

IO - May 2008

Issue 2008-05
Eugene Astronomical Society

Eugene Astronomical Society
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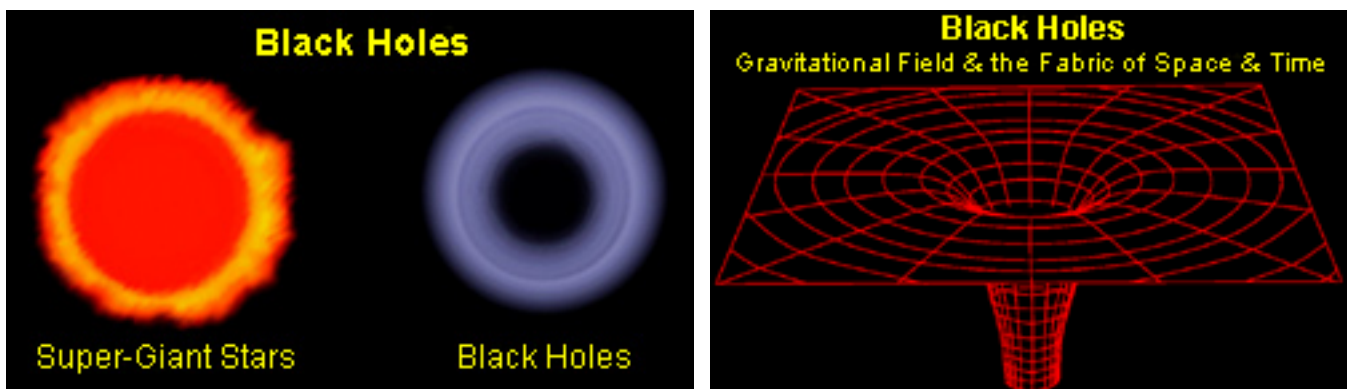
The Astronomical League
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MAY 29TH MEETING

Black Holes by Tamela Maciel

Black holes, especially the supermassive ones in the centers of galaxies, are among the most exotic objects in the universe. Recently, scientists are beginning to speculate on the importance of black hole activities on the formation and preservation of the universe, and so research about the effects of black holes on their surroundings can have large implications. I focused my research last summer on supermassive, active black holes that are in the process of accreting large amounts of matter. We have seen that in the process of swallowing up material, the largest black holes sometime form huge and powerful jets of matter that shoot away from near the core at close to the speed of light. I investigated the nature of these jets and how they interact with their environment, hoping to get a better picture of why these jets so counter-intuitively form in the first place. This talk will give a general introduction to black holes, then focus in on the jets and so-called hotspots of active black holes, ending with a comment on the future research left to be done in this fascinating realm of astrophysics.

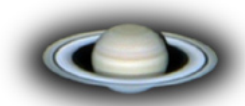


Tamela Maciel is a physics major and math minor at the University of Oregon, finishing up my second year of studies here. I grew up in Grants Pass, Oregon and graduated valedictorian a year early from high school.

At UO, I am currently involved as the co-president of Society of Physics Students on campus. As a group we do numerous outreach events, lab tours, guest lecturers, and the like to get physics majors more involved with the department and the community. In addition, I work in the physics teaching labs on campus, and have loved getting to know the physics faculty and many of my physics peers better over the past two years.

I also volunteer often at the Science Factory planetarium, where I present some of the weekend shows,

in addition to helping out with a few of their outreach programs. Recently, I presented a talk on black holes at the planetarium based on the research I completed last summer at NASA's Goddard Space Flight Center. This internship was a dream come true for me, and being placed in the astrophysical division to work on supermassive black holes made me feel right at home, since this subject has long been a passionate interest of mine. The ten-week internship went all too quickly, and so I am excited to be traveling back to Goddard for another research position this coming summer.



