NIGHTFALL

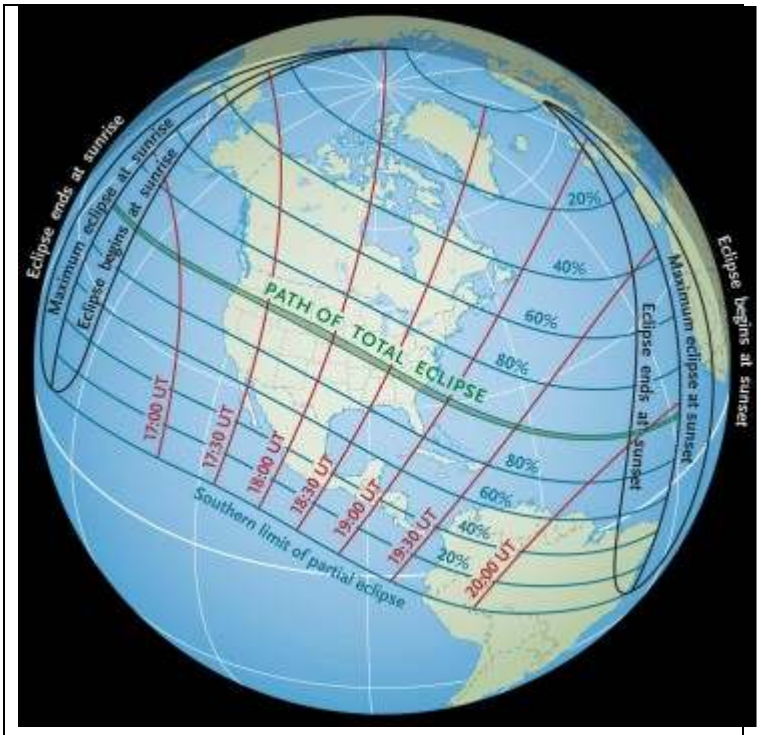
A PUBLICATION OF THE HUACHUCA ASTRONOMY CLUB

AUGUST 2016

PRESIDENT'S NOTES

HELLO HACERS!

It's August 2016, which means it is just one year from the first total solar eclipse to cross the entire continental U.S. since 1918. Oh sure, there was a total solar eclipse that crossed over Hawaii back in 1991 that you may have gone to see. And it was great, but viewers were constrained to a single north south road and the small town of Kailua-Kona. After that it made "landfall" in Mexico. This time the moon's shadow, seen on the above image, makes landfall on the Oregon coast, slices its way diagonally northwest to southeast for nearly 3,000 miles across the nation's heartland, darkening narrow corridors of twelve states before departing South Carolina and moving out into the Atlantic Ocean.



Map of 2017 Total Solar Eclipse Path Across North America
Source: "Planning for America's 2017 Solar Eclipse," Richard Tresch Fienberg, *Sky & Telescope*, August 26, 2016(http://www.skyandtelescope.com/astronomy-news/observing-news/planning-workshop-for-2017-solar-eclipse-082620155).
Sky & Telescope diagram by Fred Espenak.

Totality will begin about 10:16 a.m. Pacific Time in Oregon, in a mid-morning sky; while in the east the eclipse will occur in the late afternoon sky, and finish at 2:36 p.m. Eastern Time in South Carolina. But, how long does the shadow really take to cross the continent? It will take only 1h 33m 16.8s to cross the United States from coast to coast. The shadow will be racing across the earth faster than a commercial jetliner.

Now I'm not going to go through all the mechanics of a solar eclipse, but suffice it to say: there is only a narrow path from which to observe totality. That is, along that path, the appearance is that our sun's orb is completely covered by our moon's orb. Because the moon's orb, from our perspective, is slightly larger than the sun's, the path of totality has a width. In the case of this eclipse, the swath is about 200 miles wide through most of its travel. Therefore, the sweet spots to view the eclipse are along the center of this width -- called the eclipse's centerline. Any distance away from this centerline of shadow misaligns the two orbs, and less totality is experienced. This first manifests itself as shorter duration of totality.

Casper, Wyoming, is slightly north of centerline, and will have totality of 2m 26s, just one second less than the maximum along the exact centerline, but travel 50 miles further north and you lose about 30 seconds of totality. This may not seem like a lot but believe me it is. Viewed outside of the centerline path totality is replaced by partial coverage of the sun, a partial eclipse. That is what Sierra Vista will be getting, a partial eclipse that covers a little over half of the sun at the eclipse's maximum.

It's always a gamble trying to see a total eclipse. It's not only location, location, location; but weather, weather, weather, as well. This time, locations from which to view this eclipse are plentiful. But, will the weather cooperate where you've decided to go? Many of us have already picked spots after looking at climate generalizations and past weather outcomes. As we are locked in, we now can only hope for the best, and be ready to drive a hundred mile east or west if need be.

