Between just 400 and 500 light years away are the closest such regions to Earth: the molecular clouds in the constellations of Chamaeleon and Corona Australis. Along with the Lupus molecular clouds (about 600 light years distant), these dark, light-blocking patches are virtually unknown to most sky watchers in the northern hemisphere, as they're all southern hemisphere objects.

In visible light, these clouds appear predominantly as dark patches, obscuring and reddening the light of background stars. In the infrared, though, the gas glows brilliantly as it forms new stars inside. Combined near-infrared and visible light observations, such as those taken by the Hubble Space Telescope, can reveal the structure of the clouds as well as the young stars inside. In the Chameleon cloud, for example, there are between 200 and 300 new stars, including over 100 X-ray sources (between the Chamaeleon I and II clouds), approximately 50 T-Tauri stars and just a couple of massive, B-class stars. There's a third dark, molecular cloud (Chamaeleon III) that has not yet formed any stars at all.

While the majority of new stars form in large molecular clouds, the closest new stars form in much smaller, more abundant ones. As we reach out to the most distant quasars and galaxies in the universe, remember that there are still star-forming mysteries to be solved right here in our own backyard.



Image credit: NASA and ESA Hubble Space Telescope. Acknowledgements: Kevin Luhman (Pennsylvania State University), and Judy Schmidt, of the Chamaeleon cloud and a newly-forming star within it—HH 909A—emitting narrow streams of gas from its poles.

PAST EVENTS

Patrick Birck of the Prescott Astronomy Club proudly presented an appreciation award to Professor Bryan Bates for his presentation of "Ancient Astronomy of the Southwest" at the January 21 Third Thursday Star Talk in the Founders Suite of the Prescott Public Library.

The Founders Suite room was filled to capacity. The audience was captivated with first-person accounts of expeditions and stories of how astronomy is found to be figured in the construction of houses of the Native American people throughout the Southwest. We also learned of the discovery of trade routes with the Mayans. To build houses with windows that accurately show the position of the Sun at each of the equinoxes either requires decades of observation or vast amounts of knowledge passed down verbally from generation to generation.



Pat Birck gave a short presentation on what to look for in the sky at a star party at Lake Valley Elementary School in Prescott Valley on February 16. About 40 attendees included fifth-graders, their teacher, and parents. Participating club members with their telescopes were John Carter, Joel Cohen, Doug Tilley, Jason Hoover, Sal Jordano, Doug Taylor-Gebler, Bill McDonald, Dan Scott, and Pat Birck. In addition, street cones were set up along a path marking off the distances of the planets from the Sun. Photo courtesy of John Carter taken with an iPhone 6S Plus.

NAU/NASA SPACE GRANT PROGRAM

The Prescott Astronomy Club is a participant in NASA Space Grant program supporting a grant student at NAU. At the February 3 regular meeting, PAC members approved providing \$250 to defray travel expenses of the grant student to attend scientific conferences..



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.



On Tuesday, March 1, the Moon is at last quarter phase and rises at 1:43 AM (Wednesday).

On Friday, March 4, from 4:32 AM to 5:37 AM there will be 2 shadows (Io's and Europa's) on Jupiter.

On the night of Saturday, March 5, you can see some events with Jupiter's moons. Here is the schedule:

06:30 PM Sunset

06:35 PM Jupiter rises.

06:55 PM Jupiter easy to find in the twilight.

06:55 PM Ganymede disappears in Jupiter's shadow.

09:36 PM Europa disappears in Jupiter's shadow.

10:25 PM Ganymede appears from behind Jupiter.

10:59 PM Io's shadow falls on Jupiter.

11:02 PM Io moves in front of Jupiter.

12:27 AM (Sunday) Europa appears from behind Jupiter.

01:14 AM Io's shadow leaves Jupiter.

01:17 AM Io moves from in front of Jupiter.

On Monday, March 7, Jupiter is at opposition (rises at sunset). That means that any shadow transits and satellite transits will occur at nearly the same place and time. As a matter of fact,

Jupiter rises at 6:26 PM with 2 shadows on it, right next to the satellites of Io and Europa. Europa and its shadow leave Jupiter at 6:55 PM (about the same time it becomes easy to find Jupiter in the twilight). Io and its shadow leave at 7:42 PM. Opposition also means that Jupiter will be up all night for observation.

On Tuesday, March 8, it is new Moon and you have all night to hunt for faint fuzzies. If you were in Indonesia, you could see a total solar eclipse. Unfortunately, none of the eclipse will be visible from Arizona. This is the season of the Messier marathon, though the full Moon in the middle of the month makes this year more difficult than most to see all of them.

