AU AstroNews
The Newsletter of the Astronomical Unit

April 2016 **Sponsored by the Santa Barbara Museum of Natural History**

The Mirror-making workshop lights up the Broder Building on Tuesday evenings. Please join us! Photo: Tom Totton.

OUR APRIL MEETING

Our April General Meeting will take place on Friday, April 1st at 7PM. Our speaker this evening will be Sarah Greenstreet. Sarah is currently a joint postdoctoral fellow with Las Cumbres Observatory Global Telescope (LCOGT) and the University of California, Santa Barbara (UCSB). Sarah's talk is titled "Pluto and Beyond." She paraphrases her talk in the following: "The recent success of the New Horizons spacecraft's fly-through of the Pluto system has provided the public with spectacular images of the much loved 'dwarf planet'. These images and their accompanying data have opened the doors for scientists to study the geology, atmosphere, and history of Pluto and its moons in addition to the surrounding population of objects in the Kuiper belt like never before. I will talk about the discovery and history of our understanding of Pluto, including its demotion to 'dwarf planet' and its place in the Kuiper belt, as well as how our knowledge of the Pluto system is beginning to unfold as the images from New Horizons continue to be transmitted back to Earth. Part of that knowledge comes from determining the age of various portions of Pluto's surface based on how often impact craters are created by nearby Kuiper belt objects.

In other recent news, the implications of another planet possibly existing in the far outer reaches of our Solar System has piqued the interest of scientists and the public alike. I will briefly describe the context of these implications based on a specific group of objects in the Kuiper belt and what search efforts are being made to find it."

OUTREACH REPORT

Since the last newsletter, AU volunteers Tim Crawford, Zak Dafaallah, Joe Doyle, John Duncan, Mike Farris, Jürgen Hilmer, Sean Kelly, Ken Kihlstrom, Chris Larson, Pat & Chuck McPartlin, Janet & Martin Meza, Kim Miller, Bruce Murdock, Max Neufeldt, Edgar Ocampo, Javier Rivera & his Quasars, Colin Taylor, Tom Totton, Tom Whittemore, Jerry Wilson, and Paul Winn showed cool stuff in the sky to ***1753*** people.

APRIL OUTREACH EVENTS

It's April, and it's getting dark later, but don't hesitate to join us. We even have a couple of daytime solar events. Here are the AU outreaches scheduled so far. To get the latest information on schedules, or directions, just contact Chuck at 964-8201 or macpuzl@west.net

FRIDAY, APRIL 1, 7 PM

Monthly AU meeting in Farrand Hall at SBMNH. Start with a short planetarium show, then hear a talk by Dr. Sarah Greenstreet of LCOGT about Pluto and Beyond - the Kuiper Belt and Planet Nine.

SATURDAY, APRIL 2, ALL NIGHT

Messier Marathon at the Gun Club.

TUESDAY, APRIL 5, SETUP 7:30 PM

Telescopes for campers from Garden Street Academy at El Capitan Canyon Resort. Let Chuck know if you're coming so he can get you on the entry list.

SATURDAY, APRIL 9, 5:00 PM

AU planning meeting in the classroom outside Javier's office at SBMNH.

SATURDAY, APRIL 9, 7:00 PM TO 10 PM
Monthly Public Star Party at the Santa Barbara Museum of Natural History.

MONDAY, APRIL 11, 9 AM
Hear the AU with Baron Ron Herron on KZSB Radio 1290 AM.

TUESDAY, APRIL 12, SETUP 7 PM
Telescope Tuesday at the Camino Real Marketplace in Goleta, in the plaza by the theater.

THURSDAY, APRIL 14, SETUP 4 PM
Telescopes for Science Night (5-7:30) at Vieja Valley School, at 434 Nogal Drive, Santa Barbara. It'll never get dark, but we can get the Moon and maybe Jupiter.

FRIDAY, APRIL 15, 7:30 PM
Monthly Public Telescope Night at the Westmont observatory, next to the baseball field.

SATURDAY, APRIL 16, SETUP 10 AM
Solar scopes for Earth Day at Alameda Park in Santa Barbara, in the Sports and Recreation zone, bordering Santa Barbara Street.

THURSDAY, APRIL 21, SETUP 5 PM
Telescopes for Science Night (6-8) at Aliso School, 4545 Carpinteria Avenue in Carpinteria.

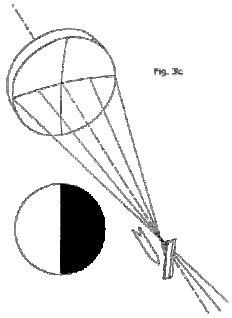
SATURDAY, APRIL 23, SETUP 10 AM
Solar scopes for Earth Day at Los Flores Ranch Park, 6245 Dominion Road in Santa Maria.

MONDAY, APRIL 25, 9 AM
Hear the AU with Baron Ron Herron on KZSB Radio 1290 AM.