REMEMBER THAT WE NOW MEET AT EWEB

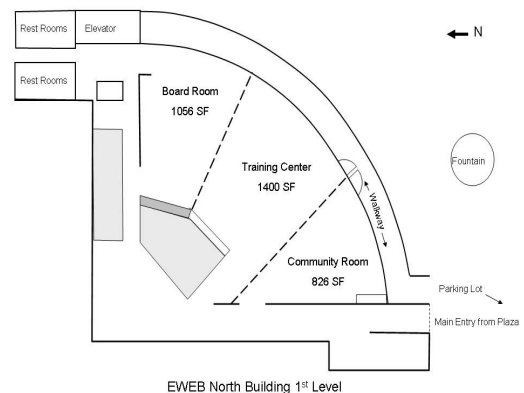
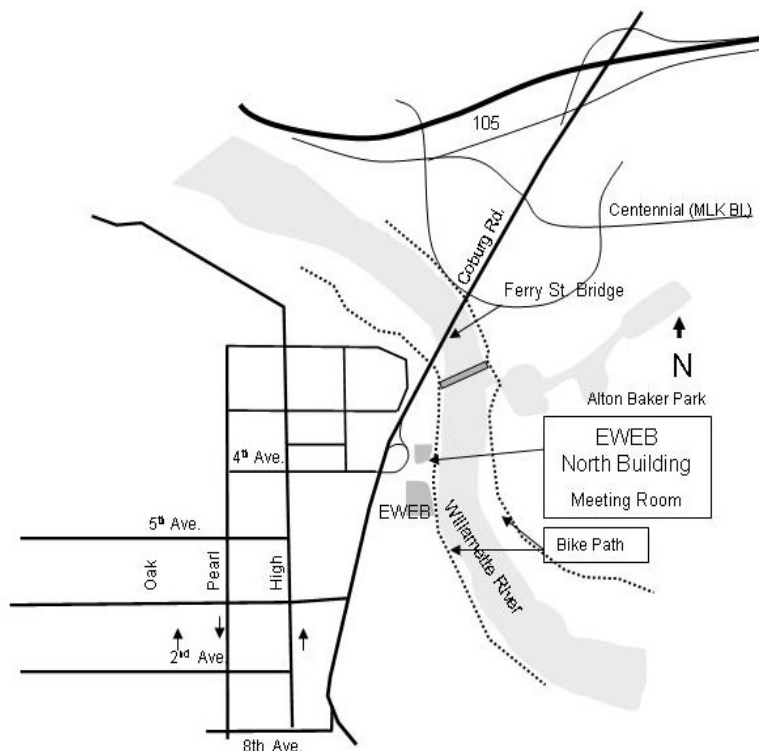
500 E. 4th Avenue in Eugene.

OUR NEXT MEETING WILL BE ON THURSDAY, MAY 29TH AT 7:00 IN THE NORTH BUILDING'S COMMUNITY ROOM. This is the first of the three wedge-shaped rooms in the semicircular building to the north of the fountain at EWEB's main campus on the east end of 4th Avenue.

Meeting dates and times for the rest of the year:

May 29 (Thursday) in Community Room
 June 26 (Thursday) in Community Room
 July 24 (Thursday) in Community Room
 August 28 (Thursday) in Community Room
 September 30 (**Tuesday**) in Community Room
 October 23 (Thursday) in Community Room
 November 10 (**Monday**) in Community Room
 December 18 (Thursday) in Community Room

Join the EAS mail list at <http://eugeneastro.org/mailman/listinfo/org.eugeneastro.general>



EWEB is located at 500 E. 4th Avenue. Our meetings will be in the first room in the semicircular building to the north of the fountain.

“First Quarter Friday” Off to a Good Start

The Eugene Astronomical Society started its monthly series of First Quarter Friday star parties with a wonderfully successful event on April 11th. We had at least 19 scopes on top of the College Hill Reservoir, several brought by new members and non-members who just wanted to join the fun. It was hard to count the number of people who came to look, but it was probably close to 100. The sky cooperated with steady seeing all night, so we were able to show people many of the springtime sky's best attractions. The Moon and Saturn proved to be popular repeat draws, especially at high power.

