# AU AstroNews

The Newsletter of the Astronomical Unit

March 2004 Sponsored by the Santa Barbara Museum of Natural History

## March Meeting – "Mars Talk"

AU members Joe Brown and Chuck McPartlin, will be presenting the Mars observations made by club members in 2003 and in 1988, and the resulting maps of surface features on the red planet. Compare them with Current NASA maps of Mars, and see how much averted imagination was used!

## March Planet Events

In the last week in March, Mercury makes its best evening appearance of the year, and all five naked-eye planets will be visible in our evening skies, along with the Moon.

Throughout March, there will be several double shadow transits of the Galilean Moons visible on Jupiter. These will happen on the night of March 4 (when Jupiter is at opposition) between 23:30 and midnight (Io and Europa), March 12 between 01:15 and 02:30 (Io and Europa), March 19 between 03:15 and 05:30 (Io and Europa), and March 20 between 21:30 and 23:30 (Io and Ganymede, during the Messier Marathon!). To cap it all off, for about 20 minutes spanning midnight on March 27/28, there will be a rare TRIPLE SHADOW TRANSIT involving Io, Ganymede, and Callisto. (All times PDT, 24 hour clock.)

## Annual Messier Marathon

Join fellow Extreme Astronomers at the annual AU Messier Marathon, going on all night Saturday/ Sunday March 20/21 at the Gun Club observing site. This is your best chance of seeing all 110 Messier Catalog items between sunset and sunrise. It's a great social event, too - kick back and sip hot chocolate and eat powdered Ring Nebulae (donuts) with fellow AU crazies. Chuck will have Marathon checklists with finder charts, coordinates, and suggested viewing order available at the March meeting to help you face this observing challenge.

## Amateur Astronomer Makes Discovery

An amateur astronomer has discovered a new nebula using a 76mm refractor and a CCD camera. Amateur astronomer Jay McNeil has been credited with discovering a new nebula near M78 in Orion. The nebula is thought to be the result of an outburst of an FU Orionis type variable star. The star had been seen previously as an infrared source embedded in a molecular cloud by the IRAS satellite. Apparently it has broken through its shroud, and is now illuminating the surrounding gas and dust. The new McNeil's Nebula is about an arcminute across, and magnitude 15.5. It has been seen visually through a 24 inch telescope. The discovery image, and information about the nebula, can be found on the web at:

http://wkaa.net/gallery/mcneil/mcneilnebulalum90labeled
http://www.balinka.com/m78c.jpg
http://www.noao.edu/outreach/aop/observers/mcneil.html

## Astronomy Trivia

- The hottest planet in the solar system is Venus with temperatures reaching $860^{o}$ F
- Absolute magnitude is measured as what the apparent magnitude would be at a distance of 10 pc from the source
- 1 pc = $3.086 \times 10^{16}$ m = 3.26 Lyrs
- Lightning is 3 times hotter than the surface of the sun.
- The Sun moves up and down in the Galactic plane at a speed of 6.25 mps

## February Outreach Volunteers

Since the last newsletter, AU volunteers John Boyd, Bill Buzin, Bill Clausen, Tim Crawford, Dora Drake, Art Harris, June Kelley, Dale Lowdermilk, Pat & Chuck McPartlin, Edgar Ocampo, Helen Osenga, Ron Pembleton, Craig Prater, Ellen Waddell, Jim Williams, and Tim Wittenburg showed cool sky stuff to 416 satisfied customers!

## AU Events for March

Thursday, March 4, setup 6:30 PM
Rain Date for telescopes at Harding School if the Feb 26 event is clouded out.

Friday, March 5, 7:30 PM
Monthly AU meeting in Farrand Hall. Mars Observations by the AU.

Saturday, March 13, 5:30 PM
AU Planning Meeting in the classroom outside Krissie's office at SBMNH. Come help plan future AU activities and help out *your* club.

Saturday, March 13, 7:30 PM
Monthly SBMNH Public Star Party.

Thursday, March 18, setup 6:30 PM
Slide show and telescopes for Hollister School second graders.

Friday, March 19, 7:30 PM
Monthly public observation at Westmont College. Vernal Equinox!

Saturday, March 20, All Night
Annual AU Messier Marathon at the Gun Club site at the end of West Camino Cielo.

Monday, March 22, Whenever
National Goof-Off Day!

