



## 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

## NOVEMBER 2016

### UPCOMING EVENTS

Wednesday, November 2 - Regular PAC meeting @ 6:30 PM in Rm 107, Bldg 74, Embry-Riddle Aeronautical University. Program TBD.

Friday, November 4 - US Vets @ 7:00 PM. Sign up at meetings on November 2.

Saturday, November 5 - Starry Nights @ 6:30 PM at Vista Park, Prescott. Sign up at meetings on November 2.

Wednesday, November 16 - PAC Board meeting @ 6:30 PM.

Thursday, November 17 - Third Thursday Presentation @ 6:00 PM in the Founder's Suite, Prescott Public Library. Dr. Ryan Anderson, Physical Scientist/Developer, US Geological Survey, will present "Latest Results from The Mars Curiosity Rover". Dr. Anderson will provide an overview of Curiosity's mission, key findings and recent activities, including the latest images from Mars.

Saturday, November 19 - Potluck and club star party @ 5:00 PM at Carol Giermann's home. Details below.



### STAR PARTY AND POTLUCK AT CAROL GIERMANN'S

A PAC star party/social event is scheduled for Saturday, November 19, 2016 at Carol Giermann's home. For those new to the club, her late husband Gene was a past president of the club. He held monthly star parties/social event at his house for several years. After he passed away, his wife Carol continued to host these monthly events. We have not had any star parties there for the past several years. Carol will be moving in the next several months so it would be nice to hold a PAC star party there one last time. It is a good, dark, observing site.

Everyone is invited along with your spouse and friends. Some members bring their telescopes and do observing, the wives and some of the guys that aren't outside observing can be found in

the house socializing. Even if the weather isn't the best for observing we will still be in the house enjoying each other company. Please bring a dish, snacks, desert, drinks, etc. to pass.

Carol's address and telephone number:

3455 W Brenda Trail (Her house is the 3<sup>rd</sup> driveway on the left)  
Chino Valley, AZ  
499-2644

Maps showing how to get to Carol's house can be found in the appendix.

If you have any questions, please contact:

John Baesemann  
jbaesemann@q.com  
642-8004

## **HOLIDAY PARTY - DECEMBER 14, 2016**

The PAC Holiday Party will be held at Gabby's Grill in Prescott Valley December 14, 2016 at 6:00 PM.

A buffet will include entrees, dinner bread, Caesar salad, scalloped potatoes and asparagus, non-alcoholic beverages and dessert. Bar drinks are available, but are paid for separately for anyone wishing to do that.



The main entrees will be Chicken Marsala and Carved Pit Ham. Dessert will be Raspberry Cheesecake.

The cost is \$29.00 per person (tax & gratuity included). Prepayment is required by the next PAC meeting on Wednesday, November 2, 2016. If paying by cash, provide the exact amount as PAC cannot provide change. If paying by check, make check payable to the Prescott Astronomy Club. We need to have a count of how many are planning to attend at that time.

Joel Cohen or Doug Tilley will be collecting the payments at meeting.

The address is: Gabby's Grill  
2982 North Park Ave, Ste B  
Prescott Valley, AZ 86314  
(928) 277-1787

## 2017 SOLAR ECLIPSE BALLOON PROJECT

On August 21, 2017, the moon's shadow will sweep eastward from Oregon to North Carolina across the United States during a rare total eclipse of the sun. During this eclipse, the moon's shadow will pass over Glendo State Park in Wyoming. The ASCEND! Project, funded by NASA Space Grant and headed by Jack Crabtree, will photograph the moon's shadow from a high altitude balloon. Members of the Prescott Astronomy Club have the opportunity to be part of this exciting project.



Arrival in Glendo State Park is scheduled for August 19, 2017, with departure no later than August 23.

The ASCENT! Team and members of the Prescott Astronomy Club will provide talks about the balloon project and telescope viewing during the eclipse and clear night observing at the campground. If you are interested in participating or want additional information, contact Jerry and Corinne Shaw at [cmshaw0430@aol.com](mailto:cmshaw0430@aol.com) or (928) 772-0941.

