



# 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

## SEPTEMBER 2016

### UPCOMING EVENTS



Wednesday, September 7 - Regular PAC meeting @ 6:30 PM in Rm 107, Bldg 74, Embry-Riddle Aeronautical University. Club member Russell Chappell and Jeff Stillman will present a brief history of the Prescott Astronomy Club, including select members, activities and its evolution.

Thursday, September 8 - Pine Summit Camp @ 7:00 PM. Sign up at meeting on September 7.

Saturday, September 10 - Starry Nights @ 7:30 PM at Vista Park, Prescott. Sign up at meeting on September 7.

Wednesday, September 14 - METASIG @ 5:00 PM at a local restaurant. Sign up at meeting on September 7.

Thursday, September 15 - Third Thursday Presentation @ 6:00 PM in the Founder's Suite, Prescott Public Library. Dr. Stephen C. Tegler, Professor and Chair, Physics and Astronomy, Northern Arizona University, will present "*Kuiper Belt Objects*" describing Kuiper belt object discoveries from laboratory experiments, telescopes and spacecraft.

Sunday, September 18 - Annual PAC Picnic @ 11:00 AM to 3:00 PM at Goldwater Lake at the Lake View Ramada/Pavilion. Details below.

Wednesday, September 21 - Board Meeting @ 6:30 PM.

Thursday, September 22 through Saturday, September 24 - 3<sup>rd</sup> Annual Flagstaff Star Party. Details can be found in the Appendix.

Saturday, September 24 - Friendly Pines Camp @ 7:00 PM. Sign up at meeting on September 7.

Tuesday, September 27 - PAC Double Star Mini-Marathon @ 7:00 PM. Location TBD. Sign up at meeting on September 7.

Saturday, October 1 - Starry Nights @ 7:30 PM at Pronghorn Park, Prescott Valley. Sign up at meeting on September 7.

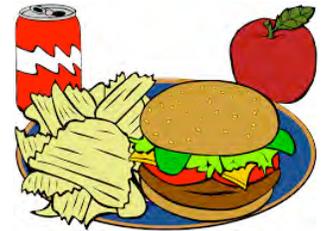
Wednesday, October 5 - Regular PAC meeting @ 6:30 PM in Rm 107, Bldg 74, Embry-Riddle Aeronautical University.

Thursday, October 6 - Mile High Middle School @ 7:00 PM. Sign up at meetings on September 7 and October 5.

Friday, October 7 - US Vets @ 7:00 PM. Sign up at meeting on September 7 and October 5.

## ANNUAL CLUB PICNIC

The Prescott Astronomy Club has scheduled the annual summer picnic for Sunday, September 18th from 11:00 am until 3:00 pm. The location is Goldwater Lake at the Lakeview Ramada/Pavilion. Located at 2900 S Goldwater Lake Rd, go south on Mount Vernon Street/Senator Highway, about four miles to the entrance of the lake. Turn right and park in the designated parking spots. A parking charge of \$3.00 per vehicle is required by the park. A map of the park is in the appendix.



The club will provide;

- Hamburgers and hotdogs

- Hamburger and hotdog buns

- Condiments (mayonnaise, ketchup, mustard, relish and lettuce)

- Cutlery, plates and cups

Members will provide:

- Chips and Snacks

- Salads (for 12)

- Desserts (for 12)

- Personal Drinks

All those planning to attend the picnic are asked to send an e-mail to David Viscio at [pkmist@gmail.com](mailto:pkmist@gmail.com) noting the number of attendees and what dessert or salad they will bring. A sign-up sheet will also be available at the September 7 regular meeting. We need to get a count of the number of participants so the appropriate amount of hamburger, hotdogs, etc. can be purchased.

## DOUBLE STAR MINI-MARATHON

The first mini-marathon, focusing on double stars, is scheduled for Tuesday, September 27, starting at 6:30PM until midnight. The venue for the event has not been finalized, pending organizing and a count of interested individuals. If you plan to participate in this event, please send a confirmation note to David Viscio at [pkmist@gmail.com](mailto:pkmist@gmail.com). A sign-up sheet will also be available at the September 7 regular meeting.



## 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 THERE A SUPER-EARTH IN THE SOLAR SYSTEM OUT BEYOND NEPTUNE?

By Ethan Siegel

When the advent of large telescopes brought us the discoveries of Uranus and then Neptune, they also brought the great hope of a Solar System even richer in terms of large, massive worlds. While the asteroid belt and the Kuiper belt were each found to possess a large number of substantial icy-and-rocky worlds, none of them approached even Earth in size or mass, much less the true giant worlds. Meanwhile, all-sky infrared surveys, sensitive to red dwarfs, brown dwarfs and Jupiter-mass gas giants, were unable to detect anything new that was closer than Proxima Centauri. At



the same time, Kepler taught us that super-Earths, planets between Earth and Neptune in size, were the galaxy's most common, despite our Solar System having none.

