



There is no better high than discovery.
E. O. Wilson

Newsletter of the Pomona Valley Amateur Astronomers

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nightwatch

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President's Message

We're very lucky here in SoCal to be close to so many great observatories, and several telescopes that have held the title of 'world's largest'. The 60-inch telescope on Mount Wilson was the world's largest telescope from 1908 to 1917. Mt. Wilson's 100-inch Hooker telescope held the title from 1917 to 1948, when it passed to the 200-inch Hale telescope at Palomar. The CHARA array on Mount Wilson is currently the world's largest (longest baseline) optical interferometer, although it will shortly be edged out by the Magdalena Ridge Optical Interferometer in

New Mexico. Finally, the 1.6-meter New Solar Telescope at Big Bear Solar Observatory is the largest solar telescope in the world, although it is also scheduled to be upstaged, by the 4-meter Daniel K. Inouye Solar Telescope on Haleakala in Hawaii. There are other places in the world with larger concentrations of larger telescopes *now* - namely Mauna Kea and Cerro Paranal - but nowhere else on Earth has such a long legacy of giant telescopes.

We are further fortunate in that we have the opportunity to tour these instruments and on occasion observe with them. In the next two months we have a couple of exciting observatory trips coming up. First, on the evening of Sunday, September 13, the PVAA will have the use of the 100-inch Hooker telescope on Mount Wilson. The Hooker telescope is one of the largest telescopes that can be used for visual observations - with an eyepiece rather than a camera - and the largest telescope in the world that amateur astronomers can observe with, period. We still have some spaces available on that trip if you're interested in going. The price per person is \$390, to be one of only 14 people using the scope for the whole night.

After that, our next observatory tour is coming up on Friday, October 9, to visit the Big Bear Solar Observatory. There may be a chance for those who are interested to stick around in the evening for a joint stargazing session with the Big Bear Valley Astronomical Society - more news on that closer to the date.

Our speaker this month is Matthew Ota, who will talk to us about the legendary observer E.E. Barnard, who among other things discovered Amalthea, the fifth moon of Jupiter; discerned the large proper motion of the star that bears his name; and photographically mapped the Milky Way and in particular its dark nebulae. I hope to see you there!

Matt Wedel

PVAA Officers and Board

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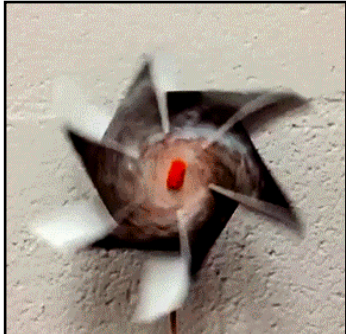
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**Summer Crafts and Pluto Pics!
What's new and fun at NASA Space Place**

July was a very exciting month for NASA! We had the Pluto flyby on July 14, and the anniversary of the National Aeronautics and Space Act was on July 29. Here at NASA Space Place, we continue to provide fun ways for kids and adults to engage with content about astronomy and Earth science. We have new craft activities and tons of articles to explore.



The Pinwheel Galaxy, or M101, is a spiral-shaped galaxy about 21 million light years away from Earth. Make your very own Pinwheel Galaxy pinwheel!

Do you know the difference between a meteor, meteoroid, and meteorite? Well, our new [glossary](#) is here to help answer all your questions about space and Earth science vocabulary.

Make an Earth fan, and cool yourself with Earth's hot layers!

Did you follow the Pluto flyby? Learn more about this peculiar dwarf planet

August meeting will convene in Shanahan B460

Club Events Calendar

- August 28, 2015, General meeting
- September 13, 2015, Annual Mt. Wilson Telescope viewing
- Sept 11-13, 2015, Joint Star Party with RAS at GMARS
- September 17, 2015, Board meeting, 6:15
- September 25, 2015, General meeting
- Oct. 9-11, 2015, Joint Star Party with RAS at GMARS
- October 22, 2015, Board meeting 6:15
- October 30, 2015, General meeting
- Nov. 5-8, 2015, Joint Star Party with RAS, Night Fall at Borrego Springs
- November 12, 2015, Board meeting, 6:15
- November 20, 2015, General meeting
- December 3, 2015, Board meeting, 6:15
- December 11, 2015, Holiday Party, Sizzlin' Skillets 7:00pm
- No scheduled General meeting.
- No scheduled Star Party.

