Prescott Astronomy Club

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

OCTOBER 2016

UPCOMING EVENTS

Saturday, October 1 - Starry Nights @ 7:00 PM at Pronghorn Park, Prescott Valley.

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

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

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

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

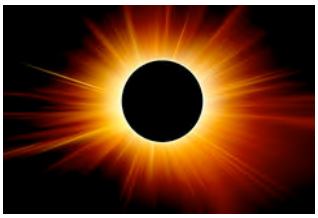
Thursday, October 20 - Third Thursday Presentation @ 6:00 PM in the Founder's Suite, Prescott Public Library. Rik Hill, Coordinator, AZ Lunar & Planetary Lab, will present “Moondance”. Rik will discuss considerations needed in taking and processing high-resolution images of the moon with easily available freeware and relatively inexpensive cameras.

Saturday, October 22 - Star party at Highland Center for Natural History.

Wednesday, October 26 thru Saturday, October 29 - Enchanted Skies Star Party, Magdalena, New Mexico. See appendix for details.

Saturday, October 29 - Star party in Black Canyon City (tentative, TBD).

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 or (928) 772-0941.

ONE INCREDIBLE GALAXY CLUSTER YIELDS TWO TYPES OF GRAVITATIONAL LENSES

By Ethan Siegel

There is this great idea that if you look hard enough and long enough at any region of space, your line of sight will eventually run into a luminous object: a star, a galaxy or a cluster of galaxies. In reality, the universe is finite in age, so this isn't quite the case. There are objects that emit light from the past 13.7 billion years—99 percent of the age of the universe—but none before that. Even in theory, there are no stars or galaxies to see beyond that time, as light is limited by the amount of time it has to travel.

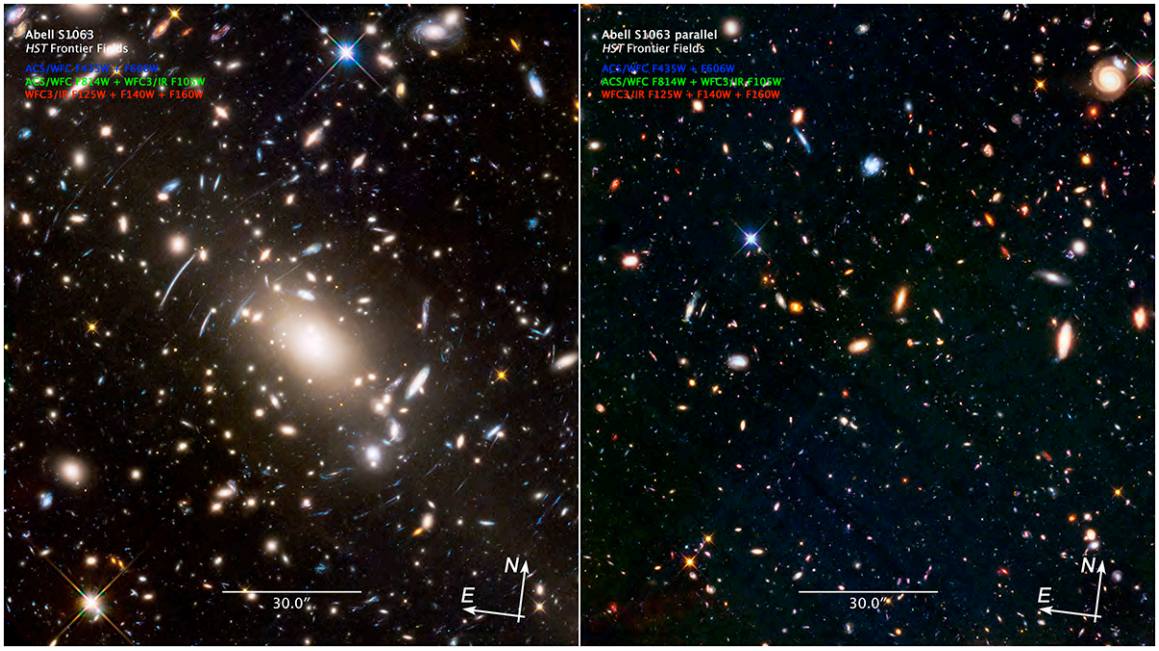
But with the advent of large, powerful space telescopes that can collect data for the equivalent of millions of seconds of observing time, in both visible light and infrared wavelengths, we can see nearly to the edge of all that's accessible to us.

