AU AstroNews

The Newsletter of the Astronomical Unit

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

Moonlight and scopes at the Bacara. Photo: Tom Totton.

The August General Meeting

Todd Boroson from the Las Cumbres Observatory will give a general talk on this global network of telescopes. In Todd's own words: "Right here in Goleta is the headquarters of an observatory that is unique in the world. Las Cumbres Observatory, a non-profit corporation, has built the largest and most complete observatory designed and operated for time domain astronomy - the technique of using temporal changes to learn about the physics of the universe. Being able to study objects that change in brightness, position in the sky, spectral properties gives us the capability to do research in a lot of interesting areas - cosmology, exoplanets, potentially hazardous asteroids, etc. This talk will cover the whole story, from conception, through design and construction, into full operation, and plans for the future. The scientific results, particularly those that highlight the unique capabilities of the network, are exciting, but equally impressive are the engineering (hardware and software) problems that had to be solved, and the development of an operational plan for this unusual facility."

Outreach Summary

Since the last newsletter, AU volunteers Angela Bates, Tim Crawford, Coni Edick & Joe Doyle, Susan Jackson & John Edkins, Mike Farris & Koko, Ruben Gutierrez, Art Harris, Sean Kelly, Ken Kihlstrom, Chris Larson, Zanna Lucy, Stephanie Mapes, Pat & Chuck McPartlin, Janet & Martin Meza, Bonnie & Bruce Murdock, Max Neufeldt, Edgar Ocampo, Javier Rivera & the Quasars, Tim Rodgers, Diane & Russell Ruiz, Wayne Ryther, Gary Schneider, Colin Taylor, Cez & Tom Totton, Chris Ulivo, Claudio Vasquez, Tom Whittemore, Patricia & Jerry Wilson, and Linda & Harold Yarbrough showed cool astronomy stuff to 1530 visitors.

August Outreach Events

The Telescope Workshop meets on Tuesday evenings at 7:30 PM at the Broder Building at SBMNH. Contact Tim Crawford at tcrawf3@cox.net for information. Listen to the AU on the radio at KZSB 1290 AM at 9 AM on the second and fourth Monday of each month.

Wednesday, August 3, setup 7:30 PM

Star party for students from the Music Academy of the West at the Westmont Observatory, next to the baseball field.

Thursday, August 4, setup 7 PM

Telescopes for Bacara Resort and Spa. We set up on the lawn overlooking the ocean at the south edge of the main parking lot.

Friday, August 5, 7 PM

AU monthly meeting in Farrand Hall at SBMNH. Dr. Todd Boroson will speak about the status of the LCOGT network.

Saturday, August 6, setup 8 PM

Slide show and telescopes for campers at Cachuma Lake Campground. We set up on the field at Dakota Plains.

Tuesday, August 9, setup 7 PM

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

WEDNESDAY, AUGUST 10, SETUP 8 PM
Slide show and scopes for Carpinteria State Beach. We set up on the sidewalk toward the ocean from the entry kiosk.

THURSDAY, AUGUST 11, SETUP 7 PM
Telescopes for Bacara Resort and Spa. We set up on the lawn overlooking the ocean at the south edge of the main parking lot.

FRIDAY, AUGUST 12, SETUP 7 PM
Telescopes for Refugio Beach State Campground, in the day use parking lot, southwest corner.

SATURDAY, AUGUST 13, 6 PM
Planning meeting in the classroom next to Javier's office at SBMNH. Come plan your club's activities. All are welcome.

SATURDAY, AUGUST 13, 8 PM
Monthly Public Star Party, next to Palmer Observatory at SBMNH.

THURSDAY, AUGUST 18, SETUP 7 PM
Telescopes for Bacara Resort and Spa. We set up on the lawn overlooking the ocean at the south edge of the main parking lot.

FRIDAY, AUGUST 19, SETUP 7:30 PM
Monthly Public Telescope Night at Westmont College Observatory, next to the baseball field.

SATURDAY, AUGUST 20, SETUP 8 PM
Slide show and telescopes for campers at Cachuma Lake Campground. We set up on the field at Dakota Plains.

THURSDAY, AUGUST 25, SETUP 7 PM
Telescopes for Bacara Resort and Spa. We set up on the lawn overlooking the ocean at the south edge of the main parking lot.

FRIDAY, AUGUST 26, SETUP 7 PM
Telescopes for Refugio Beach State Campground, in the day use parking lot, southwest corner.

SATURDAY, AUGUST 27, SETUP 8 PM
Slide show and telescopes for campers at Cachuma Lake Campground. We set up on the field at Dakota Plains.

"No kidding, Bruce? A watch that keeps Sidereal Time?" Photo: Tom Totton.