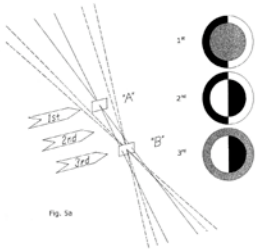
FOR SALE!
Ocular Industries is proud to announce our latest cutting-edge accessory for amateur astronomers - the **H**enryk **O**cular **G**ravitational **W**ave **A**daptive **R**eal **T**ime **S**ystem. Our patented device contains two orbiting BB-sized black holes, and works like an adaptive optics system, but for gravitational waves. Turn it on, and it forms a spherical bubble of dead calm space-time to shield you and your telescope from bothersome ripples in the fabric of the cosmos. ***ONLY $19.99!!*** ***ORDER ONE TODAY AT 1-800-HOGWARTS. DUE TO THE MASS OF THIS ITEM, A SHIPPING CHARGE OF $500,000 APPLIES.***

From the Workshop...
The Foucault Knife-edge Test: Part I
Tim Crawford

In our last installment we discussed a qualitative test for our precision mirror. This was, of course, the Ronchi Test. Now we need to have a quantitative test. This is where we enter the world of shadows! Consider the photo below on the left. It was taken at our Tuesday workshop. Notice how the mirror exhibits alternating patterns of shadows and light that complement one another. For example, the left edge of the mirror shows a clear sheen whereas the right edge of the mirror exhibits a dark half-ring. Likewise, the central sections of the mirror broadcast a similar "Yin-Yang" pattern of light and dark although here it is a bit more subtle. Not surprisingly our light source still lies at the radius of curvature of our mirror just as in the case of the Ronchi test. What is different is how we "cut" the returning light. In the Foucault Test, we use a razor blade edge – a knife-edge. Our returning light is snipped in half! And, as we advance or retreat the knife-edge, we are able to sample different areas of our mirror. We are able to diagnose small changes in curvature of our mirror!

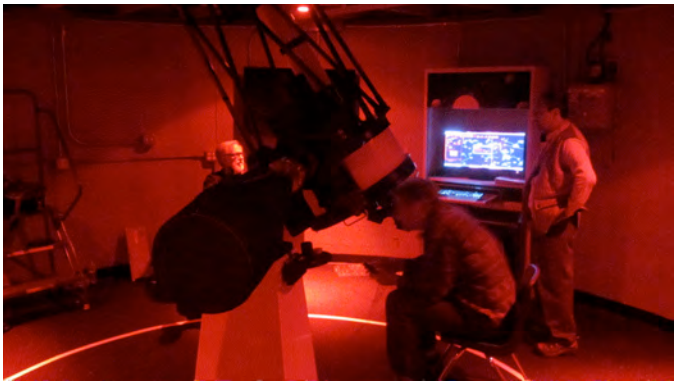


Here's how it works. In the diagram to the right, light emanates from a point-like source, strikes our mirror and returns as a bundle of rays near the source. Notice that all rays return to the source and start to spread out behind the source. We cut this light with a knife-edge which moves left-to-right. Thus, half of this light is cut off and this is the light coming from the right side of the mirror. So, what we see is a blackened image from the right side of the mirror. The left side is still bright since this light is not blocked off. You can imagine that if we were to position the knife to intercept the returning light on the other side of convergence, we would see the opposite. We would see the left half of our mirror in darkness. And the right side would be bright.



Above is a more-detailed look at what's going on. In this figure we see lines (reflected light coming from the top) converging to a point at "A" crossing and spreading as we move away from that point and crossing at a second point "B." The light is coming from different areas (or zones) of our mirror. At "A" the light is being reflected from the center of the mirror. At "B" the light is coming from the outer zones of our mirror. What the tester would see is the series of images to the right in the figure. These correspond to cutting the returning light at the 1st, 2nd, and 3rd knife-edge locations. At the 1st position the light coming from the central region of our mirror is "nulled" and thus appears grey. All the light from the center is blocked! On the other hand, the 3rd position shows what happens when the knife-edge is positioned to exclude light from the edge of our mirror. The light is "nulled" here and therefore the outer ring of our mirror appears grey.

These "doughnuts" will eventually find their way into the mathematical analysis of our precision mirror. It is the genius of Leon Foucault, who invented this technique of measuring the shape of a mirror by noting the locations of these shadows. The details in these shadow-locations guide our analysis in every Tuesday evening workshop!



Jerry Wilson and Paul Winn work on the SBMNH's new scope. Photo credit: Tom Totton.

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April 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 SBAU General Meeting 7PM	2 SBAU Messier Marathon All Night at the Gun Club
3	4	5 El Capitan Canyon Resort 7:30PM	6	7	8	9 Planning Meeting 5 PM Star Party 7-10 PM SBMNH
10	11 Tech Talk KZSB (AM 1290) 9-10AM	12 Camino Real Marketplace 7PM	13	14 Vieja Valley School 4PM	15 Westmont College 7:30PM	16 Alameda Park 10AM
17	18	19	20	21 Aliso School 5PM	22	23 Los Flores Ranch 10AM
24	25 Tech Talk KZSB (AM 1290) 9-10AM	26	27	28	29	30

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