AU AstroNews

The Newsletter of the Astronomical Unit

June 2014 **Sponsored by the Santa Barbara Museum of Natural History**

Eric Wilson shows off his prize, an Orion Starblast telescope, at this year's Astronomy Day at the Camino Real Marketplace. Photo: T. Totton.

OUTREACH SUMMARY

A big **THANK YOU**! to all the volunteers who helped out at Astronomy Day this year! Since the last AU newsletter, volunteers Angela Bates, John Boyd, Marciano Chan, Tim Crawford, Joe Doyle, Nancy Emerson, Mike Farris, Tony Galván, Sam Goodwin, Ruben Gutierrez, Art Harris, Jürgen Hilmer, Chris Larson, Zanna Lucy, Janet & Martin Meza, Pat & Chuck McPartlin, Bonnie & Bruce Murdock, Max Neufeldt, Edgar Ocampo, Bob Richard, Javier Rivera & his Quasars, Colin Taylor, Tom Totton, Chris Ulivo, Tom Whittemore, Jim Williams, Paul Winn, Tim Wittenburg, and Linda & Harold Yarbrough shared astronomy with ***1545*** people.

OUTREACH FOR JUNE

Here are the AU events scheduled so far for June. Events are subject to change, so to get the latest information on schedules, or directions, just contact Chuck at 964-8201 or macpuzl@west.net

TUESDAY, JUNE 3, SETUP 7:15 PM

Telescopes for an astronomy night at Ventura Charter School, 2060 Cameron Street in Ventura off Route 33, on the campus of DeAnza Middle School. Streets are 101 to 33 to Stanley to Ventura to DeAnza to Cameron. Drive past the tennis courts and baseball fields on the right and at the end is a gate in the left that leads out onto the basketball courts.

SATURDAY, JUNE 7, SETUP 8 PM

Telescopes for Refugio State Beach, in the day use parking lot, southwest corner.

MONDAY, JUNE 9, SETUP 8 PM

Telescopes for SB Swim Club members at the Westmont Observatory, next to the baseball field.

TUESDAY, JUNE 10, SETUP 7 PM

Telescope Tuesday at the Camino Real Marketplace in Goleta. We set up in the plaza by the theater.

THURSDAY, JUNE 12, SETUP 8 PM

Telescopes for Bacara Resort and Spa. We set up on the Miro Lawn, on the bluff overlooking the ocean. Contact Chuck for access if you haven't come before.

FRIDAY, JUNE 13, 6 PM - NOT FIRST FRIDAY

Annual AU potluck picnic at the Macveagh House at SBMNH, adjacent to the observatory.

SATURDAY, JUNE 14, 6 PM

Planning meeting in the classroom next to Javier's office at SBMNH. Come plan your club's activities. All are welcome.

SATURDAY, JUNE 14, 8 PM
Monthly Public Star Party, next to Palmer Observatory at SBMNH.

THURSDAY, JUNE 19, SETUP 8 PM
Telescopes for Bacara Resort and Spa. We set up on the Miro Lawn, on the bluff overlooking the ocean.

FRIDAY, JUNE 20, 8 PM
Monthly Public Telescope Night at Westmont College, at their observatory, next to the baseball field.

SATURDAY, JUNE 21, 03:51 AM
SUMMER SOLSTICE!

SATURDAY, JUNE 21, SETUP 8 PM
Telescopes for Cachuma Lake campground. We set up on the grassy field at Dakota Plains.

TUESDAY, JUNE 24, SETUP 8 PM
Slide show and scopes for Carpinteria State Beach. We set up on the bike path near the ranger station.

THURSDAY, JUNE 26, SETUP 8 PM
Telescopes for Bacara Resort and Spa. We set up on the Miro Lawn, on the bluff overlooking the ocean.

SATURDAY, JUNE 28, SETUP 8 PM
Telescopes for campers at Lopez Lake, up by Arroyo Grande. Contact Chuck if you're planning to come, so we can arrange camping for Friday and Saturday night.

SO YOU WANT TO PHOTOGRAPH THE STARS – Part III?

Dr. Bob Richard.