Rick Kang gave a Sky Tour to an enthusiastic audience, pointing out the Winter Circle (now low in the west) and most of the spring constellations.

By the end of the evening we had received many thanks for hosting the party and a great deal of encouragement for doing it again every month. The public clearly likes the idea of regular star parties, and it seems like a popular idea within the club as well.

We intend to keep these events relatively informal so they continue to be fun for everybody. Whoever can make it, with or without telescopes, is encouraged to show up and help show the night sky to the public. We'll start at dusk or 7:00, whichever is later. Here are the dates and times (within a half hour) for the rest of the year. All First Quarter Fridays are at the College Hill Reservoir, 24th & Lawrence in Eugene.

May 9th - 8:30	June 13th - 9:00	July 11th - 9:00	August 8th - 8:30
September 5th - 7:30	October 10th - 7:00	November 7th - 7:00	December 5th - 7:00

May 10th is Astronomy Day, so our May 9th star party will be the EAS's observation of that event. Come on out and promote astronomy to an appreciative crowd!

Coburg and Creswell Star Parties

The EAS also held successful star parties for Coburg Elementary School on April 10th and for Creswell Cub Scouts Pack 28 on April 26th.

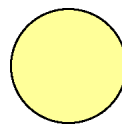
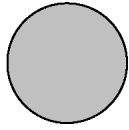
The Coburg star party drew a large crowd of over 100 students and parents despite high overcast and cold temperatures. The Moon, Mars, and Saturn provided excellent views nonetheless through telescopes provided by Gordon Landers, John Minard, Tony and Louise Dandurand, Tom Conlin, and Richard Boyd. Rick Kang organized the event and provided a sky tour.

The Cub Scout party was arranged because several of the Creswell Scouts are about to graduate to Boy Scout status, and they wanted to get their astronomy badges while they were still Cubs. Bill Murray, Jerry Oltion, Tom Conlin, and Storm Westrope helped them out in a field owned by Storm Westrope off Dillard Road. There were eight Cub Scouts, plus many more siblings, parents, friends, and members of the general public who had heard about the star party and showed up to have a look. With no Moon and a dark sky well south of town, we had no trouble finding deep sky objects to show them. M81 and M82 were especially popular directly overhead. People had trouble believing that they could see two galaxies in one field of view, so we showed them the Leo triplet just for fun. M3 also gathered a lot of “Oohs” and “Aahs,” and later on the Ring Nebula and M13 rose high enough to see as well.

Both star parties offered a good opportunity to get another generation of stargazers started. It seems likely that we'll see several of these kids at future star parties, and in years to come they may even wind up joining the EAS and helping another generation catch the bug.



Observing in May



May 5	May 11	May 19	May 27
Mercury Set 10:10 PM	Mercury Set 10:27 PM	Mercury Set 10:24 PM	Mercury Set 9:52 PM
Venus Rise 5:41 AM	Venus Rise 5:35 AM	Venus Rise 5:30 AM	Venus Rise 5:27 AM
Mars Set 1:55 AM	Mars Set 1:42 AM	Mars Set 1:23 AM	Mars Set 1:04 PM
Jupiter Rise 1:21 AM	Jupiter Rise 12:58 AM	Jupiter Rise 12:21 AM	Jupiter Rise 11:49 PM
Saturn Set 3:28 AM	Saturn Set 3:04 AM	Saturn Set 2:33 AM	Saturn Set 2:02 AM
Uranus Rise 4:00 AM	Uranus Rise 3:37 AM	Uranus Rise 3:06 AM	Uranus Rise 2:31 AM
Neptune Rise 2:55 AM	Neptune Rise 2:32 AM	Neptune Rise 2:00 AM	Neptune Rise 1:25 AM
Pluto Rise 11:22 PM	Pluto Rise 10:58 PM	Pluto Rise 10:26 PM	Pluto Rise 9:59 PM

All times: Pacific Standard Time (Nov 4, 2007-March 9, 2008) = UT-8 or U.S. Pacific Daylight Time (March 9-November 2, 2008) = UT - 7 hours.