PVAA member Cori Charles has the following item for sale. It is brand new, never used:

Starlight Express Lodestar-X2 Autoguider, 1.25" retail value \$649.00. I'd like to sell for \$400.00 or best offer. If anyone is interested they can send me an email, at Coricha156@gmail.com or cell #909-646-0275.



The following website has high resolution pictures of M31. It is a mosaic of 7398 exposures taken over 411 individual pointings.

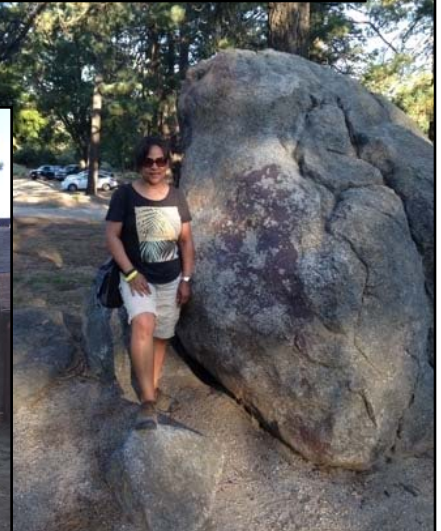
<http://hubblesite.org/newscenter/archive/releases/2015/02/>

Eldred Tubbs

Nature at Night Skyland Ranch - Aug. 2, 2015

On Sat. Aug. 2, 2015, I participated in the astronomy outreach, along with three other members, at the Girl Scouts camp at Skyland Ranch, in Idyllwild. I arrived there early evening just before a very nice dinner. We set up three telescopes, all viewing different objects in the sky, as the viewers rotated through. Even though the evening started out with intermittent clouds, and later a very bright Moon, we observed Saturn, a few very bright stars, and a few clusters, and of course the beautiful Moon. The camp leaders and the girls provided a nice desert with hot chocolate, tea, or coffee later in the evening. I spent the night in a cabin with a few camp counselors, and had a nice breakfast in the morning, before heading out. The weather was nice, never needed a jacket.

*Cori Charles
The Planetary Society
Outreach Coordinator*



A few photos from my Iphone.



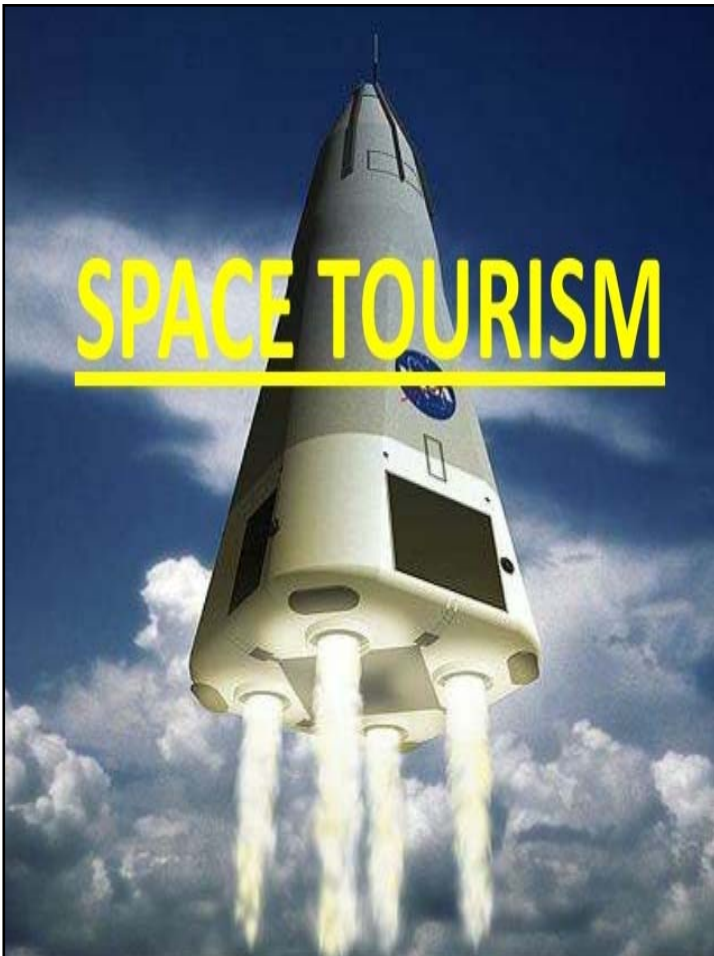
What's Up? - Space Tourism?

Tourists in space? Ordinary people who aren't astronauts going into space for recreational, business, or leisure reasons? I remember science fiction stories about Earth folk vacationing at hotels on the Moon or Mars. Could this ever come true? Given the costs of space travel wouldn't space tourism be very expensive?