For those of you who want to head for that centerline but haven't yet built your trip and secured your lodgings, you now have another factor to worry about: where to find a room. Many of the cities along the path of totality have already fully capitalized on the eclipse frenzy. They are sold out. However, some major hotel chains available in the larger towns and cities, only open their reservations one

year in advance of a given date. This gives you at least a chance of still scoring rooms. Don't forget many more towns and cities with many hotel rooms will be out of totality but will be within a few hours travel to the centerline. You just have to be mobile on the important morning to guarantee you get a good spot from which to view. Scout it out first so there are no surprises. Oh, and did I mention (long lost) friends and family along the path? Maybe it's time to catch up with your aunt and uncle and the rest of the gang.

Lastly, being hardy Arizonans you've probably been raised on hardtack and are used to roughing it in your deluxe RV. Those might be good traits to remember when planning to see this eclipse. Flexibility will be a key factor, and there are still good chances that national, state, county, city parks, and fairgrounds in many states have openings along the path. For a wonderful write up of what's and where's along the path, I think there is no finer website than The Great American Eclipse, http://www.greatamericaneclipse.com/best-places-to-view/ , state by state all along the way is covered by maps and commentary including probable weather conditions. With all that information at hand the only question left is: what to take with you? We'll handle that later.

Welcome our new members

Jay Snelgrove of Bisbee joined the club at the June meeting. Grace Preston of Sierra Vista joined the club via our on-line application. Grace is our newest military member. Scott Vasey of Hereford also joined the club via our online application. Welcome, we are glad you joined!

At The August meeting

Dr. Wen-fai Fong of the Steward Observatory will give a talk entitled The Energetic World of Gamma-ray Bursts and Gravitational Waves

Dana Berry, SkyWorks Digital,

Gamma-ray bursts are the most energetic explosions in the Universe since the Big Bang itself. Decades of research suggest that these explosions are likely caused by the mergers of two neutron stars, or a neutron star and a black hole. In addition to gamma-ray bursts, these merging neutron stars are also expected to produce gravitational wave emission. Here, I introduce you to the exciting world of gamma-ray bursts and describe what it is like to study them. I also discuss the first detection of gravitational waves and prospects for the upcoming revolutionary era of gravitational wave discovery.

Wen-fai Fong grew up in a suburb outside of Rochester, NY. She received double Bachelor's degrees in Physics and Biology at the Massachusetts Institute of Technology in 2008, and earned her Ph.D. in Astronomy & Astrophysics from Harvard University in 2014, where she worked with Professor Edo Berger. For her dissertation research, she undertook a multi-wavelength observational campaign to uncover the elusive origin of short-duration gamma-ray bursts, a class of highly energetic cosmic explosions. The importance of this work was recognized by Harvard's 2014 Edward L. Fireman Fellowship for experimental astrophysics, and was the recipient of the 2016 American Physical Society Prize for Outstanding Doctoral Thesis in Astrophysics. She was subsequently awarded an Einstein Postdoctoral Fellowship, and started a position at the University of Arizona's Steward Observatory in 2014. There, she took advantage of the exceptional observational access to facilities ranging from 1- to 11-meters in diameter to continue unraveling the mysteries enshrouding cosmic explosions. In addition to research, Wen-fai is also passionate about mentoring. Recognizing the importance of her own mentors, Wen-fai has founded mentoring programs for graduate students at both Harvard and the University of Arizona.

We will treat Wen-fai and her guest, Patrick, to dinner at the Outback Steakhouse before the meeting. Members are invited to join us at the restaurant at 5 p.m. If you would like to participate, please RSVP to Ted Forte tedforte511@gmail.com

Patterson Observatory: OSIRIS REx Launch Party!

The launch window for the OSIRIS REx Asteroid Sample Return mission begins on September 8. If all goes well, the launch from the Kennedy Space Center will occur at 4:05 p.m. MST. This mission is managed out of the University of Arizona, Tucson and so has a great deal of local significance.

I hope many of you will be able to join us for a Launch Party at the Patterson Observatory. Mirroring the celebration at the UA Main campus, we will open the observatory at 2:30 p.m. There will be informative presentations and fun

activities leading up to the launch which we will stream live. Come share in the excitement and wish the OSIRIS REx team luck as this historic mission begins.

September 8th is also our regular Public Night, so, weather permitting, the fun will continue on through the evening.

Congratulations to Bruce Gary and Tom Kaye

Congratulations are in order for Bruce and Tom for their successful observing campaign and paper for the Monthly Notices of the Royal Astronomical Society (MNRAS) which entered the public domain on August 1.