Date	Moonrise	Moonset	Sunrise	Sunset	Twilight Begin	Twilight End
5/1/2008	03:55	15:59	06:03	20:16	04:08	22:12
5/2/2008	04:15	17:15	06:02	20:17	04:06	22:13
5/3/2008	04:38	18:35	06:00	20:19	04:04	22:15
5/4/2008	05:04	19:59	05:59	20:20	04:02	22:17
5/5/2008	05:36	21:24	05:58	20:21	04:00	22:19
5/6/2008	06:17	22:45	05:56	20:22	03:58	22:21
5/7/2008	07:11	23:55	05:55	20:23	03:56	22:23
5/8/2008	08:17	—	05:54	20:24	03:54	22:25
5/9/2008	09:33	00:51	05:53	20:26	03:52	22:27
5/10/2008	10:50	01:33	05:51	20:27	03:50	22:28
5/11/2008	12:06	02:05	05:50	20:28	03:48	22:30
5/12/2008	13:18	02:30	05:49	20:29	03:47	22:32
5/13/2008	14:26	02:51	05:48	20:30	03:45	22:34
5/14/2008	15:33	03:10	05:47	20:31	03:43	22:36
5/15/2008	16:37	03:28	05:46	20:32	03:41	22:38
5/16/2008	17:42	03:47	05:45	20:33	03:39	22:40
5/17/2008	18:47	04:07	05:44	20:35	03:37	22:42
5/18/2008	19:52	04:30	05:43	20:36	03:35	22:44
5/19/2008	20:56	04:58	05:42	20:37	03:34	22:46
5/20/2008	21:57	05:32	05:41	20:38	03:32	22:47
5/21/2008	22:51	06:14	05:40	20:39	03:30	22:49
5/22/2008	23:38	07:05	05:39	20:40	03:29	22:51
5/23/2008	—	08:03	05:38	20:41	03:27	22:53
5/24/2008	00:16	09:07	05:37	20:42	03:25	22:55
5/25/2008	00:48	10:13	05:37	20:43	03:24	22:56
5/26/2008	01:14	11:22	05:36	20:44	03:22	22:58
5/27/2008	01:37	12:30	05:35	20:45	03:21	23:00
5/28/2008	01:57	13:41	05:34	20:46	03:19	23:01
5/29/2008	02:17	14:53	05:34	20:47	03:18	23:03
5/30/2008	02:38	16:08	05:33	20:47	03:17	23:05
5/31/2008	03:02	17:28	05:33	20:48	03:15	23:06

Other Items of Interest This Month

All month: Asteroids Daphne and Astraea in Virgo
 5/1-26 Mercury visible after sunset (Best 5/12)
 5/1-3 Mercury near Pleiades
 5/3 Saturn ends retrograde motion
 5/5-7 Asteroid 7 Iris near Sombrero Galaxy
 5/6 Mercury near Moon (Pleiades & Aldebaran nearby)
5/9 First Quarter Friday star party
 5/10 Moon near M44 (Beehive Cluster)
 5/12 Moon just S. of Saturn & Regulus
 5/22-23 Mars goes through M44 (Beehive)

For Current Occultation Information

Visit **Derek C. Breit's** web site

“BREIT IDEAS Observatory”

<http://www.poyntsource.com/New/Regions/EAS.htm>

Go to Regional Events and click on the Eugene, Oregon section. This will take you to a current list of Lunar & asteroid events for the Eugene area. Breit continues to update and add to his site weekly if not daily. This is a site to place in your favorites list and visit often.