The discovery of Sedna in 2003 turned out to be even more groundbreaking than astronomers realized. Although many Trans-Neptunian Objects (TNOs) were discovered beginning in the 1990s, Sedna had properties all the others didn't. With an extremely eccentric orbit and an aphelion taking it farther from the Sun than any other world known at the time, it represented our first glimpse of the hypothetical Oort cloud: a spherical distribution of bodies ranging from hundreds to tens of thousands of A.U. from the Sun. Since the discovery of Sedna, five other long-period, very eccentric TNOs were found prior to 2016 as well. While you'd expect their orbital parameters to be randomly distributed if they occurred by chance, their orbital orientations with respect to the Sun are clustered extremely narrowly: with less than a 1-in-10,000 chance of such an effect appearing randomly.

Whenever we see a new phenomenon with a surprisingly non-random appearance, our scientific intuition calls out for a physical explanation. Astronomers Konstantin Batygin and Mike Brown provided a compelling possibility earlier this year: perhaps a massive perturbing body very distant from the Sun provided the gravitational "kick" to hurl these objects towards the Sun. A single addition to the Solar System would explain the orbits of all of these long-period TNOs, a planet about 10 times the mass of Earth approximately 200 A.U. from the Sun, referred to as **Planet Nine**. More Sedna-like TNOs with similarly aligned orbits are predicted, and since January of 2016, another was found, with its orbit aligning perfectly with these predictions.

Ten meter class telescopes like Keck and Subaru, plus NASA's NEOWISE mission, are currently searching for this hypothetical, massive world. If it exists, it invites the question of its origin: did it form along with our Solar System, or was it captured from another star's vicinity much more recently? Regardless, if Batygin and Brown are right and this object is real, our Solar System may contain a super-Earth after all.



*A possible super-Earth/mini-Neptune world hundreds of times more distant than Earth is from the Sun.  
Image credit: R. Hurt / Caltech (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.



On Thursday, September 8, the Moon is at first quarter phase and sets at 11:20 PM.

On Saturday, September 10, from about 8:15 PM till 11:00 PM, the gibbous Moon moves in front of the open star cluster, M 25. Because of the brightness of the Moon, it will be difficult to see the stars. Using a big telescope at high power will increase your chances.

On Friday, September 16, at 6:46 PM, the full Moon rises spoiling any chance of seeing faint fuzzies for the night. The Sun sets at 6:34 PM.

On Thursday, September 22, the Moon is at last quarter phase and rises at 11:23 PM. It is also the first day of Autumn so the days and nights are approximately equal.

On Friday, September 23, about 8:20 PM, Algol is at magnitude 3.4. After about an hour, it begins its climb to magnitude 2.1.

On Friday, September 30, it is new Moon and you have all night to hunt for faint fuzzies.

