



# AU AstroNews

The Newsletter of the Astronomical Unit

December 2017

Sponsored by the Santa Barbara Museum of Natural History



“Thanks, Art. It is easier to align my scope with your shirt buttons!” Photo credit: Tom Totton.

## THE DECEMBER GENERAL MEETING

December is Election and Members’ Night when we approve of our officers for the coming year. If you arrive by 7 PM sharp, you can enjoy a short Gladwin Planetarium show. The meeting starts at 7:30 PM.

## OUTREACH REPORT

Since the last newsletter, AU outreachies Peter Angeloff, Farshad Barman, Mike Chibnik, Krissie Cook, Tim Crawford, John Edkins, Tessa Flanagan, Art Harris, Baron Ron Heron, Jürgen Hilmer, Sean Kelly, Ken Kihlstrom, Chris Larson, Pat & Chuck McPartlin, Janet & Martin Meza, Bruce Murdock, Max Neufeldt, Peggy O’Rork, Edgar Ocampo, David Salvia, Tom Totton, Matt Walton, Tom Whittemore, and Patricia & Jerry Wilson showed the night sky to 1012 happy viewers.

## OUTREACH SUMMARY

Here are the AU events scheduled so far for December. Remember, 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](mailto:macpuzl@west.net)

The Telescope Workshop meets on Tuesday evenings at 7:30 PM at the Broder Building at SBMNH. Contact Tim Crawford at [tcrawf3@cox.net](mailto: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.

### FRIDAY, DECEMBER 1, 7 PM

Monthly AU meeting in Farrand Hall at SBMNH.

### MONDAY, DECEMBER 4, SETUP 6 PM

Telescopes for an Astronomy Night at Santa Barbara Junior High School, 721 East Cota Street. We set up behind the Marjorie Luke Theater, with access through the gate where East Ortega Street dead-ends into North Quarantina Street.

### TUESDAY, DECEMBER 5, SETUP 7 PM

Telescope Tuesday at Camino Real Marketplace in Goleta. We set up in the plaza next to the theater, under the Christmas tree. **For 2018 we move to the third Tuesday of the month.**

### WEDNESDAY, DECEMBER 6, GATHER AT 6 PM

Annual AU Holiday Party at the High Sierra Grill, 521 Firestone Road, at the airport.

### FRIDAY, DECEMBER 8, SETUP 7 PM

Telescopes for an Astronomy Night at Midland School, 5100 Figueroa Mountain Road north of Los Olivos. Dark Skies!

### SATURDAY, DECEMBER 9, 4 PM

AU planning meeting, in the classroom next to Javier's office.

### SATURDAY, DECEMBER 9, 6 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.

### FRIDAY, DECEMBER 15, 7 PM

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

### SATURDAY, DECEMBER 16, SETUP 4 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!

### SATURDAY, DECEMBER 23, SETUP 6 PM

Telescopes for Bacara Resort and Spa. We set up on the bluff by the Angel Oak Restaurant.

### SATURDAY, DECEMBER 30, SETUP 6 PM

Telescopes for Bacara Resort and Spa. We set up on the bluff by the Angel Oak Restaurant.

## From the President...

Jerry Wilson

*Quantum and classical mechanics - a quick overview.*

A comparison of classical and quantum mechanics is a comparison of how things move and interact on the ordinary, macroscopic size range of our everyday experiences and the subatomic, microscopic world of electrons, protons, and other subatomic particles. It is also a comparison of how many particles constitute an object.

We have observed and learned how to interact with macroscopic objects since we were born. Objects such as basketballs, cars, rocks, and dogs. Through our experiences we have developed a fairly accurate expectation of how things move and interact. You don't need to take a class in physics to play pool well. Trust me on this - the physics class really doesn't help much except maybe on a physics test. Experiences such as playing pool develop and form our intuition about mechanics.

This form of intuition was quantified in 1660 by Isaac Newton in his three laws of classical mechanics. It works very well on macroscopic objects, and is sufficiently accurate to form the basis for modern spaceflight. It describes the motion of things that contain, typically,  $10^{23}$  particles.