The Russian Soyuz spacecraft charged \$20-40 million a trip during 2001-2009 for seven space tourists. Basically round trips to the International Space Station. Fees covered Russia's skyrocketing flight costs. They used a company called MirCorp linked to U.S based Space Adventures, Ltd. But as the ISS crew got a lot bigger they had to end it in 2010. Also NASA refused to train any of the travelers, all preflight training had to be done in Star City in Russia.

Who were these tourists with deep pockets? Why did they go? In 2001 American investment manager Dennis Tito stayed for a typical seven days as an "independent researcher" at a cost of \$20 million. He announced he would send a privately financed spaceflight to Mars by 2018. Of course he'd need NASA's help and they don't approve of space tourists.

In 2002 South African computer software millionaire Mark Shuttleworth also paid \$20 million to stay as a "commercial space travel pioneer" on the ISS. He spoke by radio with Nelson Mandela and did experiments related to AIDS. In 2005,



American Gregory Olsen, owner of Optoelectronic Sensors Unlimited shelled out another \$20 million as a "private researcher" in space travel. He's a physics professor and conducted astrophysical astronomy experiments. A licensed FCC ham radio operator he became the first to use ham radio to speak to his students from space.

The first woman space tourist was Anousheh Ansari, an Iranian-American. NASA announced that she no longer had anything to do with anti-American Iran. Although a Muslim, she does speak Russian. She also paid \$20 million as a "private space explorer" with funds from her computer software company. She gave the first internet web-log from space. Next an American-Hungarian software billionaire, Charles Simonyi paid \$25 million to stay for 15 days in 2007. Not having seen enough of the Earth from space he returned in 2009 at a cost of \$35 million. He also used his ham radio license. Richard Garriott, a British-American video games developer went in 2008 at the cost of \$30 million. He said he was a "private astronaut" getting ideas for outer space video games. He's developed dozens of games with names like Labyrinth Of Worlds. He bought Russia's Luna 21 lander (currently on the lunar surface) making him the first to claim private ownership of extraterrestrial territory.

The last of this group was a Canadian, Guy Laliberte, who went for \$40 million. He modestly called himself a "poetic mission participant" but he's a talented circus performer. He's the inventor and CEO of Cirque du Soleil of Las Vegas fame. The first space traveler to have a star on the Hollywood Walk Of Fame, he's also a T.V. show High Stakes poker player. He used his pictures from space for his book GAIA, intended to save the planet. These people aren't your average tourists.

Precursors to Space Adventures include businessmen with interests in the shuttle payloads. Charles Walker of the McDonnell Douglas became the first non-government astronaut in 1984 at a cost of a mere \$40 thousand. A NASA Space Flight Participant program came to a sudden end when the chosen Teacher In Space, Christa McAuliffe, was killed in 1986's Challenger disaster. Then to reassure its Congressional sponsors, NASA took Senator Jake Garn and Representative Bill Nelson in 1986. Garn suffered extreme space nausea and inspired a Garn Space Sickness Scale.

But tourists were undaunted. McAuliffe's backup Barbara Morgan flew in 1998. For \$28 million the Russians took the Japanese reporter Toyohiro Akiyama to Mir in 1990. Paid for by Tokyo Broadcasting, he hosted a daily TV show from space during which he performed scientific experiments. Still for international relations, the Russians took British chemist Helen Sharman in 1991. She became the first Briton in space.

Currently private and less expensive suborbital space flights are being developed by companies like Virgin Galactic. The Federal Aviation Administration is optimistically issuing rules and licenses. But this commercial market has yet to emerge successfully. There have been crashes, reminders of the danger and uncertainty of space flight. What's certain is that space tourism is still for the super rich.

Lee Collins

Solar Wind Creates - and Whips - a Magnetic Tail Around Earth

As Earth spins on its axis, our planet's interior spins as well. Deep inside our world, Earth's metal-rich core produces a magnetic field that spans the entire globe, with the magnetic poles offset only slightly from our rotational axis. If you fly up to great distances, well above Earth's surface, you'll find that this magnetic web, called the magnetosphere, is no longer spherical. It not only bends away from the direction of the sun at high altitudes, but it exhibits some very strange features, all thanks to the effects of our parent star.

The sun isn't just the primary source of light and heat for our world; it also emits an intense stream of charged particles, the solar wind, and has its own intense magnetic field that extends much farther into space than our own planet's does. The solar wind travels fast, making the 150 million km (93 million mile) journey to our world in around three days, and is greatly affected by Earth. Under normal circumstances, our world's magnetic field acts like a shield for these particles, bending them out of the way of our planet and protecting plant and animal life from this harmful radiation.

