

★ ABOVE THE FOG

• BULLETIN OF THE SAN FRANCISCO AMATEUR ASTRONOMERS •

Vol. 60, No. 11 - November 2012

NOVEMBER GENERAL MEETING CANCELLED

Randall Museum . 199 Museum Way . San Francisco

7:00 pm Doors Open . 7:30 pm Announcements . 8:00 pm Speaker

SFAA's General Meetings occur on the 3rd Wednesday of each month (except January)



HAPPY THANKSGIVING

Thanksgiving ...
the holiday of peace,
the celebration of work
.. the simple life...
a true folk-festival that speaks
the poetry of the turn of the
seasons, the beauty of seedtime
and harvest,
the ripe product of the year
~Ray Stannard Baker (David
Grayson)

Heap high the board
with plenteous cheer
and gather to the feast,
And toast the sturdy Pilgrim
band whose courage never
ceased.
~Alice W. Brotherton

PRESIDENT'S MESSAGE

Who is enjoying the wonderful night skies as the evenings lengthen and cool down? We've been lucky to enjoy some great conditions on Mt Tam and some good ones at Pt Lobos. I am honored to be President of a club with such active volunteer members, many of whom brought scopes out to Mt Tam's Rock Springs last month – twice – for public viewing events.

The Summer Program of Astronomy on the Mountain finished its season strong, with an amazingly packed audience and only two weeks later, the Bay Area Science Festival also attracted the public who were treated to more scope viewing. A special thanks to all the regulars who make the trek (some of you from afar!) to bring your scopes to the public ... you do the club proud!

Nominations for the 2012 awards are being sought. An email soliciting your suggestions will be sent soon, as will a request for nominations for the Board.

Having served two years as President, and a year prior to that as Treasurer, in 2013 I will be standing down as an Officer of the club, however I'll certainly remain a loyal Board Member! If you have an interest in becoming more involved with the growth of the club, please do consider running for a Board Position. Please contact Douglas Smith at secretary@sfaa-astronomy.org if you would like more information about the nomination process.

I encourage you to save the date – January 19th 2013 for our Annual Awards Dinner and investiture of new Officers. More to come on venue and menu in December.

December is also renewal time for some club members, so keep an eye out for an email from Club Treasurer – Angie Treager!

Wishing you all Clear and Still Skies

Sue-Ellen Speight
President
San Francisco Amateur Astronomers



DECEMBER 19, 2012
THE SUTTER'S MILL METEORITE FALL IN
CALIFORNIA'S GOLD COUNTRY

a presentation by
Dr. Peter Jenniskens
SETI Institute

Randall Museum . 199 Museum Way . San Francisco
7:00 pm Doors Open . 7:30 pm Announcements . 8:00 pm Speaker



Join Dr. Peter Jenniskens from the SETI Institute for a presentation on *The Sutter's Mill Meteorite Fall in California's Gold Country*. On April 22, 2012, a bomb-like detonation was heard in a wide area around Lake Tahoe. A small asteroid had crashed in our atmosphere, broke in fragments, and pieces of the asteroid fell down over the Colama/Lotus region. This is right above Sutter's Mill where James Marshall's discovery of gold in 1848 led to the California Gold Rush. The recent fall of the meteorites has created a second rush in the area, now many are trying to recover the precious space rocks. SETI Institute meteor astronomer Dr. Peter Jenniskens found the second recovered meteorite from this fall. Jenniskens will talk about the efforts made by NASA Ames Research Center and the SETI Institute to coordinate the recovery and learn as much as possible about the asteroid that shook people's imagination.

Peter Jenniskens latest project took him and 27 researchers on NASA's DC-8 Airborne Laboratory for a mission to study the re-entry of JAXA's Hayabusa mission in June of 2010. Before that, he had been the Principal Investigator of a number of airborne observing campaigns that studied meteor showers and the fireballs created when spacecraft returned from interplanetary space. He received his Ph.D. in astronomy from Leiden University in the Netherlands and has since been associated with NASA Ames Research Center and the SETI Institute. He is the author of "Meteor Showers and their Parent Comets" (2006).

IMPORTANT DATES & UPCOMING SIGNIFICANT VIEWING EVENTS

SFAA GENERAL MEETINGS & LECTURES

*Randall Museum, 199 Museum Way (Near 14th Street and Roosevelt)
Third Wednesday of each month: 7:00 p.m. Doors open. 7:30 p.m. Announcements.
8:00 p.m. Speaker*

SFAA BOARD MEETINGS IMMEDIATELY PRECEDE GENERAL MEETINGS AND BEGIN AT 6:00 P.M.

December 19

2010 MT TAM SPECIAL USE PERMIT STAR PARTIES MEMBERS ONLY (*GATEKEEPERS NEEDED*)

Special Use Permit observing nights on Mount Tamalpais are private and open *only* to SFAA members. Please arrive by sunset. A permit is required for each car. We must vacate the mountain by 2:00 a.m. except on specially approved nights (such as Messier Marathon).