The paper was titled: WD 1145+017 Photometric Observations During 8 Months of High Activity and lists the collaborating authors as B.L. Gary, S. Rappaport, T.G. Kaye, R. Alonso, F.-J. Hambsch. The paper is available on-line at http://arxiv.org/abs/1608.00026

This is the Zombie Star that Tom Kaye spoke to us about at our February 2016 meeting. You may have watched Tom's YouTube update which is available at https://www.youtube.com/watch?v=I38sdKCUd7g&feature=youtu.be

Bruce Gary explains the campaign and the results in layman's terms at his informative website: http://www.brucegary.net/zombie3/

Space Place Article — July 2016

Venus and Jupiter prepare for their close-up this August

By Ethan Siegel

As Earth speeds along in its annual journey around the Sun, it consistently overtakes the slower-orbiting outer planets, while the inner worlds catch up to and pass Earth periodically. Sometime after an outer world—particularly a slow-moving gas giant—gets passed by Earth, it appears to migrate closer and closer to the Sun, eventually appearing to slip behind it from our perspective. If you've been watching Jupiter this year, it's been doing exactly that, moving consistently from east to west and closer to the Sun ever since May 9th.

On the other hand, the inner worlds pass by Earth. They speed away from us, then slip behind the Sun from west to east, re-emerging in Earth's evening skies to the east of the Sun. Of all the planets visible from Earth, the two brightest are Venus and Jupiter, which experience a conjunction from our perspective only about once per year. Normally, Venus and Jupiter will appear separated by approximately 0.5º to 3º at closest approach. This is due to the fact that the Solar System's planets don't all orbit in the same perfect, two-dimensional plane.

But this summer, as Venus emerges from behind the Sun and begins catching up to Earth, Jupiter falls back toward the Sun, from Earth's perspective, at the same time. On August 27th, all three planets—Earth, Venus and Jupiter—will make nearly a perfectly straight line.

As a result, Venus and Jupiter, at 9:48 PM Universal time, will appear separated by only 4 arc-minutes, the closest conjunction of naked eye planets since the Venus/Saturn conjunction in 2006. Seen right next to one another, it's startling how much brighter Venus appears than Jupiter; at magnitude -3.80, Venus appears some eight times brighter than Jupiter, which is at magnitude -1.53.

Look to the western skies immediately after sunset on August 27th, and the two brightest planets of all—brighter than all the stars—will make a dazzling duo in the twilight sky. As soon as the sun is below the horizon, the pair will be about two fists (at arm's length) to the left of the sun's disappearance and about one fist above a flat horizon. You may need binoculars to find them initially and to separate them. Through a telescope, a large, gibbous Venus will appear no more distant from Jupiter than Callisto, its farthest Galilean satellite.

As a bonus, Mercury is nearby as well. At just 5º below and left of the Venus/Jupiter pair, Mercury achieved a distant conjunction with Venus less than 24 hours prior. In 2065, Venus will actually occult Jupiter, passing in front of the planet's disk. Until then, the only comparably close conjunctions between these two worlds occur in 2039 and 2056, meaning this one is worth some special effort—including traveling to get clear skies and a good horizon—to see!

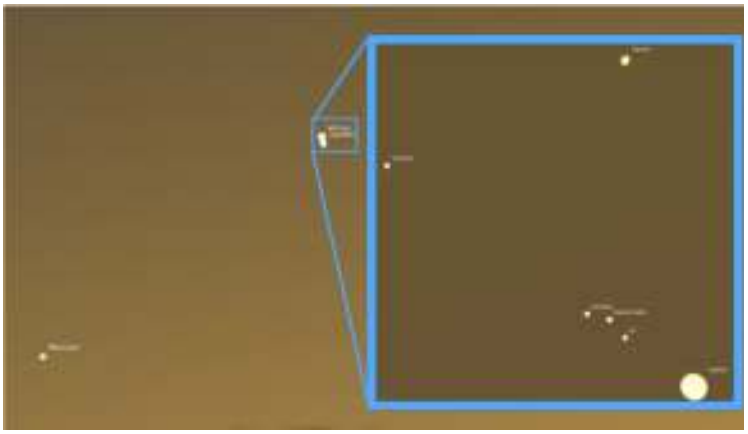


Image credit: E. Siegel, created with Stellarium, of a small section of the western skies as they will appear this August 27th just after sunset from the United States, with Venus and Jupiter separated by less than 6 arc-minutes as shown. Inset shows Venus and Jupiter as they'll appear through a very good amateur telescope, in the same field of view.

To teach kids more about Venus and Jupiter, visit the NASA Space Place webpages titled "All About Venus" [http://spaceplace.nasa.gov/all-about-venus/en/] and "All About Jupiter" [http://spaceplace.nasa.gov/all-about-jupiter/en/].