But for every action, there's an equal and opposite reaction: as our magnetosphere bends the solar wind's ions, these particles also distort our magnetosphere, creating a long magnetotail that not only flattens and narrows, but whips back-and-forth in the onrushing solar wind. The particles are so diffuse that collisions between them practically never occur, but the electromagnetic

interactions create waves in Earth's magnetosphere, which grow in magnitude and then transfer energy to other particles. The charged particles travel within the magnetic field toward both poles, and when they hit the ionosphere region of Earth's upper atmosphere, they collide with ions of oxygen and nitrogen causing aurora. Missions such as the European Space Agency and NASA Cluster mission have just led to the first accurate model and understanding of equatorial magnetosonic waves, one such example of the interactions that cause Earth's magnetotail to whip around in the wind like so.

The shape of Earth's magnetic field not only affects aurorae, but can also impact satellite electronics. Understanding its shape and how the magnetosphere interacts with the solar wind can also lead to more accurate predictions of energetic electrons in near-Earth space that can disrupt our technological infrastructure. As our knowledge increases, we may someday be able to reach one of the holy grails of connecting heliophysics to Earth: forecasting and accurately predicting space weather and its effects. Thanks to the Cluster Inner Magnetosphere Campaign, Van Allen Probes, Mars Odyssey Thermal Emission Imaging System, Magnetospheric Multiscale, and Heliophysics System Observatory missions, we're closer to this than ever before.

Ethan Siegel

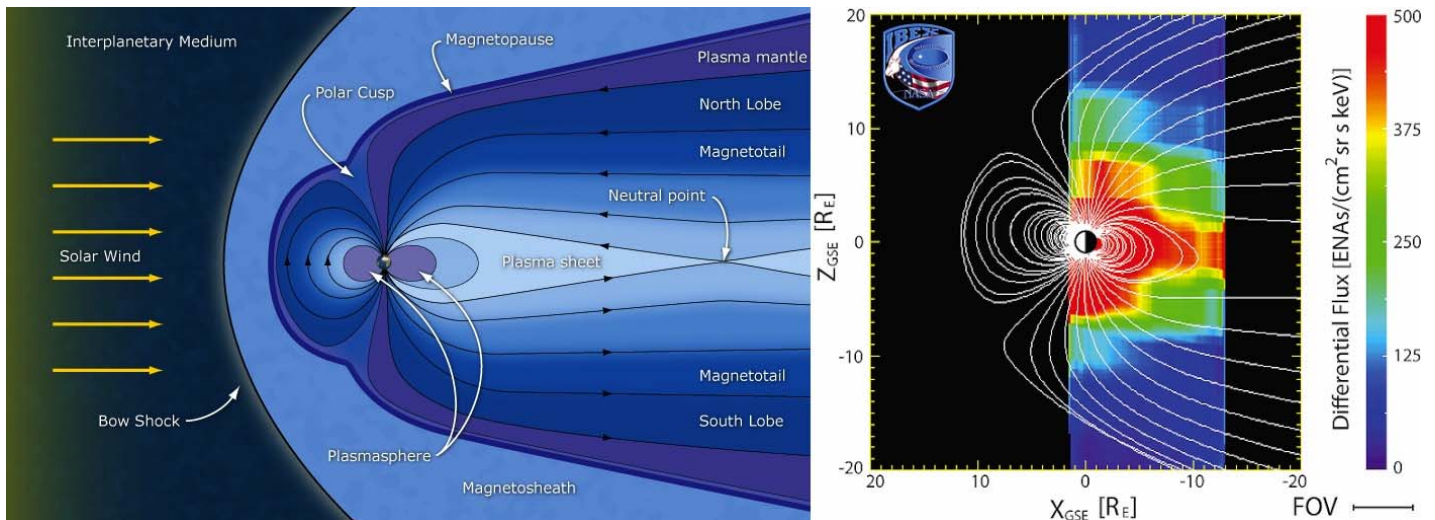


Image credit: ESA / C. T. Russell (L), of Earth's magnetic tail and its cause: the solar wind; Southwest Research Institute / IBEX Science Team (R), of the first image of the plasma sheet and plasmasphere created around Earth by the solar wind.



Kids can learn about how solar wind defines the edges of our solar system at NASA Space Place.

<http://spaceplace.nasa.gov/interstellar>