Always on Saturday. December 15

MT TAM PUBLIC STAR PARTIES (May through October)

Public nights on Mount Tamalpais start with a lecture in the Mountain Theatre, followed by public viewing in the Rock Springs parking lot. SFAA members may view privately after crowd departs from approx. 11 pm-2 am.

For more information: <http://www.sfaa-astronomy.org/starparties/>

GRAND MEETING ANNOUNCED

NIGHT SKY NETWORK

NOVEMBER 2012 - THE EVENING SKY

November Sky Map: <http://skymaps.com/skymaps/tesmn1211.pdf>

November Sky Calendar: <http://skymaps.com/articles/n1211.html>

BAY AREA ASTRONOMY EVENTS

Kenneth Lum

<http://tech.groups.yahoo.com/group/bayastro/?v=1&t=directory&ch=web&pub=groups&sec=dior&slk=94>

BAY AREA REGULARLY SCHEDULED EVENTS

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| <p>EVERY FRIDAY NIGHT 7:00 PM – 10:00 PM excluding major holidays</p> <p>The Telescope Makers' Workshop</p> <p>CHABOT SPACE AND SCIENCE CENTER 10000 Skyline Boulevard Oakland, CA 94619-2450</p> | <p>THE TELESCOPE MAKERS' WORKSHOP is held every Friday night from 7pm - 10pm, excluding major holidays (e.g. Christmas Day and New Year's Day) that fall on Fridays. The Workshop is always closed on Memorial Day Weekend. Attendance every Friday night is not mandatory, and members work at their own pace. The Workshop meets at Chabot Space & Science Center, 10000 Skyline Blvd., Oakland. Contact us for more specific details:</p> <p>Contact: E-mail Richard Ozer (rozer@pacbell.net) or (510) 406-1914</p> |
| <p>EVERY FRIDAY & SATURDAY EVENING, weather permitting 7:30 PM – 10:30 PM</p> <p>CHABOT SPACE AND SCIENCE CENTER 10000 Skyline Boulevard Oakland, CA 94619-2450 (510) 336-7300</p> | <p>EXPLORE THE NIGHT SKIES AT THE CHABOT OBSERVATORIES For more information: http://www.chabot.space.org/</p> <p>Free Telescope Viewing Regular hours are every Friday & Saturday evening, weather permitting: 7:30pm -10:30pm Come for spectacular night sky viewing the best kept secret in the Bay Area and see the magnificence of our telescopes in action!</p> <p>Daytime Telescope Viewing On Saturday and Sunday afternoons come view the sun, moon, or Venus through Chabot's telescopes. Free with General Admission. (weather permitting)</p> <p>12pm - 5pm: Observatories Open</p> |
| <p>EVERY CLEAR FRIDAY 9:00 PM – 11:00 PM</p> <p>FOOTHILL OBSERVATORY FOOTHILL COMMUNITY COLLEGE 12345 Moody Rd. Los Altos Hills</p> | <p>FOOTHILL OBSERVATORY is open for public viewing every clear Friday evening from 9:00 p.m. until 11:00 p.m. Visitors can view the wonders of the universe through the observatory's computer-controlled 16- inch Schmidt-Cass grain telescope.</p> <p>Views of objects in our solar system may include craters and mountains on the moon, the moons and cloud-bands of Jupiter, the rings of Saturn, etc. Deep space objects including star clusters, nebulae, and distant galaxies also provide dramatic demonstrations of the vastness of the cosmos. The choice of targets for any evening's viewing depends on the season and what objects are currently in the sky.</p> <p>The public viewing programs at Foothill are free of charge and are open to guests of all ages. Please note that the observatory is closed when the weather is cloudy. Also note that visitor parking permits are available from the machines in the parking lots for \$3.00.</p> <p>Come to Foothill Observatory and join us in the exploration of our Universe!</p> <p>Foothill Observatory is located on the campus of Foothill College in Los Altos Hills, CA. Take Highway 280 to</p> |