## **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

S&T Lunar 100

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**

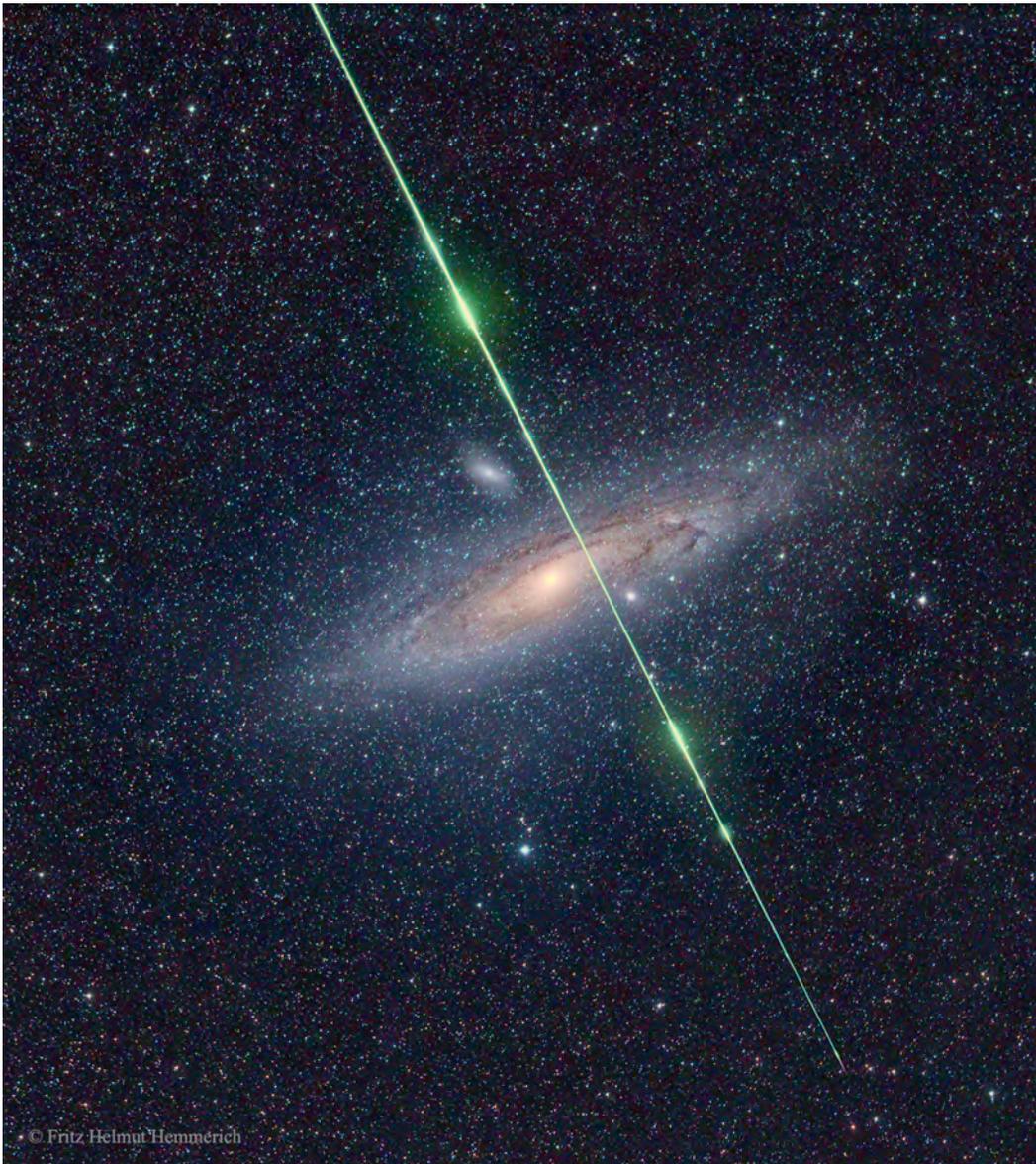
Astronomical League Coordinator: Pat Birck  
Facebook: John Carter & Pam Shivak  
Highland Center Coordinator: David Viscio  
Hospitality: Corinne Shaw & Dick Lewis  
Magazine Subscriptions: Stephen Eubanks  
METASIG: Marilyn Unruh  
PAC Affiliate Partner w/ NAU Space Grant Program – Jerry & Corinne Shaw  
PAC Store Sales: Dick Felgenhour  
Property Records: Fred Arndt  
Schools & Camps Outreach: Pat Birck  
Third Thursday Coordinator: Corinne Shaw & Pat Birck  
Webmaster: Russell Chappell

Membership: Stephen Eubanks  
Newsletter: David Viscio  
Refreshments: Janie Thompson  
Publicity Coordinator: John Carter  
Starry Nights Coordinator: Open



## METEOR BEFORE GALAXY

Image Credit & Copyright: Fritz Helmut Hemmerich



**Explanation:** *What's that green streak in front of the Andromeda galaxy? A meteor. While photographing the Andromeda galaxy last Friday, near the peak of the Perseid Meteor Shower, a sand-sized rock from deep space crossed right in front of our Milky Way Galaxy's far-distant companion. The small meteor took only a fraction of a second to pass through this 10-degree field. The meteor flared several times while braking violently upon entering Earth's atmosphere. The green color was created, at least in part, by the meteor's gas glowing as it vaporized. Although the exposure was timed to catch a Perseids meteor, the orientation of the imaged streak seems a better match to a meteor from the Southern Delta Aquariids, a meteor shower that peaked a few weeks earlier.*

# **The 3<sup>rd</sup> Annual Flagstaff Star Party September 22 - 24, 2016**

**The event is hosted by the Flagstaff Dark Skies Coalition, the Coconino Astronomical Society, the Northern Arizona University Department of Physics and Astronomy, the Flagstaff Unified School District, Lowell Observatory, and the U.S. Naval Observatory.**

**Astronomy Club members throughout Arizona are invited to bring their scopes and share the wonders of the universe with the public.**

**Telescope hosts will receive discounted motel rooms; and may sign up for a presentation on the Lowell Amateur Research Initiative and/or a special eyepiece-observing session on the Kaj Strand 61-inch astrometric telescope of the Naval Observatory.**

**If you would like to volunteer to be a telescope host, please visit the Flagstaff Star Party Website ([flagstaffstarparty.org](http://flagstaffstarparty.org)) and look for the Telescope Hosts link to get more information.**

**Background Photo: Site for the 2015 Flagstaff Star Party, Flagstaff's Buffalo Park —stars like no-one would imagine in the middle of a town of 65,000**