Patterson Observatory News

By Ted Forte

Thanks to our primary upgrade team, David Roemer, Rick Burke, Bert Kehler, and Ken Duncan, we are nearly ready to do spectroscopy at Patterson. The piggyback 8" SCT was hung today. We will have the capability to do spectroscopy through either the 8-inch (primary) or the 20-inch (alternate). The next step is to align the piggyback to the main scope and then get things focused and calibrated to put starlight into the spectrometer slit.

We will be encouraging members to get involved with the Patterson. Eventually, there will be training offered to qualify interested astronomers on the telescope operation, basic imaging and finally taking science measurements. We now will have the ability to do photometry and rudimentary spectroscopy simultaneously. Please let us know if you want to participate.

Want Ads

For sale: Meade 10" LX200 classic telescope

In very good condition, with tripod, 120v AC and 12v DC power converters with 25' power cords, dew shield, 8x50 finder scope, electric focuser, piggy back bracket, and soft sided carrying case.Also includes a set of Meade CCD color filters, Meade CCD 3.3 focal reducer and CCD variable T-adapter. Plus some other equipment. Asking $ 1,800.

Contact Bob Stroxtile at strox@ssvecnet.com or call 520-249-0875.

For Sale: Pier Tech electric telescoping pier with Lati-wedge made for the latitude of Sierra Vista

All the hardware, bolts, nuts, washers and plates are with the pier. Pier Tech can make new legs for it to make it correct for anywhere in the world. The pier and wedge have never been used and the only time the pier was out of the box was to take the photos. New today, the pier and wedge are $3,400. Asking $2,800.

Contact Bob Stroxtile at strox@ssvecnet.com or call 520-249-0875.

For Sale: Planewave CDK14 corrected Dall-Kirkham telescope.

Includes the OTA, new November 2014, optional truss rod shroud and optional upper dovetail and the accessories that were included with the telescope (primary to secondary spacing tool). There is NO FOCUSER (they do not come with one, you need to add one) but the adapter for an Optec TCFS3i (which is the focuser I used) is included. I also have the factory wooden shipping crate. The telescope has been in use every clear night in the observatory in Sonoita. This is an outstanding instrument and a great imaging scope.

FOR SALE: StellaCam

Also have a StellaCam II video camera with video to computer adapter to view on a computer monitor. $150.00.

Contact Bob Kepple at 520-366-0490, or Astrocards@aol.com.

FOR SALE: Meade Starfinder 8" Reflector Telescope

Will Sell at a very reasonable price. Included are a Telrad Finder, Filters, and additional Lenses.

Contact Mr. Jim Moses at (520) 803-0913 or by email jjmoses2@gmail.com

FOR SALE: Celestron Celestar 8 inch S/C Deluxe - $1200.

Will also sell pieces individually

Contact Rhonda and Terry Taylor at (520) 366-2378 or by email at twrl2@yahoo.com. Or See Craigslist at http://sierravista.craigslist.org/bar/4523742100.html

FOR SALE: Older Optical Guidance Systems 12.5" f/9 Ritchey-Chretian telescope.

Very good Paul Jones ceramic optics, Robofocus secondary focuser, will include Takahashi collimating telescope. Some of the images through the scope are at Mshadephotography.com.

Contact Mike J. Shade at mshade@q.com

FOR SALE: 8" Celestron Nex Star

Good condition with all original accessories.

Contact Mae Childs at maechilds2014@aol.com

Pictures from HAC Members

Perseids, August 12 – Jay LeBlanc

Orion – By Mike J. Shade

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HAC Aug/Sept Calendar of Events

SU	MO	TU	WE	TH	FR	SA
14 August Perseid Meteors	**15**	**16**	**17**	**18** **5:27AM**	**19** HAC Meeting Student Union Wen-fai	**20** Pallas Opposition
21	**22**	**23**	**24** **11:41PM**	**25**	**26**	**27**
28	**29**	**30**	**31**	**Sep 1** **5:03AM**	**2** Neptune Opposition	**3** Member Star party. TBD
4	**5** Labor Day	**6**	**7**	**8** **OSIRIS REx Launch Party** 2:30 PM Public Night 7PM	**9** **7:49AM**	**10**
11	**12**	**13**	**14**	**15**	**16** **3:05 PM** HAC Meeting Student Union Ted Forte	**17**
18	**19**	**20**	**21**	**22** Autumnal Equinox	**23** **5:56 AM**	**24**
25	**26**	**27**	**28**	**29**	**30** **8:11 PM** Patterson. Ft. Huachuca Souces Club	**1 October** Astronomy Day Kartchner Caverns SP 10A-10P
2	**3**	**4**	**5**	**6** Patterson Public Night 6:30 p.m.	**7** Draconid meteors	**8** Draconid meteors
9 **12:33 AM**	**10** Columbus Day	**11**	**12**	**13**	**14**	Huachuca Astronomy Club

All event times MST. Join Haclist to keep up to date with all of the Huachuca Astronomy Club events
Send an email to: haclist-subscribe@yahoogroups.com