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| | <p>the El Monte Rd exit. The observatory is next to parking lot 4. Parking at the college requires visitor parking permits that are available from the machines in the parking lots for \$3.00.</p> |
| <p>EVERY SATURDAY 10:00 AM – 12PM if it is clear</p> <p>FOOTHILL COLLEGE OBSERVATORY FOOTHILL COMMUNITY COLLEGE 12345 Moody Rd. Los Altos Hills, CA</p> | <p>Solar observing with a Hydrogen alpha solar telescope every clear Saturday morning. This allows spectacular views of solar prominences and unusual surface features on the Sun not otherwise visible with regular white light telescopes.</p> <p>Admission is free.</p> <p>Foothill Observatory is located on the campus of Foothill College in Los Altos Hills, CA. Take Highway 280 to the El Monte Rd. exit. The observatory is next to parking lot 4. Parking at the college requires visitor parking permits that are available from the machines in the parking lots for \$ 3.00.</p> |
| <p>TWICE MONTHLY Sunset - 7:43PM</p> <p>Inclement weather (clouds, excessive wind and showers) will cause the event to be canceled without notice.</p> <p>San Mateo County Astronomical Society Star Party</p> | <p>STAR PARTIES AT CRESTVIEW PARK, SAN CARLOS</p> <p>Come out and bring the kids for a mind expanding look at the universe</p> <p>The City of San Carlos Parks and Recreation Department and the San Mateo County Astronomical Society has open Star Parties twice a month. These events are held in Crestview Park, San Carlos California.</p> <p>Note that inclement weather (clouds, excessive wind and showers) will cause the event to be canceled without notice.</p> <p>For more information call Bob Black, (650)592-2166, or send an email to SMCAS@live.com or call Ed Pieret at (650)862-9602.</p> <p>Reasons to Attend</p> <p>If you have kids interested in space or planets bring them here for a real life view of planets, nebula, star clusters and galaxies.</p> <p>If you are thinking of buying a telescope or want help using a telescope you own, come here to talk with experienced users. If you think you might have an interest in astronomy come and talk to experienced amateur astronomers.</p> <p>Cautions</p> <p>Dress warmly and wear a hat.</p> <p>Visitors should park on the street and walk into the park so your headlights don't affect the observer's dark adaptation.</p> <p>Only park in the parking lot if you are arriving before dark and plan to stay until the end of the event. You shouldn't need lights but if you feel you do, only bring a small flashlight with the lens covered using red cellophane or red balloon.</p> <p>Please respect the telescopes and ask permission from the owner if you wish to touch.</p> <p>Parents, please watch your children.</p> <p>The park is residential, and adjacent to homes and backyards, please keep noise to a minimum.</p> <p>Schedule Time</p> <p>Astronomers arrive to set up at around sunset. Observing starts at about one hour after sunset and continues for two to three hours.</p> |
| <p>BAY AREA EVENTS – NOVEMBER 2012</p> | |
| <p>Thursday, November 15 4:15 PM</p> <p>LOCKHEED MARTIN ADVANCED TECHNOLOGY CENTER 3251 Hanover Street Palo Alto</p> | <p>MOLTEN-SALT & THORIUM NUCLEAR POWER – Dr. Alex Cannara, Cannara Consulting</p> |

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| <p>Friday, November 16 8:45 PM - 11:45 PM weather permitting</p> <p>SAN JOSE ASTRONOMICAL ASSOCIATION Houge Park Twilight Drive San Jose, CA 95124</p> | <p>HOUGE PARK STAR PARTY</p> <p>Meet with members of San Jose Astronomical Society for a Star Party, weather permitting.</p> |
| <p>Saturday, November 17 11:00 AM</p> <p>HILLER AVIATION MUSEUM 601 Skyway Road San Carlos CA</p> <p>Cost: Free with Admission</p> | <p>FARIDE KHALAF SATURN V - THE FIRST 700 SECONDS</p> <p>As we witnessed each launch of the Apollo program, we would forever remember the countdown, ignition sequence, images of the Saturn V rocket engines billowing out vast, fast and furious hot gas, and then lift off. We'll never forget those sheets of ice breaking off the exterior and raining down on the launch pad as the rocket cleared the tower. What we saw, what we remember, and the extent of what was broadcast on the daily news is a very small fraction of all that lead to NASA's greatest achievements. Highlighting some of the interesting and little known technical aspects of the various missions, Faride Khalaf will take you down memory lane and visit the Apollo program in a unique way. We will focus on some of the details starting from launch preparation to the last rocket blast that sent the gallant crew and their spacecraft to the moon. In this presentation, you'll find answers to questions that Walter Cronkite never thought to ask! Come join us and relive the oldest of human dreams, a dream worth revisiting.</p> |
| <p>Saturday, November 17 7:30 PM</p> <p>EAST BAY ASTRONOMICAL SOCIETY CHABOT SPACE & SCIENCE CENTER 10000 Skyline Blvd Hauben Resource Center, Dellums Bldg Oakland</p> <p>Cost: Free</p> | <p>IO AND THE GALILEAN SATELLITES: LAVA LAKES, VOLCANIC PLUMES, AND UNDERGROUND OCEANS Speaker: KATHERINE DE KLEER, UC BEKELEY</p> |
| <p>Monday, November 19 7:00 – 9:00 PM</p> <p>MT DIABLO ASTRONOMICAL SOCIETY</p> <p>CONCORD LIBRARY 2900 Salvio Concord</p> <p>Cost: Free</p> | <p>ASTRONOMY PROGRAM CONCORD LIBRARY MT. DIABLO ASTRONOMICAL SOCIETY PRESENTS ASTRONOMY ACTIVITIES</p> <p>See stars, nebula, galaxies, clusters, the moon and Jupiter through member telescopes. Bring kids, dress warmly. Astronomy program is weather dependent.</p> <p>Contact: Steve Jacobs Email: outreachinfo@... Phone: 925-695-3134</p> |
| <p>Monday, November 20 12:00 NOON</p> <p>SETI INSTITUTE 189 Bernardo Avenue Mountain View 94043</p> | <p>ON THE LONG TERM ORBITAL EVOLUTION OF THE NATURAL SATELLITES BENOIT NOYELLES</p> <p>The natural satellites of the giant planets of our Solar System are nearly all locked into</p> |