## IS PROXIMA CENTAURI'S 'EARTH-LIKE' PLANET ACTUALLY LIKE EARTH AT ALL?

By Ethan Siegel

Just 25 years ago, scientists didn't know if any stars—other than our own sun, of course—had planets orbiting around them. Yet they knew with certainty that gravity from massive planets caused the sun to move around our solar system's center of mass. Therefore, they reasoned that other stars would have periodic changes to their motions if they, too, had planets.



This change in motion first led to the detection of planets around pulsars in 1991, thanks to the change in pulsar timing it caused. Then, finally, in 1995 the first exoplanet around a normal star, 51 Pegasi b, was discovered via the “stellar wobble” of its parent star. Since that time, over 3000 exoplanets have been confirmed, most of which were first discovered by NASA's Kepler mission using the transit method. These transits only work if a solar system is fortuitously aligned to our perspective; nevertheless, we now know that planets—even rocky planets at the right distance for liquid water on their surface—are quite common in the Milky Way.

On August 24, 2016, scientists announced that the stellar wobble of Proxima Centauri, the closest star to our sun, indicated the existence of an exoplanet. At just 4.24 light years away, this planet orbits its red dwarf star in just 11 days, with a lower limit to its mass of just 1.3 Earths. If

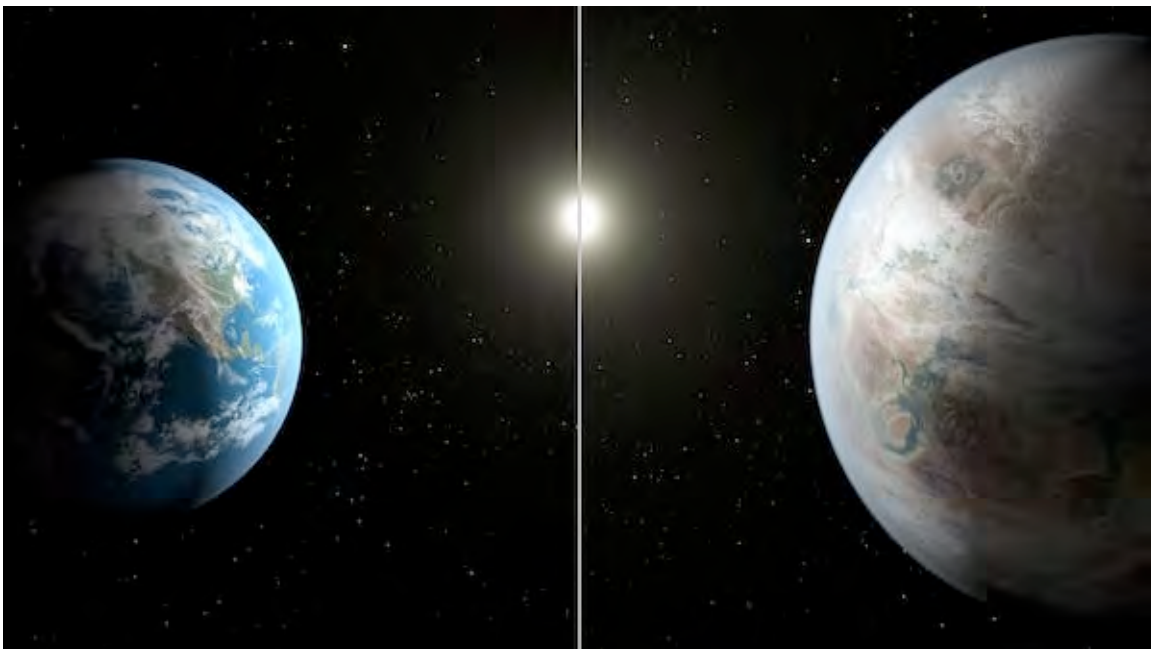
verified, this would bring the number of Earth-like planets found in their star's habitable zones up to 22, with 'Proxima b' being the closest one. Just based on what we've seen so far, if this planet is real and has 130 percent the mass of Earth, we can already infer the following:

- It receives 70 percent of the sunlight incident on Earth, giving it the right temperature for liquid water on its surface, assuming an Earth-like atmosphere.
- It should have a radius approximately 10 percent larger than our own planet's, assuming it is made of similar elements.
- It is plausible that the planet would be tidally locked to its star, implying a permanent 'light side' and a permanent 'dark side'.
- And if so, then seasons on this world are determined by the orbit's ellipticity, not by axial tilt.