All times are for Eugene, Oregon Latitude 44° 3' 8" Longitude 123° 5' 8" for listed date

Pine Mountain Observatory Gets Ready for 2008 Visitors' Season

by Rick Kang

U of O's Pine Mountain Observatory, about an hour east of Bend, in Central Oregon, will soon be opening for public drop-in visits. Staffed primarily by amateur astronomers, the programs are run Friday and Saturday evenings from May 23rd through September 27th this year. The facility is undergoing several upgrades: Trees are being cut back to provide the lower skylines that were present when the Observatory was established 40 years ago. We have a Welcome Center/Info Building near the parking lot, which will also be where souvenirs are available for visitors. We'll have a large professional-grade tent near the Info Building in which to conduct introductory programs (in place of using the 32" telescope dome). Dan Gray, telescope expert from Portland, has restored the 24" telescope to much improved mechanical condition. The 15" telescope is in storage, replaced by our new 14" sitting atop the Paramount mount loaned from PSU. This new instrument, which will include an Apogee CCD Camera, will be for research data collection by students and teachers, hopefully starting later in the summer. To complement the 24" for visual viewing, we need to have several portable telescopes set up outside at the "upper deck" during tour nights. There is limited overnight storage space for portable scopes either in the temporary shed at the upper deck or in the warm room at the basement of the 24". (We contemplate having a roll-off roof building for these, with permanent piers for the Cassegrains, eventually.)

So, we're looking for volunteers to staff the Info Building and to handle telescopes (portables and the 24") on Friday and Saturday nights. We have several Dobsonians and a few Cassegrains available, or you're welcome to bring your own telescope. We will provide training for the 24" and for working at the Info Center. Also, if you have a program about space, particularly about the current sky, we're looking for presenters at the new tent facility. We hope to have Internet available within, and are even looking at how we could offer remote presentations, as we know how expensive travel can be. We have a limited budget to comp serious tourguides for gas, and we may offer access to the astronomers' residence for tourguides staying for both days.

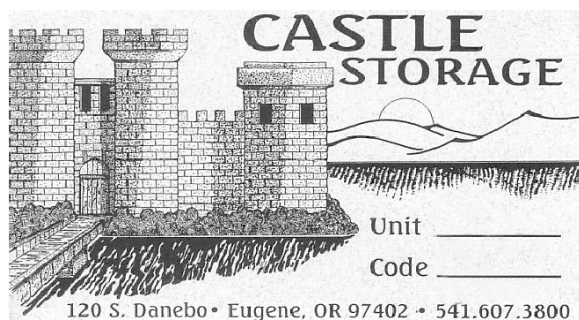
If you're interested in helping out at PMO, please contact Greg Hogue, Tour Chairman, in Bend, 541-771-6987, or Kent Fairfield, Facility Coordinator, in LaPine, tualatinkent@aol.com, or for info, contact Rick Kang, in Eugene, 541-683-1381 or rkang@efn.org. This year we'll offer training on Saturdays through the season rather than in advance. We'll continue our Tourguide mail listserve that you can join to sign up for weekends and see who else is available (contact Kent about that), post to pmoguides@patch.com, replying to weekly invitational message.

The Friends of Pine Mountain Board meets in Hillsboro, Saturday, May 3rd, where tour issues will be discussed. All interested astronomers are welcome. Bring a sack lunch and munchies/beverages to share. Details/directions posted shortly on FOPMO website, <http://pmo-sun.uoregon.edu/~pmo/>



Thank You Castle Storage

Board member Tommy Lightning Bolt was instrumental in getting a storage unit from the owners of Castle Storage for EAS to store its telescopes and equipment. EAS would like to thank Castle Storage for their generosity and support for our group. Please give them a call if you need a storage space, and tell your friends. They are great people and offer secure and quality units.



Galaxy or Globular Cluster?

by Sam Pitts

The largest and brightest naked eye globular cluster, Omega Centauri, may be the remnants of a dwarf galaxy. Recent observations also suggest it hosts an intermediate-mass black hole in its core of 40,000 solar masses. The results by astronomer and team leader Eva Noyola, of Garching Germany, show a continuous range of masses for black holes from super-massive down to smaller stellar-mass types.