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| <p>Cost: Free</p> | <p>resonances. There are spin-orbit resonances, resulting in synchronous rotations as for our Moon, but also orbital resonances between them. This configuration cannot be the result of a random process but is the consequence of slow dissipation acting over the ages, driving the system into a dynamical equilibrium.</p> <p>Quantifying this dissipation yields clues on the internal structure of these bodies and their parent planets. A good way to quantify this process is to elaborate accurate orbital ephemerides of these bodies, in which this dissipation is considered. For that, we must dispose of the last 100 years of astrometric observations.</p> <p>In this talk, Dr. Noyelles will explain how the orbital dissipation in Jupiter was quantified, present a surprising result for the Saturnian satellites that could explain the formation of the Cassini Division, and discuss some dynamical aspects of the satellites of Uranus.</p> <p>https://plus.google.com/events/cnenv5cm34hdfi6jsmsqto28ro</p> |
| <p>Friday, November 23 8:45 PM - 11:45 PM weather permitting</p> <p>SAN JOSE ASTRONOMICAL ASSOCIATION Houge Park Twilight Drive San Jose, CA 95124</p> | <p>HOUGE PARK STAR PARTY</p> <p>Meet with members of San Jose Astronomical Society for a Star Party, weather permitting.</p> |
| <p>Tuesday, November 27 12:00pm</p> <p>SETI INSTITUTE COLLOQUIUM SERIES 189 Bernardo Avenue Mountain View, CA 94043</p> | <p>SARA WALKER, BEYOND Center, Arizona State University THE ALGORITHMIC ORIGINS OF LIFE</p> <p>The origin of life is arguably one of the greatest unanswered questions in science. A primary challenge is that without a proper definition for life – a notoriously challenging problem in its own right – the problem of how life began is not well posed. Here we propose that the transition from non-life to life may correspond to a fundamental shift in causal structure, where information gains direct, and context-dependent, causal efficacy over matter, a transition that may be mapped to a nontrivial distinction in how living systems process information.</p> <p>Dr. Walker will discuss potential measures of such a transition, which may be amenable to laboratory study, and how the proposed mechanism corresponds to the onset of the unique mode of (algorithmic) information processing characteristic of living systems.</p> |
| <p>Tuesday, 11/27/12 04:15 PM</p> <p>Stanford University Hewlett Teaching Center Rm 201</p> | <p>HIGGS BOSONS IN SUPERCONDUCTORS PROFESSOR CHANDRA VARMA, Univ. of California at Riverside, will give the Applied Physics/Physics colloquium.</p> |