Thursday, March 25, setup 5:30 PM
Telescopes for Hollister School Science Night.

Saturday/Sunday, March 27/28, midnight
Triple shadow transit on Jupiter of 3 Galilean Moons!

Scheduled events are subject to change and additions with little notice! For the latest and greatest, contact Chuck McPartlin at **macpuzl@west.net**.

## Are We Inside a Black Hole?

Black holes have been a source of mystery and excitement ever since they were first speculated independently back in the last part of the 1790's by Pierre LaPlace and John Michell. Using Newtonian physics alone, they calculated the mass and radius for a star with a gravitational field strong enough not to let light escape. They found the event horizon! In 1967 the term black hole was coined by the American theoretical physicist John Wheeler.

Today when one studies General Relativity the concept of the "Swartzchild radius" is always studied ($R = 2Gm/c^2$ where R is the radius of a black hole, G is the gravitational constant, m is the mass and c is the speed of light). It states that if a certain amount of mass is compressed into a small enough region a black hole will exist. Normal exercises include finding out how small a radius would be needed for the mass of the Earth or the Sun to make them black holes. Which are .5 cm and 2950m, respectively?

Our understanding of physics tells us that the Earth will never become a black hole and that our Sun is the wrong type of star to become one either. However there is one weird thing that we find out. If we do the same calculations for the universe we find that the Universe is sufficiently small that the radius for a black hole with the mass of the universe is bigger than the current size of our own Universe. Thus stating that we live in a black hole!

There is obviously something weird going on, right? Well it turns out that this is a criterion for the Universe to be flat, which we speculate that it is. How is it then that we are alive? Why are we not being ripped apart? It turns out that the bigger the Black hole or star for that matter, the less 'dangerous' (if that is a good word to use) it is to matter around it. What stretches and ultimately rips apart stars or theoretical space travelers in sci-fi books as they travel into a black hole is not the gravitational field that the black hole creates but the resulting tidal force.

Tidal forces which cause the very noticeable high and low tides on Earth are the effects of the Moon's pull on the Earth; caused by a stronger gravitational pull on the near side of Earth, than the far side by the Moon. Your body experiences the same effect by the Earth. Your feet are experiencing a stronger gravitational pull than your head. However you don't notice the difference because 5-6 feet is irrelevant compared to the radius of the Earth.

The bigger a black hole is the less tidal force that it exerts. Therefore if we travel into a small black hole, we will be ripped apart much quicker than if we travel into a bigger one. So 'if' we are inside a black hole called the universe the tidal force would be so small even at the distances of galaxies that it would never bother us. Therefore we might actually be inside the biggest black hole of all!

## Deep Space Network 2-for-1 Sale!

By Patrick L. Barry

Call it a "buy one, get one free" sale for astronomers: Build a network of radio dishes for communicating with solar-system probes, get a world-class radio telescope with a resolution nearly as good as a telescope the size of Earth!

That's the incidental bonus that NASA's Deep Space Network (DSN) offers the astronomy community. VLBI produces very high resolution images of the cosmos by combining the output from two or more telescopes. The result is like having a giant "virtual" telescope as large as the distance between the real dishes! Since bigger telescopes can produce higher resolution images than smaller ones, astronomers need to use dishes that are as far apart as possible.

To maintain continuous contact with deep space missions, the DSN has tracking stations placed in California, Spain, and Australia. That also means, though, that the straight-line distance between any two of the stations is roughly 85 percent of Earth's diameter-or about 6,700 miles. That's almost as far apart as land-based telescopes can be.

"We often collaborate with other VLBI groups around the world, combining our dishes with theirs to produce even better images," says Michael J. Klein, manager of the DSN Science Office at NASA's Jet Propulsion Laboratory. "Since our 70-meter dish in Canberra, Australia is the largest dish in the southern hemisphere, adding that dish in particular makes a huge difference in the quality of a VLBI observation." Even though only about 1 percent of the DSN's schedule is typically spared from probe-tracking duty and scheduled for radio astronomy, it manages to make some important contributions to radio astronomy. For example, the DSN is currently helping image the expanding remnant of supernova 1987A. To introduce kids to multi-wavelength astronomy, NASA's website for kids, The Space Place, has just added the interactive demo, "Cosmic Colors," at spaceplace.nasa.gov/cosmic. This article was provided by JPL under a contract with the NASA.

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