The most massive compact, bound structures in the universe are galaxy clusters that are hundreds or even thousands of times the mass of the Milky Way. One of them, Abell S1063, was the target of a recent set of Hubble Space Telescope observations as part of the Frontier Fields program. While the Advanced Camera for Surveys instrument imaged the cluster, another instrument, the Wide Field Camera 3, used an optical trick to image a parallel field, offset by just a few arc minutes. Then the technique was reversed, giving us an unprecedentedly deep view of two closely aligned fields simultaneously, with wavelengths ranging from 435 to 1600 nanometers.

With a huge, towering galaxy cluster in one field and no comparably massive objects in the other, the effects of both weak and strong gravitational lensing are readily apparent. The galaxy cluster—over 100 trillion times the mass of our sun—warps the fabric of space. This causes background light to bend around it, converging on our eyes another four billion light years away. From behind the cluster, the light from distant galaxies is stretched, magnified, distorted, and

bent into arcs and multiple images: a classic example of strong gravitational lensing. But in a subtler fashion, the less optimally aligned galaxies are distorted as well; they are stretched into elliptical shapes along concentric circles surrounding the cluster.

A visual inspection yields more of these tangential alignments than radial ones in the cluster field, while the parallel field exhibits no such shape distortion. This effect, known as weak gravitational lensing, is a very powerful technique for obtaining galaxy cluster masses independent of any other conditions. In this serendipitous image, both types of lensing can be discerned by the naked eye. When the James Webb Space Telescope launches in 2018, gravitational lensing may well empower us to see all the way back to the very first stars and galaxies.



Galaxy cluster Abell S1063 (left) as imaged with the Hubble Space Telescope as part of the Frontier Fields program. The distorted images of the background galaxies are a consequence of the warped space dues to Einstein's general relativity; the parallel field (right) shows no such effects. Image credit: NASA, ESA and Jennifer Lotz (STScI)

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.

This is a good month to find Uranus and Neptune. See Sky & Telescope, October 2016, p. 50 for an article about finding them.

On Thursday, October 6, about 7:08 PM, the dark limb of the Moon occults the globular cluster, M 9. The occultation takes about 8 minutes. The reappearance occurs at the bright limb at about 8:25 PM and should be much harder to observe. Use a big telescope and high power for best results.

On Saturday, October 8, the Moon is at first quarter phase and sets at 11:37 PM. The first quarter phase occurs at 9:34 PM so the Moon should look half illuminated at that time.

On Tuesday, October 11, at 5:37 AM, Mercury and Jupiter rise at the same time, less than 1 degree apart. The Sun rises an hour later.

On Wednesday, October 12, in the evening, it would be a good time to observe the Moon crater, Aristarchus. This brightest spot on the Moon, has both a favorable libration (that part of the Moon is tipped toward us) and a favorable terminator placement (near the terminator but in the sunlit part).

On Saturday, October 15, at 5:59 PM, the full Moon rises (4 minutes after Sunset), spoiling any chance of hunting for faint fuzzies for the night. The phase officially occurs at 9:24 PM and is quite close to the earth's shadow at that time, so the Moon should be evenly illuminated with no craters being shadowed.

On Sunday, October 16, in the evening, you can easily observe the variable star, Algol. When it gets dark enough to find the star, it will be at its minimum, magnitude 3.4. Gradually during the night it will brighten to magnitude 2.1.