What's up with Orbits – Part II

Jerry Wilson

Continuing in our discussion of orbits, let's look at two orbits.

An object, let's say a golf ball, in low earth orbit, say about 200 miles above the Earth's surface. This scenario is not that extraordinary, considering how I play golf. So this golf ball, in order to stay in orbit, needs to be moving sideways at about 17,500 miles per hour. At this speed, it will go around the Earth in about 90 minutes. We have a history of golf mishaps in our family. My once teenage daughter broke her leg putting. But, enough of golf. Let's consider two golf balls in orbit very close to each other, but separated vertically. One golf ball is one foot higher than the other, and they are connected together only by their mutual gravitational attraction; a connection that is vanishingly small. They are each in their own separate orbit. They each have a slightly different speed, and hence orbital period. The lower one will pass the upper one, so that after one orbit the 200 mile high one will be ahead of the 200 mile plus one foot high one. Being in two separate orbits acts on these golf balls like a force pulling them apart.

In a more complicated case, if we have a ball of gravel in orbit, held together only by its self gravitation, then there will be the same two forces competing with each other. These are the self gravity holding the ball together and the varied pulls of the individual orbits forcing it apart. The pull of the individual orbits is called a Tidal Force. Which one wins is determined by the altitude of the gravel ball's orbit. Above a certain altitude, the tidal force pulling the object apart will lose, and the ball will stay together as one object. But below that altitude, the multiplicity of orbits of the gravel pieces will be

a stronger force, and the ball will spread out into a ring around the planet. The critical altitude where the tidal and cohesive forces just balance is called the Roche Limit. It was first calculated by Edouard Roche in 1848.

Just outside the Roche Limit, the effect of multiple orbits is strong enough to make individual gravel pieces move a bit and adjust their position, but not strong enough to actually tear the ball apart. In this case the object is internally heated by the friction of the gravel pieces continually adjusting their positions.

Now of course, this limit doesn't hold for an object held together by forces other than gravity. If we had glued each piece of gravel into the ball, then the tensile force of the glue would allow the object to orbit much closer without coming apart.

CalStar on the Horizon...
A letter from the director of CalStar, Charles Wicks:

Greetings,

I'm pleased to inform you that CalStar registration is now open. Space is limited, so register early to ensure your attendance. There will be no registration at the gate. You must pre-register online to attend. Please go to the website (http://calstar.observers.org/) and follow the link to the registration page, and complete the registration process.

Thanks,

Charlie

AU Information Box

President: Tom Totton
president@sbau.org

Vice President: Jerry Wilson 968-4056
jerryawilsonphd@gmail.com

Secretary: Adrian Lopez, Adrian Conrad
secretary@sbau.org

Treasurer: Colin Taylor 967-8140
dancingmagpie@cox.net

Equipment: Art Harris 968-4017
n6is@cox.net

Outreach: Chuck McPartlin 964-8201
outreach@sbau.org

Newsletter: Tom Whittemore 687-2025
kometes@aol.com

Refreshments: Janet & Martin Meza 450-8383
AguilarPerryMeza@gmail.com

Webmaster: Paul Winn 886-2319
webmaster@sbau.org

SBMNH Astronomy Programs Manager
Javier Rivera 682-4711x173
jrivera@sbnature2.org

AU AstroNews, the monthly publication of the **Astronomical Unit (AU)**, is mailed to the AU membership. For publishing consideration for the next month, submit astronomical items by the 20th of the current month!

AU annual membership rates:
Single = $20 Family = $25

AU mailing address:
Astronomical Unit
c/o Santa Barbara Museum of Natural History
2559 Puesta Del Sol Road
Santa Barbara, CA 93105-2998
On the Web: http://www.sbau.org

August 2016						
Sunday	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
	1	2	3 Star Party for MAW Students at Westmont 7:30PM	4 Bacara Resort 7PM	5 AU General Meeting 7PM	6 Cachuma Lake 8PM
7	8 Tech Talk KZSB (AM 1290) 9-10AM	9 Camino Real Marketplace 7PM	10 Carpinteria State Beach 8PM	11 Bacara Resort 7PM	12 Refugio State Beach 7PM	13 Planning Meeting 6PM Star Party 8PM SBMNH
14	15	16	17	18 Bacara Resort 7PM	19 Westmont College 7:30PM	20 Cachuma Lake 8PM
21	22 Tech Talk KZSB (AM 1290) 9-10AM	23	24	25 Bacara Resort 7PM	26 Refugio State Beach 7PM	27 Cachuma Lake 8PM
28	29	30	31			

The Astronomical Unit
c/o Santa Barbara Museum of Natural History
2559 Puesta Del Sol Road
Santa Barbara, CA 93105-2998