



# AU AstroNews

## The Newsletter of the Astronomical Unit

June 2018

Sponsored by the Santa Barbara Museum of Natural History



*Ready. Set. Outreach! Photo credit: Pat McPartlin.*

### ANNUAL POTLUCK SET FOR JUNE 8<sup>TH</sup>

In lieu of a General Meeting for June the AU will hold its annual potluck at the MacVeagh House at SBMNH. **Please note the change in date to the second Friday of the month.** Festivities begin at 6PM.

### OUTREACH SUMMARY

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.

Since the last AU newsletter, volunteers Farshad Barman, Tim Crawford, Art Harris, Sean Kelly, Janet & Martin Meza, Pat & Chuck McPartlin, Bruce Murdock, Peggy O'Rork, Javier Rivera, Dianne & Russell Ruiz, Tom Totton, and Tom Whittemore shared astronomy with 762 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](mailto:macpuzl@west.net)

### FRIDAY, JUNE 8, 6 PM \*\*\* NOTE NOT FIRST FRIDAY \*\*\*

Annual AU potluck dinner at the MacVeagh House at SBMNH.

### SATURDAY, JUNE 9, 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 9, 8 PM

Monthly Public Star Party, next to Palmer Observatory at SBMNH. Jupiter!

### FRIDAY, JUNE 15, 8 PM

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

### TUESDAY, JUNE 19, SETUP 7 PM

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

### WEDNESDAY, JUNE 20, SETUP 8 PM

Slide show and scopes for Carpinteria State Beach. We set up on the sidewalk toward the ocean from the entry kiosk.

### TUESDAY, JUNE 21, 04:07 AM

Northern Hemisphere Summer begins with the Solstice.

### SATURDAY, JUNE 23, SETUP 8 PM

Slide show and telescopes for campers at Lopez Lake, up by Arroyo Grande. Contact Chuck if you want to come, so we can arrange camping for Friday and Saturday night. Space is limited.

## FRIDAY, JUNE 29, SETUP 8 PM

Telescopes for Refugio State Beach, in the SW corner of their day use parking lot.

## SATURDAY, JUNE 30, SETUP 8 PM

Slide show and scopes for Carpinteria State Beach. We set up on the sidewalk toward the ocean from the entry kiosk. Asteroid Day, on the anniversary of the Tunguska Event.

## Neutron Stars

Jerry Wilson

Neutrons are one of the three subatomic particles that make up atoms: protons neutrons, and electrons. There are more elementary particles that make up these subatomic particles, but as Conan the Barbarian says, "...that's another story."

Hydrogen consists of one proton and one electron for a mass of one atomic unit (au). The electron has mass, but it's not significant compared to a proton or neutron. If we add one neutron to hydrogen we get heavy hydrogen, also known as deuterium, with a mass of 2 au. Another neutron gets tritium at a mass of 3 au. These types of hydrogen with different masses are called isotopes of hydrogen. Eventually, addition of neutrons makes the isotope unstable and it decays in some way or other into lighter elements. Hydrogen and deuterium are stable, while tritium has a half-life of 12.4 years. All higher isotopes of hydrogen have a half-life of less than one zeptosecond ( $10^{-21}$  sec).

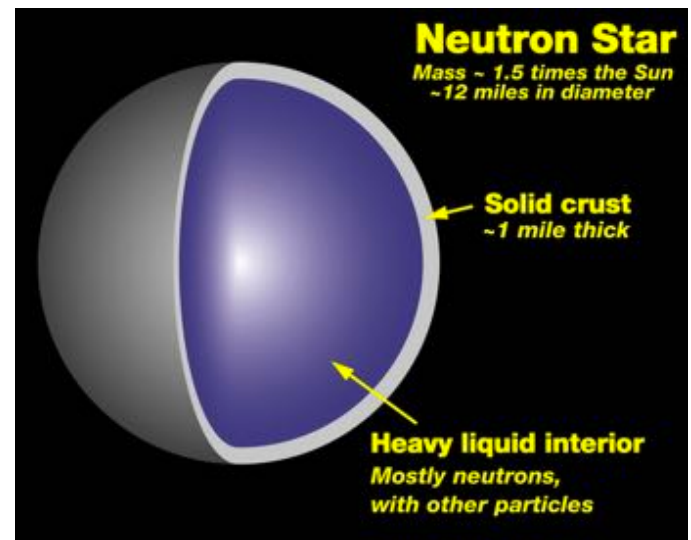
The neutron in an atomic nucleus (not nucleus) is itself stable, as far as we can tell. However a neutron in free space, all by itself, decays into a proton, an electron, and an antineutrino with a half-life of about 15 minutes. The neutron by itself is not stable.

A simple way to think of a neutron is that it is a proton with an electron smeared over its surface. (Smeared is a useful word I picked up from the film *The Birdcage*.)

A neutron star is a very dense star whose gravity is so strong (but not strong enough to form a black hole) that it compresses the subatomic particles into densely packed neutrons. The protons and electrons have been compressed into stable neutrons. So, the

star should last for a very long time. It is the second most dense object known.

When I studied neutron stars in quantum statistical mechanics, it was presented as a blob of neutrons with no known internal structure. As Sean Kelly pointed out in his recent SBAU presentation, there are now credible models of a likely four-layered structure for neutron stars consisting of an outer crust of atomic nuclei and electrons, an inner crust of superfluid neutrons, an outer core of normal neutrons, and an inner core of superfluid neutrons, superconducting protons, and electrons.



One model of a Neutron Star's interior.



Mars Insight mission launch. Photo credit: Bruce Murdock.



Javier cooks up a comet for the public. Photo credit: Tom Totton.



“You’re kidding. If I turn this the other way, time goes backwards?!” Photo credit: Tom Totton.



Fine grinding at the mirror-making workshop. Photo credit: Tom Totton.

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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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## June 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5	6	7	8 AU ANNUAL POTLUCK 6PM	9 PLANNING MEETING 6 PM STAR PARTY 8 PM SBMNH
10	11 TECH TALK KZSB (AM 1290) 9-10 AM	12	13	14	15 WESTMONT COLLEGE 8PM	16
17	18	19 CAMINO REAL MARKETPLACE 7 PM	20 CARPINTERIA STATE BEACH 8PM	21 SUMMER SOLSTICE 4:07AM	22	23 LOPEZ LAKE 8PM
24	25 TECH TALK KZSB (AM 1290) 9-10 AM	26	27	28	29 REFUGIO STATE BEACH 8PM	30 CARPINTERIA STATE BEACH 8PM