On Tuesday, October 18, at 10:18 PM, the bright limb of the Moon occults Aldebaran. The star reappears at 10:41 PM on the dark limb.

On Saturday, October 22, the Moon is at third quarter phase and rises at 12:09 AM (Sunday).

On Thursday, October 27, about 6:30 PM, you can see Venus pass between Saturn and Antares, much as Mars did in the past but much lower in the sky. Look very low above the Southwest horizon for the trio.

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

TELESCOPES FOR MEMBERS' USE

The club has 2 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.

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.

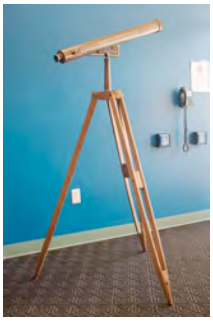
Records

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.

ANTIQUE 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 Sky and Telescope magazine for 1965, 1966, and 1967. These also will be available at the October meeting 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.

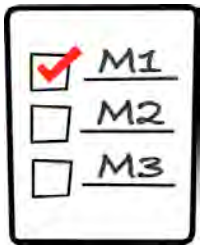
John R. Carter Sr. - General - 928-458-0570

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	Binocular Showpieces
Bright Nebulae	Caldwell
Dunlop 100	Face-On Spiral Galaxies
Globular Clusters	Herschel 400
Herschel II	Hidden Treasures
Messier	Open Clusters
Planet Maps	Planetary Nebulae
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

Astrophotography special interest group:

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

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Refreshments: Janie Thompson
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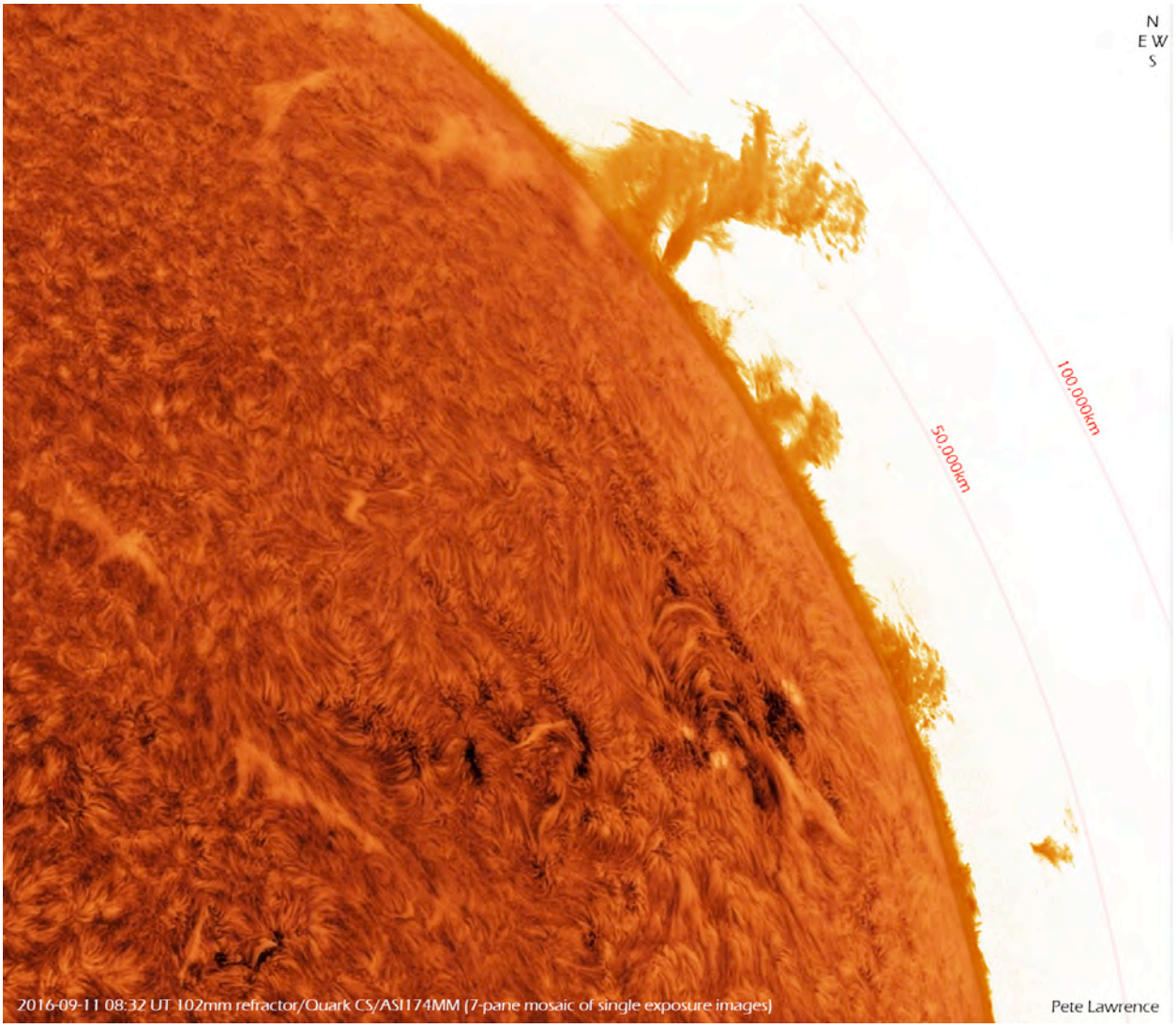
Starry Nights Coordinator: Open
Webmaster: Russell Chappell