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| <p>Palo Alto, CA</p> <p>Cost: Free</p> | |
| <p>Tuesday, November 27, 2012 at 7:30 PM</p> <p>PANOFSKY AUDITORIUM SLAC NATIONAL ACCELERATOR LABORATORY 2575 Sand Hill Road Menlo Park, California</p> | <p>SUPERNOVA SHOCK WAVES: POWERHOUSES OF THE GALAXY YASUNOBU UCHIYAMA, SLAC/KIPAC</p> <p>An exploding star, or supernova, is one of the most violent events in the universe, giving off a billion stars' worth of light. Even thousands of years later, the remnants of these explosions are among the most beautiful and mysterious objects in the cosmos--enormous balls of high-energy particles and strong magnetic fields, confined by the expanding shock wave from the original explosion. To understand the true nature of supernova remnants, scientists examine them in a wide range of wavelengths, from visible light to radio waves, X-rays and gamma rays. New observations with the Fermi Gamma-ray Space Telescope show how supernova remnants act as giant particle accelerators--much more powerful than the biggest ones on Earth--to produce the high-energy cosmic rays that fill the galaxy.</p> <p>Speaker Bio: Yasunobu Uchiyama is a scientist at the joint SLAC/Stanford University Kavli Institute for Particle Astrophysics and Cosmology. He received his undergraduate degree from the University of Tokyo in 1998, and received his Ph.D. also from the University of Tokyo in 2003. After working as a postdoc at Yale University and ISAS/JAXA (Japan), he joined SLAC as a Panofsky Fellow in 2008. His research interests include the physics of cosmic-ray acceleration, and X-ray and gamma-ray observations of galactic cosmic-ray sources (especially supernova remnants). He is a member of the Fermi Gamma-ray Space Telescope LAT Collaboration and leads the Supernova Remnant working group. He is also a member of the ASTRO-H Collaboration as deputy leader of the Shock/Acceleration working group.</p> |
| <p>Wednesday, November 28 7:00 - 8:00 PM</p> <p>OSHMANN FAMILY JCC 3921 Fabian Way Palo Alto, CA</p> <p>Cost: \$5 students \$10 Commonwealth Club \$15 general</p> | <p>SLAC: CELEBRATING 50 YEARS OF SCIENTIFIC DISCOVERY</p> <p>For five decades, SLAC National Accelerator Laboratory has pioneered groundbreaking discoveries from astrophysics to energy science. The home of cutting-edge facilities and technologies, scientists uncover mysteries on the smallest and largest scales - from the workings of the atom to the enigmas of the cosmos. Research conducted at SLAC has led to Nobel Prizes for discovering two fundamental particles, proving protons are made of quarks and showing how DNA directs protein manufacturing in cells. Richter explains how SLAC helped define the science of the past, and Holtkamp shares his vision of how SLAC will enable the science of the future. Join Richter as he explains how SLAC helped define the science of today, and Holtkamp as he shares his vision of how SLAC will enable the science of the future.</p> <p>Speakers: DR. BURTON RICHTER, Nobel Prize Winning Physicist, Director Emeritus, SLAC National Accelerator Laboratory DR. NORBERT HOLTKAMP, SLAC National Accelerator Laboratory</p> <p>Contact: GEORGETTE GEHUE Email: ggehue@commonwealthclub.org Phone: 408-280-5530 Website: https://www.commonwealthclub.org/events/2012-11-28/slac-50-years-scientific-discovery</p> |
| <p>Friday, 11/30 7:00 - 10:00 PM</p> <p>SAN JOSE ASTRONOMICAL</p> | <p>HOUGE PARK STAR PARTY Meet with members of San Jose Astronomical Society for a Star Party, weather permitting.</p> |

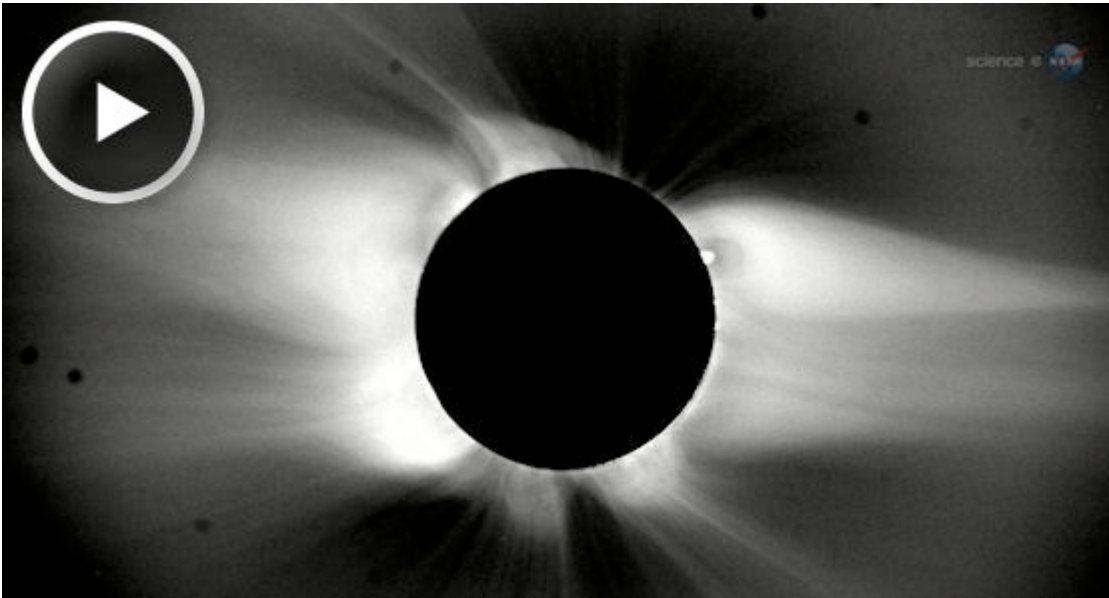
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| <p>ASSOCIATION Houge Park Twilight Drive San Jose, CA</p> <p>Cost: Free</p> | |
| <p>Sunday, December 2 12:00 NOON - 1:00 PM</p> <p>MOSCONE CENTER SOUTH Gateway Ballroom, Room 102 San Francisco, CA</p> <p>Cost: Free</p> | <p>PUBLIC LECTURE – CURIOSITY DRIVEN MARS EXPLORATION</p> <p>The American Geophysical Union invites everyone to it's annual public lecture, given this year by scientists working with the rover Curiosity, which is currently exploring Mars. A panel of three Mars scientists will engage the public in a discussion of Mars exploration and the latest activities of the most sophisticated explorer ever sent to another planet. The panelists will discuss the hopes and excitement of exploring Mars through a robot's eyes, nose, taste, and touch.</p> <p>Web:http://fallmeeting.agu.org/2012/events/public-lecture-curiosity-driven-mars-exploration/</p> |
| <p>Saturday, December 1 7:30 PM</p> <p>San Jose Astronomical Association Houge Park Twilight Drive San Jose, CA</p> <p>Cost: Free</p> | <p>San Jose Astronomical Association Meeting</p> <p>MAKING SPACE EXPLORATION AFFORDABLE FOR EVERYONE SPEAKER: PETER PLATZER</p> <p>Contact: http://www.sjaa.net/year2012.shtml Website: Click to Visit</p> |
| <p>Monday, December 3 7:00 PM</p> <p>BUILDING 3 BALLROOM NASA AMES MOFFETT FIELD</p> <p>Cost: Free</p> | <p>Please join us at NASA Ames for an exciting lecture on December 3, at 7 pm in the Bldg. 3 Ballroom.</p> <p>"ABUNDANCE", which is part of the NRP Exploration Lecture Series, will feature Dr. Peter H. Diamandis, Executive Chairman Singularity University (SU at NASA Research Park) & CEO of X PRIZE.</p> <p>Diamandis, best-selling author, space entrepreneur, medical doctor and educational visionary, will discuss the synergies between SU, the International Space University (ISU), X PRIZE and NASA, the use of cutting edge technologies to shape the future of humankind and solve global problems, and the concepts of abundance and persistence to achieve amazing results.</p> <p>Attendees are welcome to bring pre-purchased copies of Diamandis' books for him to autograph.</p> |
| <p>Monday, December 3 7:30PM</p> <p>Planetarium 55 Music Concourse Dr. Golden Gate Park San Francisco CA</p> | <p>Benjamin Dean Lecture NEAR-EARTH OBJECTS: FINDING THEM BEFORE THEY FIND US DR. DONALD YEOMANS NASA Jet Propulsion Laboratory</p> <p>Of all the natural disasters that could befall us, only an Earth impact by a large comet or asteroid has the potential to end civilization in a single blow. Yet these near-Earth objects also offer tantalizing clues to our solar system's origins, and someday could even serve as stepping-stones for space exploration. Donald Yeomans introduces the public to the science of near-Earth objects—its history, applications, and ongoing quest to find near-Earth objects before they find us. Abook signing with the author will follow the presentation.</p> <p>Reservations:Adults \$12, Seniors \$10, Academy Members \$6. Seating is limited. To reserve a place today, buy a ticket online or over the phone at 415-379-8000</p> |