Hubble Telescope image of Omega Centauri, NASA

Omega Centauri is 17,000 light years from Earth and appears as large as the moon from a dark sky. It is located above the plane of the Milky Way Galaxy and only visible from southern latitudes in the United States. It was first listed in Ptolemy's catalogue some two thousand years ago as a single large star. In 1677 Edmond Hally listed it as a nebula, while in the 1830s John Herschel recognized it as a globular cluster. Current speculation and theorists now believe it is a dwarf galaxy stripped of its outer stars.

The great globular cluster M13 in Hercules as well as all similarly listed clusters consist of millions of old stars bound tightly by their gravitational fields. These stars are thought to be the oldest stars of our Milky Way galaxy. The problem with Omega Centauri is it is made up of several different generations of stars, is

highly flattened, and rotates much faster than other so-called globular clusters.

The current observable mass of Omega Centauri is at least ten times more than any other of the Milky Way's globular clusters and is more in line with the mass of a small or possible dwarf galaxy. Finding a black hole at the center would lend credence to the small galaxy theory, and its present view may have been the result of the Milky Way colliding with a smaller galaxy and stripping off its outer mass.

We are living in interesting times, as our ideas and assumptions of various objects continue to change and progress as our knowledge and observational techniques increase. Pluto is not a planet (?), black holes everywhere and now Omega Centauri may not be a globular cluster.



M13 photo © by Sam Pitts



The Moon and the Magnetotail

From Science@NASA.gov

Behold the full Moon. Ancient craters and frozen lava seas lie motionless under an airless sky of profound quiet. It's a slow-motion world where even a human footprint may last millions of years. Nothing ever seems to happen there.

Right?

Wrong. NASA-supported scientists have realized that something does happen every month when the Moon gets a lashing from Earth's magnetic tail.

"Earth's magnetotail extends well beyond the orbit of the Moon and, once a month, the Moon orbits through it," says Tim Stubbs, a University of Maryland scientist working at the Goddard Space Flight Center. "This can have consequences ranging from lunar 'dust storms' to electrostatic discharges."



Yes, Earth does have a magnetic tail. It is an extension of the same familiar magnetic field we experience when using a Boy Scout compass. Our entire planet is enveloped in a bubble of magnetism, which springs from a molten dynamo in Earth's core. Out in space, the solar wind presses against this bubble and stretches it, creating a long "magnetotail" in the downwind direction.

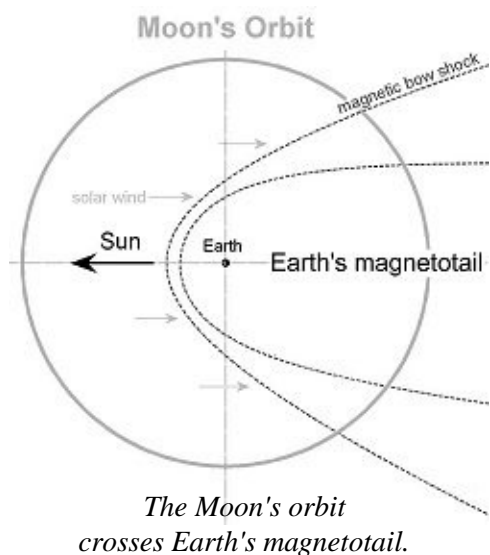
Anyone can tell when the Moon is inside the magnetotail. Just look: "If the Moon is full, it is inside the magnetotail," says Stubbs. "The Moon enters the magnetotail three days before it is full and takes about six days to cross and exit on the other side."

It is during those six days that strange things can happen.

During the crossing, the Moon comes in contact with a gigantic "plasma sheet" of hot charged particles trapped in the tail. The lightest and most mobile of these particles, electrons, pepper the Moon's surface and give the Moon a negative charge.

On the Moon's dayside this effect is counteracted to a degree by sunlight: UV photons knock electrons back off the surface, keeping the build-up of charge at relatively low levels. But on the nightside, in the cold lunar dark, electrons accumulate and voltages can climb to hundreds or thousands of volts.