Yet the unknowns are tremendous. Proxima Centauri emits considerably less ultraviolet light than a star like the sun; can life begin without that? Solar flares and winds are much greater around this world; have they stripped away the atmosphere entirely? Is the far side permanently frozen, or do winds allow possible life there? Is the near side baked and barren, leaving only the 'ring' at the edge potentially habitable?

Proxima b is a vastly different world from Earth, and could range anywhere from actually inhabited to completely unsuitable for any form of life. As 30m-class telescopes and the next generation of space observatories come online, we just may find out!

Looking to teach kids about exoplanet discovery? NASA Space Place explains stellar wobble and how this phenomenon can help scientists find exoplanets: <http://spaceplace.nasa.gov/barycenter/en/>



*An artist's conception of the exoplanet Kepler-452b (R), a possible candidate for Earth 2.0, as compared with Earth (L). Image credit: NASA/Ames/JPL-Caltech/T. Pyle.*

## **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 Wednesday, November 2, about 6:00 PM, you can see some solar system objects near each other. Look about 10 degrees above the southwest horizon for Venus (magnitude -4) on the left and Saturn (magnitude + 0.5) on the right. Then look above Saturn for the thin crescent Moon.

On Sunday, November 6, at 2:00 AM, daylight savings time ends for most of the country (Spring forward, Fall back). However, Arizona does not participate in such silliness and for us, time marches on.

On Monday, November 7, the Moon is at first quarter phase and sets at 12:17 AM (Tuesday).

On Monday, November 7, at 8:12 PM the Moon occults a double star. These stars are dim (magnitude 9.1 and 10.3) so this observation will require a large telescope (12 inch) and even then might be impossible because of the bright Moon nearby. The dimmer of the two is actually a very close (and pretty equal) double, and it might disappear in two steps.

On Sunday, November 13, at 5:15 PM (12 minutes before sunset) the full Moon rises, spoiling any chance of seeing faint fuzzies for the night.

On Tuesday, November 15, after about 9:00 PM, you can see the northeast (IAU) part of the Moon at its best. Libration tips that part of the Moon toward us. In particular, look for the dark floored crater, Endymion, in the upper left part of the terminator as the Moon rises. On the upper right is the much bigger Mare Crisium.

On Monday, November 21, the Moon is at third quarter phase and rises at 12:56 AM (Tuesday).

On Monday, November 28, it is new Moon and you have all night to hunt for faint fuzzies.

## TELESCOPES FOR MEMBERS' USE

The club has 3 telescope systems that are available for temporary long-term use and possession by a club member with the understanding that the scopes are club property and the user is also willing to bring them to the club's public star parties and private events at schools, camps, etc.

The two scopes are as follows:

8-inch Celestron Nexstar with alt-az GoTo mount, tripod, red dot finder, hand controller, diagonal, several eyepieces, color filters, Nexstar Users Guide, Celestron manual, DC power cord, level, Orion case, and lens cleaner. It can run on internal batteries but not for long. A 12-volt AC/DC power source would be recommended.



SkyWatcher 152mm (6") f/8 doublet achromatic refractor on an HEQ-5 German equatorial mount and tripod. The mount has motor drives on both axes and can track sky motion but it is not a GoTo mount. The system includes a finder scope, polar axis alignment scope, dual axes hand controller, William Optics diagonal, several eyepieces, 12-volt DC power cord with standard cigarette lighter plug and SkyWatcher manual.



8-inch Meade LX200 Classic with alt-az GoTo mount, tripod, finder scope, diagonal and several eyepieces.