The Science@NASA team is pleased to announce a new product: the ScienceCast. Every week, we produce a short video highlighting a topic in NASA science news. A complete list of ScienceCast episodes may be found on Science@NASA's Youtube channel: <http://www.youtube.com/user/ScienceAtNASA> . Enjoy!

TOTAL ECLIPSE OF THE SUN

Nov. 8, 2012: People from around the world are converging on the coast of northeast Australia. The attraction isn't the Great Barrier Reef, just offshore, or the surrounding rain forests full of wildlife and exotic plants. They're going to see a total eclipse of the sun.

On the morning of Nov. 14th (Australia time), about an hour after sunrise, the Moon will pass directly in front of the sun. Residents and visitors of the city of Cairns, also known as the Gateway to the Great Barrier Reef, will enjoy an early morning eclipse lasting 2 minutes with the sun only 14 degrees above the eastern horizon.



Solar eclipses aren't only pretty, they're also scientifically valuable. A new ScienceCast video explains how. [Play it](#)

NASA eclipse expert Fred Espenak has a rating scheme for natural wonders. "On a scale of 1 to 10," he says, "total eclipses are a million." Even the reef itself will be momentarily forgotten by onlookers as the Moon's cool shadow sweeps across the beach and the ghostly tendrils of the solar corona surround the black lunar disk.

But there's more to this event than tourism. Scientists are attending, too. For researchers, the brief minutes of totality offer a window into one of the deepest mysteries of solar physics: The mystery of coronal heating.

In plain language, they'd like to know why the sun's outer atmosphere or "corona" is so hot. The surface temperature of the sun is only 6000 degrees C. Yet the corona above it is much warmer, a million degrees Celsius or even more.

To understand the physics involved, astronomers have developed instruments called coronagraphs, which block the glare of the sun to reveal the faint corona. Three spacecraft, SOHO and the twin STEREO probes, currently monitor the solar corona using these devices. But no manmade instrument can match Earth's natural satellite. The Moon is nature's greatest coronagraph.

During an eclipse, "the moon reveals the innermost corona, which manmade coronagraphs have trouble seeing," explains Shadia Habbal of the Institute for Astronomy in Hawaii. "That is where all the magnetic field and physical processes responsible for heating the corona are evolving most rapidly."