Walking across the dusty charged-up lunar terrain, astronauts



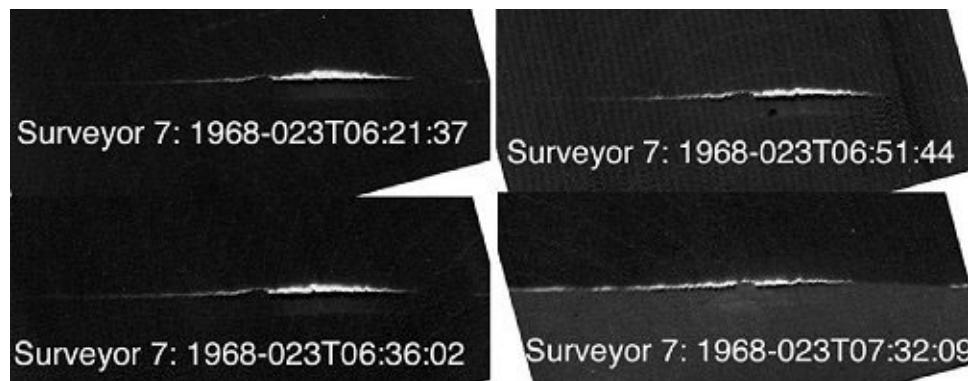
may find themselves crackling with electricity like a sock pulled out of a hot dryer. Touching another astronaut, a doorknob, a piece of sensitive electronics—any of these simple actions could produce an unwelcome zap. "Proper grounding is strongly recommended," advises Stubbs.

The ground, meanwhile, may leap into the sky. There is compelling evidence (see, e.g., the Surveyor 7 image below) that fine particles of moondust, when sufficiently charged-up, actually float above the lunar surface. This could create a temporary nighttime atmosphere of dust ready to blacken spacesuits, clog machinery, scratch faceplates (moondust is very abrasive) and generally make life difficult for astronauts.

Stranger still, moondust might gather itself into a sort of diaphanous wind. Drawn by differences in global charge accumulation, floating dust would naturally fly from the strongly-negative nightside to the weakly-negative dayside. This "dust storm" effect would be strongest at the Moon's terminator, the dividing line between day and night.

Much of this is pure speculation, Stubbs cautions. No one can say for sure what happens on the Moon when the magnetotail hits, because no one has been there at the crucial time. "Apollo astronauts never landed on a full Moon and they never experienced the magnetotail."

The best direct evidence comes from NASA's Lunar Prospector spacecraft, which orbited the Moon in 1998-99 and monitored many magnetotail crossings. During some crossings, the spacecraft sensed big changes in the lunar nightside voltage, jumping "typically from -200 V to -1000 V," says Jasper Halekas of UC Berkeley who has been studying the decade-old data.



In 1968, on many occasions, NASA's Surveyor 7 moon lander photographed a strange "horizon glow" after dark. Researchers now believe the glow is sunlight scattered from electrically-charged moondust floating just above the lunar surface.

"It is important to note," says Halekas, "that the plasma sheet (where all the electrons come from) is a very dynamic structure. The plasma sheet is in a constant state of motion, flapping up and down all the time. So as the Moon orbits through the magnetotail, the plasma sheet can sweep across it over and over again. Depending on how dynamic things are, we can encounter the plasma sheet many times during a single pass through the magnetotail with encounters lasting anywhere from minutes to hours or even days."

"As a result, you can imagine how dynamic the charging environment on the Moon is. The Moon can be just sitting there in a quiet region of the magnetotail and then suddenly all this hot plasma goes sweeping by causing the nightside potential to spike to a kilovolt. Then it drops back again just as quickly."

The roller coaster of charge would be at its most dizzying during solar and geomagnetic storms. "That is a very dynamic time for the plasma sheet and we need to study what happens then," he says.

What happens then? Next-generation astronauts are going to find out. NASA is returning to the Moon in the decades ahead and plans to establish an outpost for long-term lunar exploration. It turns out they'll be exploring the magnetotail, too.