On the microscopic scale, however, single particles behave very non-intuitively. An electron in an atom must occupy discrete energy levels. In fact its angular momentum about the nucleus comes in discrete steps, or quanta. In quantum mechanics it is angular momentum that is quantized. Other examples of non-intuitive behavior are that a

particle can move from point A to point B without traversing the distance between the points. It can also be in a combination of states until observation of its state puts it in one or the other.

This latter point is elucidated by the Schrodingers cat analogy. Picture a box which has a cat inside. The cat can exist in one of two possible states. It can be either dead or alive. You don't know which until you look inside. Sounds simple, eh? Well, if the cat were a single particle cat then it's not simply that it is dead or alive, but you just don't yet know which. It's that the cat IS BOTH dead and alive at the same time, until you look, and the act of looking forces it into one or the other state. This is a case where a look can kill.

Single particles, in any system, obey quantum mechanics where their behavior is determined probabilistically. But on the macroscopic scale where our senses measure the world, we only see deterministic behavior. Deterministic behavior, like the arrow of time, is an emergent property. The reason is that on the everyday macroscopic scale we only see the action of a large crowd of particles. That large agglomeration behaves in the most probable way. We don't see all the single particle behavior that is possible, but improbable.

There are systems such as superconductivity or superfluidity where the counterintuitive quantum mechanical behavior is manifest macroscopically, and then you can see it with your own eyes. Both these systems involve the condensation of  $10^{23}$  particles into a state where they act as a single particle.



“You’re kidding, Ed. You imaged the Cosmic Background with this?” Photo credit: Tom Totton.

## Arts Corner...

The Eclipse  
Mary Freericks

My once in life time chance  
to see the moon cover the sun:  
Monday, August 21. I have no solar eclipse glasses.  
Samy's has run out - too late to order on the web.

The Astronomical Unit  
warns of unsafe glasses.  
I could burn my retina go blind  
in spite of a cataract operation  
last May and a Lasik operation  
this May and my now 20/20 vision.

But I have my first session  
of art class with Toni Askew.  
If absent you lose your spot.  
So, at 8:00 am:  
I am sitting in art class wondering how and where  
to view the eclipse. Which venue to choose?  
Will I find a parking spot? The long lines?

At 9:15 an angel arrives blond and plump with a  
handful of eclipse glasses.  
"You can use these to see the eclipse."  
She waves half a dozen eclipse glasses.  
They are cardboard like 3D movie glasses

"Where did you get the glasses?"  
I ask - wary of unsafe eclipse glasses. "My  
astronomer husband," she answers. Students grab  
glasses. I get a pair. At 10:15 we walk outside.

The eclipse glasses are so dark I take them off not  
to trip and hold them in my hand as I walk.

Then I put them on and see nothing.  
Where is the sun? A thick cloud covers the sun.  
Ten minutes later "We see the eclipse!"  
a classmate calls. I walk out move diagonally and  
place the eclipse glasses on my eyes.  
There it is: a crescent moon against the dark sun.

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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**

### **AU mailing address:**

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# The Astronomical Unit

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## December 2017

| Sunday | Monday   | Tuesday                                | Wednesday                            | Thursday | Friday                           | Saturday   |
|--------|--|--|--------------------------------------|----------|----------------------------------|--|
|        |  |  |                                      |          | 1<br>GENERAL<br>MEETING<br>7PM   | 2  |
| 3      | 4<br>SB JUNIOR<br>HIGH SCHOOL<br>6PM           | 5<br>CAMINO REAL<br>MARKETPLACE<br>7PM | 6<br>SBAU<br>HOLIDAY<br>PARTY<br>6PM | 7        | 8<br>MIDLAND<br>SCHOOL<br>7PM    | 9<br>PLANNING<br>MEETING 4PM<br>STAR PARTY<br>6PM<br>SBMNH |
| 10     | 11<br>TECH TALK<br>KZSB<br>(AM 1290)<br>9-10AM | 12                                     | 13                                   | 14       | 15<br>WESTMONT<br>COLLEGE<br>7PM | 16<br>LOS FLORES<br>RANCH PARK<br>4PM                      |
| 17     | 18   | 19                                     | 20                                   | 21       | 22                               | 23<br>BACARA<br>6PM  |
| 24     | 25   | 26                                     | 27                                   | 28       | 29                               | 30<br>BACARA<br>6PM  |
| 31     |  |  |                                      |          |                                  |  |