On Nov. 13/14, 2012, the path of totality crosses the northeast coast of Australia. Click on the image for viewing times and a map of the entire eclipse path. [More](#)



On Nov. 12th, Habbal will be in Palm Cove, Australia, to deliver a keynote speech at a solar physics conference sponsored in part by NASA's Living with a Star Program. The title of her talk is "*The unique scientific advantages of total solar eclipse observations.*" Two days later, Habbal and her colleagues will be inside the path of totality, monitoring the eclipse with a variety of telescopes and spectrometers at 6 different wavelengths from 2 different sites.

Astronomy professor Jay Pasachoff, chair of the International Astronomical Union's Working Group on Eclipses will be there, too. He has observed an astounding 55 solar eclipses. "The Australia eclipse will be my 56th," he notes.

Over the years, Pasachoff and colleagues have developed techniques to photograph the corona with a clarity and resolution that coronagraphs on current spacecraft cannot match. Using these techniques, "we are learning how the wonderfully-detailed structures we see in the corona are shaped by the sun's magnetic field," he explains. The shapes vary in a regular way during the sun's 11-year sunspot cycle. "We can use this information to improve predictions of the next solar cycle."

That's a lot of science in two minutes of shadowy darkness.

After totality is over, the moon's shadow will sweep out across the South Pacific Ocean, tracing a line thousands of miles long across uninhabited waters, reaching almost, but not quite, the coast of South America. Back on the beach, scientists will be taking a first look at their data while tourists starting thinking about breakfast--and snorkeling in the reef. For all concerned, it's a great way to begin the day.

For more information about the eclipse, visit NASA's [Solar Eclipse Home Page](#).

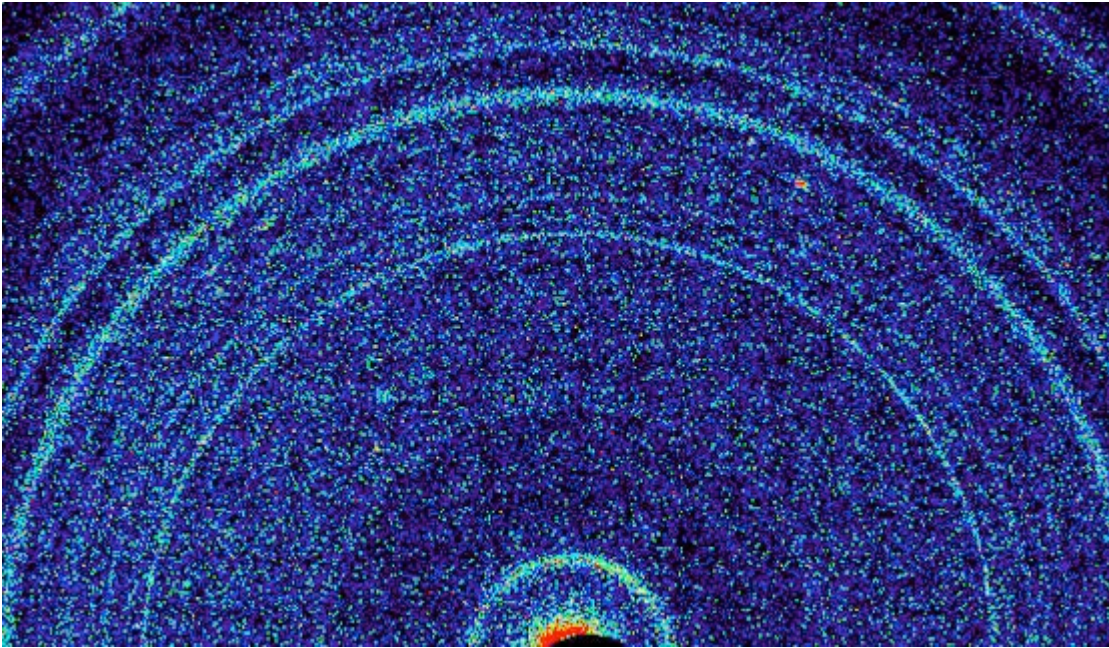
Author: [Dr. Tony Phillips](#) | Production editor: [Dr. Tony Phillips](#) | Credit: [Science@NASA](#)

A HINT OF HAWAII IN THE SANDS OF MARS

Oct. 31, 2012: New results from NASA's Mars rover Curiosity show that the mineralogy of Martian soil is similar to weathered basaltic soils of volcanic origin in Hawaii.

The minerals were identified in the first sample of Martian soil ingested recently by the rover. Curiosity used its Chemistry and Mineralogy (CheMin) instrument to analyze the sample.

"Our team is elated with these first results from our instrument," said David Blake of NASA Ames Research Center in Moffett Field, Calif., who is the principal investigator for CheMin. "They heighten our anticipation for future CheMin analyses in the months and miles ahead for Curiosity."