On Saturday, March 12, you can see the north-east (IAU-terrestrial) part of the Moon at its best. Libration tips that part toward us. It is also good the following night or two.

On Sunday, March 13, at 2:00 AM, the rest of the USA sets their clocks forward 1 hour for "Daylight Saving Time". It should be called "Daylight Shifting Time". Arizona doesn't participate in such foolishness.

On Monday, March 14, you can see some events with Jupiter's moons, including a double shadow transit. Here is the schedule:

05:54 PM Jupiter rises.

06:26 PM Europa moves in front of Jupiter.

06:37 PM Sunset

06:45 PM Europa's shadow falls on Jupiter. (1 shadow)

07:05 PM Dark enough to find Jupiter easily. Look 15 degrees above the East horizon.

07:12 PM Io moves in front of Jupiter.

07:22 PM Io's shadow falls on Jupiter. (2 shadows)

(Notice that the shadows follow the satellites now that we are past opposition.)

09:11 PM Europa moves from in front of the planet.

09:26 PM Io moves from in front of the planet.

09:31 PM Europa's shadow leaves the planet. (1 shadow)

09:36 PM Io's shadow leaves the planet. (no shadows)

On Tuesday, March 15, the Moon is at first quarter phase and sets at 2:03 PM (Wednesday).

On Wednesday, March 16, if you are up at about 5:00 AM, you can see Mars (magnitude 0) about 10 arc-minutes from Beta1 Scorpii (magnitude 2.6). Saturn is nearby to the East and Antares is below the pair forming an isosceles triangle. Notice that Mars and Antares look red while Saturn looks yellow. Check out Tau Scorpii, down and to the left from Antares, for a blue star. Left of Beta1 is Nu Scorpii, a challenging double-double.

On Sunday, March 20, Spring begins and we have equal length day and night.

On Monday, March 21, you can see some events with Jupiter's moons. The show starts at 8:42 PM when Europa moves in front of the planet. There are 2 shadows on the planet from 9:22 PM to 11:29 PM. The show is over at 12:08 AM (Tuesday) when Europa's shadow leaves the planet.

On the night of Tuesday, March 22, at 6:17 PM (28 minutes before sunset) the full Moon rises spoiling any chance of seeing faint fuzzies for the night. If you are up later that night, you might notice a slight penumbral eclipse. First contact is 2:42 AM (Wednesday) and is unobservable. The center of the eclipse is about 4:50 PM but it won't help you out much with your hunt for faint fuzzies although it should be noticeable. Fourth contact (there is no 2nd and 3rd because the Moon never touches the umbra) is unobservable because the dimming is too slight to see and because the Moon has set. I'm not planning to stay up for this one.

On Monday, March 28, we get another chance to observe a double shadow transit on Jupiter. The show starts with Io moving in front of the planet at 10:40 PM. There are 2 shadows on the planet from 11:59 PM to 1:23 AM (Tuesday). The show is over at 2:45 AM when Europa's shadow exits.

On Wednesday, March 30, the Moon is at last quarter phase and rises at 1:18 AM (Thursday).

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 advise on the purchase of astronomy equipment, setting up equipment, astrophotography, etc., contact a PAC mentor.

John R. Carter Sr. - General - 928-458-0570

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	Binocular Showpieces
Caldwell	Dunlop 100
Face-On Spiral Galaxies	Herschel 400
Hidden Treasures	Messier
Planet Maps	Royal Astronomical Society of Canada Finest NGC
Saguaro Astronomy Club Best NGC	S&T Lunar 100
Telescope Showpieces	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>

General PAC user group:

<https://groups.yahoo.com/neo/groups/Prescott-Astronomy-Club/info>

Astrophotography special interest group:

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



BOARD OF DIRECTORS

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Third Thursday Coordinator: Corinne Shaw & Pat Birck

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Newsletter: David Viscio

Refreshments: Janie Thompson

Publicity Coordinator: John Carter

Starry Nights Coordinator: Open

Astronomy Picture of the Day

February 17, 2016

Michael Goh



What strange world is this? Earth. In the foreground of the featured image are the Pinnacles, unusual rock spires in Nambung National Park in Western Australia. Made of ancient sea shells (limestone), how these human-sized picturesque spires formed remains unknown. In the background, just past the end of the central Pinnacle, is a bright crescent Moon. The eerie glow around the Moon is mostly zodiacal light, sunlight reflected by dust grains orbiting between the planets in the Solar System. Arching across the top is the central band of our Milky Way Galaxy. Many famous stars and nebula are also visible in the background night sky. The featured 29-panel panorama was taken and composed last September after detailed planning that involved the Moon, the rock spires, and their corresponding shadows. Even so, the strong zodiacal light was a pleasant surprise.