



AU AstroNews

The Newsletter of the Astronomical Unit

November 2019

Sponsored by the Santa Barbara Museum of Natural History



Tim Crawford guides the small hands of a future mirror-maker at the Marymount Maker Fair. Photo credit: Tom Whittemore.

NOVEMBER GENERAL MEETING

Our November meeting will host a talk by Physics Professor Jean Carlson of UCSB. Jean heads the Complex Systems group at UCSB which investigates robustness, tradeoffs, and feedback in complex, highly connected systems, and develops multi-scale models to capture important small-scale details and predict large-scale behavior. She is a co-organizer of the Network Architectures of Brain Structures and Functions, and the Physics of Climate Change Program at the Kavli Institute for Theoretical Physics at UCSB.

OUTREACH SUMMARY

Since the last newsletter, AU outreaches Brandy Ackerman, Zoe & Winslow Barnwood, Raf Cottom, Tim Crawford, Tessa Flanagan & Duff Kennedy, Art Harris, Baron Ron Herron, Sean Kelly, Ken Kihlstrom, Chris Larson, Alyssa Lindsey, Pat & Chuck McPartlin, Janet & Martin Meza, Bonnie & Bruce Murdock, Edgar Ocampo, Ray Ogella, Peggy O'Rork, Javier Rivera, Diane & Russell Ruiz, David Salvia, Charles Schueler, Cez & Tom Totton, Matt Walton, Tom Whittemore, Pat Forgey & Jerry Wilson, and Andre Yew showed the night sky to 1093 astronomy tourists.

NOVEMBER OUTREACH EVENTS

Note that the meeting will not be in Farrand Auditorium this month!

Here are the AU events scheduled so far for November. 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

The Telescope Workshop meets most 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. Here are the events scheduled so far for the month.

FRIDAY, NOVEMBER 1, 7 PM *** NOTE CHANGE OF VENUE ***

Monthly AU meeting in Gladwin Planetarium at SBMNH. Hear about the complexities of wildfires and disasters.

SATURDAY, NOVEMBER 2, SETUP 6 PM

Telescopes for the Ritz-Carlton Bacara. We set up on the bluff lawn next to the Angel Oak restaurant.

SUNDAY, NOVEMBER 3 - DAYLIGHT SAVING TIME ENDS!

MONDAY, NOVEMBER 4, SETUP 5:30 PM

Telescopes for Science Night at Coastline Christian Academy, 5950 Cathedral Oaks in Goleta.

THURSDAY, NOVEMBER 7, SETUP 5 PM

Telescopes for a Hope School 5th graders, 3970 La Colina in Santa Barbara. We set up on the blacktop around back.

FRIDAY, NOVEMBER 8, SETUP 6 PM

Telescopes for the Ritz-Carlton Bacara. We set up on the bluff lawn next to the Angel Oak restaurant.

SATURDAY, NOVEMBER 9, 5 PM

AU Planning Meeting in the classroom outside Javier's office at SBMNH. Come help plan your club's activities.

SATURDAY, NOVEMBER 9, 7 PM

Monthly Public Star Party at SBMNH. Bring a scope and have fun showing goodies in the sky outside Palmer Observatory, or just show up and enjoy looking at them.

MONDAY, NOVEMBER 11, 7:30 TO 10:30 AM

Set up at Camino Real Marketplace with safely filtered solar telescopes to observe the **Transit of Mercury**. If you miss this one, your next chance for seeing a transit of Mercury from Santa Barbara won't occur until May 7, 2049.

TUESDAY, NOVEMBER 12, SETUP 7 PM

Telescope Tuesday at the Camino Real Marketplace in Goleta. We set up in the plaza by the theater. Pat & Chuck can't make it, so please help out if you can!

FRIDAY, NOVEMBER 15, SETUP 6:30 PM

Monthly Public Telescope Night at Westmont College, at the observatory, next to the baseball field.

SATURDAY, NOVEMBER 16, SETUP 5:30 PM

Telescopes for the Ritz-Carlton Bacara. We will set up on the Ocean Lawn next to the Bistro restaurant. Carts will be available to transport equipment from the parking lot.

FRIDAY, NOVEMBER 22, SETUP 6 PM

Telescopes for the Ritz-Carlton Bacara. We set up on the bluff lawn next to the Angel Oak restaurant.