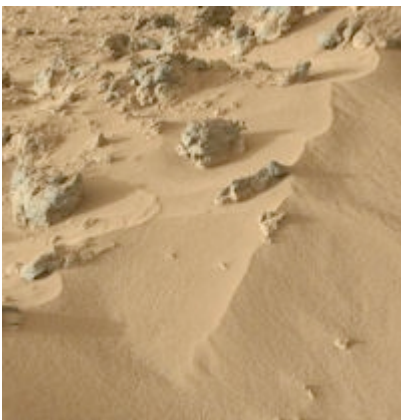


The first x-ray crystallography view of Martian soil. Obtained by the Chemistry and Mineralogy (CheMin) experiment on NASA's Curiosity rover, these data reveal crystalline feldspar, pyroxenes and olivine mixed with some amorphous (non-crystalline) material. The soil sample is similar to volcanic soils in Hawaii. [\[more\]](#)

CheMin uses X-ray diffraction, the standard practice for geologists on Earth using much larger laboratory instruments. This method provides more accurate identifications of minerals than any method previously used on Mars. X-ray diffraction reads minerals' internal structure by recording how their crystals distinctively interact with X-rays.

Innovations from Ames led to an X-ray diffraction instrument compact enough to fit inside the rover. Mars exploration wasn't the only benefit, however. The innovations have also led to applications on Earth such as compact and portable X-ray diffraction equipment for oil and gas exploration, analysis of archaeological objects and screening of counterfeit pharmaceuticals, among other uses.

The identification of minerals in rocks and soil is crucial for Curiosity's mission to assess past environmental conditions in Gale Crater. Each mineral records the conditions under which it formed.



Curiosity sampled the soil from this wind blown deposit dubbed "Rocknest." [\[more\]](#)

The specific sample for CheMin's first analysis was soil Curiosity scooped up at a patch of dust and sand that the team named Rocknest. The sample was processed through a sieve to exclude particles larger than 0.006 inch (150 micrometers), roughly the width of a human hair. The sample has at least two components: dust distributed globally in dust storms and fine sand originating more locally. Unlike conglomerate rocks Curiosity investigated a few weeks ago, which are several billion years old and indicative of flowing water, the soil material CheMin has analyzed is more representative of modern processes on Mars.

"Much of Mars is covered with dust, and we had an incomplete understanding of its mineralogy," said David Bish, CheMin co-investigator with Indiana University in Bloomington. "We now know it is mineralogically similar to basaltic material, with significant amounts of feldspar, pyroxene and olivine, which was not unexpected. Roughly half the soil is non-crystalline material, such as volcanic glass or products from weathering of the glass. "

Bish said, "So far, the materials Curiosity has analyzed are consistent with our initial ideas of the deposits in Gale Crater recording a transition through time from a wet to dry environment. The ancient rocks, such as the conglomerates, suggest flowing water, while the minerals in the younger soil are consistent with limited interaction with water."

During the two-year prime mission of the Mars Science Laboratory Project, researchers are using Curiosity's 10 instruments to investigate whether areas in Gale Crater ever offered environmental conditions favorable for microbial life.

Production editor: [Dr. Tony Phillips](#) | Credit: [Science@NASA](#)

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The SFAA owns eight very fine, easy to use, loaner telescopes well-suited for deep sky, planets, and star parties. All scopes are available to any SFAA member. The loaner custodians for the majority of our fleet are Pete & Sarah Goldie. Please contact them at telescopes@sfaa-astronomy.org for details if you are interested in borrowing a scope or if you have items you can donate for the loaner program (eyepieces, star maps/books, red flashlights, collimator, etc.). Please contact the appropriate member indicated below if you are interested in borrowing one of the telescopes.

- 1) 6" f/10.3 Dobsonian/Ken Frank ken@sfaa-astronomy.org
- 2) 8" f/7 Dobsonian/Pete Goldie
- 3) 8.5" f/6 Dobsonian/Pete Goldie
- 4) 10" f/8 Dobsonian/Pete Goldie
- 5) 114mm f/4 Newtonian StarBlast/Pete Goldie
- 6) 8" f/10 Celestron SCT/Annette Gabrielli/ annette@sfaa-astronomy.org
- 7) 8" f/10 Meade SCT/Stefanie Ulrey/treasurer@sfaa-astronomy.org
- 8) 9.5" f/5.6 Celestron Newtonian/Ken Frank/ ken@sfaa-astronomy.org

CLUB ASTRONOMY VIDEOS

The SFAA owns a series of astronomy videotapes featuring Alex Filippenko, a world-renowned professor of astronomy at UC Berkeley. The videotapes provide an introduction to astronomy and cover topics such as the Solar System, the lifecycles of stars, the nature of galaxies, and the birth of the Universe. The SFAA loans the tapes free to all members. If you are interested in viewing these tapes, you may check them out at any of the SFAA General Meetings. These tapes were kindly donated to the SFAA by Bert Katzung. For information on the course tapes themselves:

<http://www.teach12.com/ttc/assets/coursedescriptions/180.asp>

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