If any member is interested in using either of these scopes, please contact Pat Birck.

## GUIDELINES FOR PAC EQUIPMENT STORAGE SHED USE

The PAC board has recently completed an inventory of astronomy systems and equipment belonging to the club. The club has installed a small storage shed at Pat Birck's home to hold some of the equipment. Three club members have keys to access the shed: Pat Birck, Doug Tilley and John Baesemann. If club members want to obtain club equipment for temporary use or store equipment in the shed, please contact one of the 3 key holders. The following rules for obtaining and storing equipment are applicable:



Items stored

- Only property belonging to the Prescott Astronomy Club.
- No items containing hazardous materials or that may be flammable.



- Only items of use to the PAC as determined by the Board – i.e. no junk.

## Records

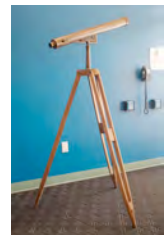
A ledger will be kept in the shed containing the following information:

- A description of each item stored, the date it was entered into storage, the identity of the person putting it into storage, and the person from whom the item was received.
- A record of each item withdrawn from storage, the date it was withdrawn and the identity of the person taking custody.
- A copy of the ledger shall be given upon request to the custodian of PAC records.

Use of an item for longer than “temporary” requires Board approval.

## ANTIQUATE BRASS TELESCOPE

The club has an antique brass-tubed refractor on wooden tripod. Anyone interested having this scope as a display/conversation piece or for historical purposes should contact Doug Tilley or Pat Birck for more information.



## BOOKS AND MAGAZINES

During the past several years a variety of books have been donated to the Astronomy Club. The PAC board has decided, starting with the October regular meeting and continuing for about 6 months, a box of these books will be available at the 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.

After that any remaining unsold books will be donated to the Friends of the Prescott Public Library. In addition, we have complete sets of past Sky and Telescope magazine. These also will be available at the meetings 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.

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

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: David Viscio

Vice President: Open

Secretary: Doug Tilley

Treasurer: Stephen Eubanks

At Large: Joel Cohen

At Large: Dick Lewis

At Large: Fred Arndt

At Large: John Baesemann



## PAC COORDINATORS

Astronomical League Coordinator: Pat Birck

Facebook: John Carter & Pam Shivak

Highland Center Coordinator: David Viscio

Hospitality: Corinne Shaw & Dick Lewis

Magazine Subscriptions: Stephen Eubanks

METASIG: Marilyn Unruh

PAC Affiliate Partner w/ NAU Space Grant Program – Jerry & Corinne Shaw

PAC Store Sales: Dick Felgenhour

Property Records: Fred Arndt

Schools & Camps Outreach: Pat Birck

Third Thursday Coordinator: Corinne Shaw & Pat Birck

Membership: Stephen Eubanks

Newsletter: David Viscio

Refreshments: Janie Thompson

Publicity Coordinator: John Carter

Starry Nights Coordinator: Open

Webmaster: Russell Chappell



**APOD SEPT. 24, 2016 - HEART AND SOUL AND DOUBLE CLUSTER**  
**Image Credit & Copyright: Adrien Klamerius**



**Explanation:** This rich starfield spans almost 10 degrees across the sky toward the northern constellations Cassiopeia and Perseus. On the left, heart-shaped cosmic cloud IC 1805 and IC 1848 are popularly known as the Heart and Soul nebulae. Easy to spot on the right are star clusters NGC 869 and NGC 884 also known as h and Chi Perseii, or just the Double Cluster. Heart and Soul, with their own embedded clusters of young stars a million or so years old, are each over 200 light-years across and 6 to 7 thousand light-years away. In fact, they are part of a large, active star forming complex sprawling along the Perseus spiral arm of our Milky Way Galaxy. The Double Cluster is located at about the same distance as the Heart and Soul nebulae. Separated by only a few hundred light-years, h and Chi Perseii are physically close together, and both clusters are estimated to be about 13 million years old. Their proximity and similar stellar ages suggest both clusters are likely a product of the same star-forming region.

# Maps to Carol Giermann's Home