SATURDAY, NOVEMBER 23, SETUP 5 PM

Telescopes for a star party at Los Flores Ranch Park, in Santa Maria at 6245 Dominion Road. Setup entrance (with signs) will be up Dominion a bit north of the main entrance. Dark skies!

FRIDAY, NOVEMBER 29, SETUP 6 PM

Telescopes for the Ritz-Carlton Bacara. We set up on the bluff lawn next to the Angel Oak restaurant.

From the President

Jerry Wilson

As reported in Sky & Telescope's November 2019 issue, page 10, the mystery of the Hubble "constant" and the history of the universe deepen.

To the disagreement between the previous two values, a new measurement has contributed a third value that adds to the confusion. Each of the three different values is based on a separate candle. Candle, of course, refers to a light source that can be used to indicate distance. Distance measurements in astronomy start with stellar parallax of the nearer stars. Some of the nearer stars, including Polaris, are a type of variable star called a Cepheid variable. Using parallax, a relationship between variability period and absolute luminosity was worked out. So measurement of the variable's period gives us the absolute luminosity which is compared to its apparent brightness and *voilà!*, we know the distance. It was Edwin Hubble's identification of Cepheid variables in images of the Andromeda Galaxy that resolved the issue of the nature of galaxies. This method works up to distances where individual stars can no longer be resolved.

The Cosmic Microwave Background (CMB) is also used as a standard candle to measure expansion of the very early universe. The CMB is displayed as an ellipse representing fluctuations of emissions from the whole sky at the time the universe became clear. These fluctuations are of a distribution of sizes, also known as spatial frequency spectrum. The "Standard Model" is used to calculate the Hubble constant from this frequency distribution. The value obtained does not match the Cepheid result. It can be made to match if the Standard Model is modified, but that would mean new physics.

Now a study of red giants that have just switched from hydrogen to helium burning has been used to give a second opinion on galaxy distances. The study was done by Wendy Freedman's team at the University of Chicago.

These different methods for different ranges of distance are also measurements of the universe's expansion at different times in history. The CMB is the earliest at 300,000 years.

Each of the three measurement candles, CMB (66.9 to 67.9 km/sec/Mpc), red giants (67.9 to 71.7 km/sec/Mpc), and Cepheids (73 to 76km/sec/Mpc), gives a different value with sufficient accuracy to exclude both of the other two. The options are: there's still something wrong with the measurements; we need new physics; or the Hubble constant ain't constant.



“Whew! I thought my 40” Dobsonian would never arrive!”
Photo credit: Tom Totton.

Arcturus

Tom Whittimore

This is the time of year where you can enjoy watching certain stars set in the northwest and watch them rise again the next morning in the northeast. One of my favorites from this elite group is Arcturus, the brightest star in Boötes, the Herdsman. This “keeper of the Bear” is a beautiful red giant that played a role in early technology. The light of Arcturus is so bright that the star was used to help open the Chicago World's Fair in 1933. At 9:15 p.m. Central Time on May 27, 1933, telescopes focused the star's light on several photoelectric cells. The electric current from the star-powered photocells [was used to flip a switch that turned on the floodlights](#) at the exhibition grounds. Years later, measurements refined the distance to Arcturus as 37 light-years away from Earth. So, the light that was used at the Chicago's World Fair actually began its journey to Earth in 1896, not in 1893.



Drawing above taken from “Astronomy Trek.”

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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

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November 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 GENERAL MEETING 7PM	2 RITZ-CARLTON BACARA 6PM
3 DST ENDS!	4 COASTLINE CHRISTIAN 5:30PM	5	6	7 HOPE SCHOOL 5PM	8 RITZ-CARLTON BACARA 6PM	9 PLANNING MEETING 5PM SBMNH STAR PARTY 7PM
10	11 TRANSIT OF MERCURY 7:30-10:30 AM TECH TALK KZSB (AM 1290) 9-10 AM	12 CAMINO REAL MARKETPLACE 7PM	13	14	15 WESTMONT COLLEGE 6:30PM	16 RITZ-CARLTON BACARA 5:30PM
17	18	19	20	21	22 RITZ-CARLTON BACARA 6PM	23 LOS FLORES RANCH PARK 5PM
24	25 TECH TALK KZSB (AM 1290) 9-10 AM	26	27	28	29	30 RITZ-CARLTON BACARA 6PM