APOD SEPTEMBER 19, 2016 - 50,000 KILOMETERS OVER THE SUN

Image Credit & Copyright: Pete Lawrence



What's happening at the edge of the Sun? Although it may look like a monster is rampaging, what is pictured is actually only a monster prominence -- a sheath of thin gas held above the surface by the Sun's magnetic field. The solar event was captured just this past weekend with a small telescope, with the resulting image then inverted and false-colored. As indicated with illustrative lines, the prominence rises over 50,000 kilometers above the Sun's surface, making even our 12,700-diameter Earth seem small by comparison. Below the monster prominence is active region 12585, while light colored filaments can be seen hovering over a flowing solar carpet of fibrils. Filaments are actually prominences seen against the disk of the Sun, while similarly, fibrils are actually spicules seen against the disk. Energetic events like this are becoming less common as the Sun evolves toward a minimum in its 11-year activity cycle.

Enhanced Skies Star Party

October 26-29, 2016

Magdalena, New Mexico
34.142° N, 107.315° W

Serious Observer & Astro-Photographers
as well as all who want to discover the beautiful skies!

Private Tours
NRAO/Very Large Array & Magdalena Ridge Observatory
included with full registration.

Registration
Full: $50 per adult attending any or all nights includes private tours
Saturday Night Only: $15 per adult. (One night Option ONLY available for Saturday)
Children 17 and under FREE when accompanied by an adult ticket holder.

Space is limited!
Advanced on-line registration is recommended.
Dry Camping & RV parking is available at the Dark Sky Site.
Hotel packages are available.
Food Available at the Dark Sky Site or Magdalena.

Daytime Activities in Magdalena
Attend Astronomy lectures,
See antique telescopes on the "Telescope Trail".
Visit "Trail's End" stockyard and the ghost town of Kelly.
Shop for handmade treasures, antiques and rocks.

www.enchantedskies.org
505-515-5780

Historic Magdalena
6,800' (2,070m)
Desert-mountain town in south-central New Mexico. Magdalena is truly a dark sky site with regular recordings of 21.6-21.8 magnitudes per square arc-second and sometimes 22.0. One of the darkest and driest in the continental US.

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Magdalena is NEW MEXICO True
Adventure that Feeds the Soul. www.nmtrue.org

National Radio Astronomy Observatory
NRAO
public.nrao.edu

NSTE

MRO
Magdalena Ridge Observatory

They Don't Make Places Like This Anymore