Let's hang a camera on the end of a telescope and see what we come up with. But before we do this, we need to be aware of some very important optical characteristics of the telescope that will help determine length of exposure, field of view, and resolution. Making these determinations is directly involved with the focal ratio. The focal ratio of any particular telescope is the focal length of the mirror or objective lens divided by the aperture. Thus, an 8-inch telescope with a focal ratio of 80 inches is operating at F/10. The following applies to all telescopes, regardless of aperture: The lower the focal ratio number, the shorter the exposure time for any given image, the wider the field of view, and the lower the resolution. Knowing these simple relationships will help the budding astrophotographer to make the correct choice about what focal ratio to use when photographing various objects. So, if you are interested in photographing the moon or planets, a higher focal ratio is in order, say at least F/10, which may be increased by a Barlow lens to F/20 or F/30. These focal ratios allow for greater resolution which is needed for lunar and planetary imaging. Length of exposure is not a big concern here because these objects are relatively bright. But if your interest turns toward photographing fainter deep-sky objects like nebulae, star clusters, and galaxies, a lower F-ratio between F/2 and F/8 is needed. These F-ratios allow for a wider field of view and most importantly dramatically cut down on exposure times compared to F/10 or above. An important rule of thumb I use in making a decision about F-ratios is to choose one that will allow the fastest exposure to get the job done. The shorter the exposure the less likely errors, such as tracking, meteors, airplanes, electronic camera noise, and air turbulence, will be introduced into the images. My motto: Keep it short for best results!

"Not sure that I can use this. Do you have one with the Arp Catalog on it?" Photo: T. Totton.

From the Workshop...

Tim Crawford

Let's review briefly. We have a tool and a blank that will ultimately become a mirror for our reflecting telescope. We would like our blank to end up an 8", f/6, mirror. This translates to a focal length of 48" and a radius of curvature of 96". At this point we are using 60 or 80 grit silicon carbide to grind our blank to the desired focal length. Our mental state at this stage is optimistic: (1) this blank

will become a fine mirror that we will place in a great telescope, and (2) any errors at this point can be redone. How do we know when we have reached focal length? Recall in workshop #4 we used a basic equation to find the depth of our curve of our mirror: $s = \frac{r^2}{2R}$ Using this equation our 8" mirror will have a Sagitta at its center of .083" Conveniently, this depth at the mirror's center may be approximated by the thickness of a drill bit resting under a straight edge. As an example, a 5/64" drill bit has a thickness of .078". Although this drill bit is a "bit" undersized, it can still be used as a crude guide to tell us when to stop grinding since we are near the desired focal length of our mirror. When this depth is reached, a straight edge will easily slide over the bit without rocking. This is a good mechanical test. But we need a test that is a little more precise. We need some kind of optical test. Consider the following.

Wet the surface of the mirror, and go outside when the sun is reasonably high in the sky. Reflect the sunlight onto a surface and watch the image that your "mirror" makes. As you move your mirror toward and away from the surface you will see a spot that becomes larger or smaller. Stop when you see the smallest spot. Measure the distance from your mirror to the surface. Since the sun is essentially an infinite distance away, you have just determined your mirror's focal length to a precision of an inch or two from the desired target of 48". Until we bench test your polished mirror, this is one of the best ways to estimate your mirror's focal length!

Once you achieve your desired focal length, reverse the roles of the tool and the mirror in order to maintain your mirror's focal length. With the mirror on top (MOT) you affect the center depth of the mirror. Working with this positioning will tend to preferentially deepen the center of the mirror, and thus shorten the focal length of the mirror. When the tool is on top (TOT), the mirror's focal length is increased. Alternating the two positions allows us to (1) maintain the desired focal length and (2) smooth out any aberrations on the mirror's surface that do not conform to a sphere.

We will use this technique all the way through our list of finer and finer abrasives. Our mirror will become smoother and smoother as it becomes more and more spherical. Ultimately we will move to Aluminum Oxide, a lapping powder, in order to smooth our mirror even further. But, even after this fine course of material, our mirror will still not reflect light when it is dry. In future issues I will discuss polishing and figuring your mirror and the tests we use in the workshop to determine the quality of your mirror.

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June 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3 VENTURA CHARTER SCHOOL 7:15PM	4	5 ◐	6	7 REFUGIO STATE BEACH 8PM
8	9 SB SWIM CLUB AT WESTMONT 8PM	10 CAMINO REAL MARKETPLACE 7PM	11	12 BACARA RESORT ○ 8PM	13 AU POTLUCK MACVEAGH HOUSE 6PM	14 PLANNING MEETING 6PM STAR PARTY 8PM SBMNH
15	16	17	18 ◑	19 BACARA RESORT 8PM	20 WESTMONT COLLEGE 8PM	21 CACHUMA LAKE 8PM SUMMER SOLSTICE!
22	23	24 CARPINTERIA STATE BEACH 8PM	25	26 BACARA RESORT 8PM	27 ●	28 LOPEZ LAKE 8PM
29	30					

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