

General Meeting Presentation on November 6, 2015

The Large Synoptic Survey Telescope Dr. Joshua Meyers, Stanford University, Kavli Institute for Particle Astrophysics and Cosmology

Friday, November 6, 2015, [College of San Mateo, Building 36](#)
SMCAS General meeting at 7:00 p.m. ISC Room, room 110
Presentation at 8:00 p.m. [Planetarium](#)
Free and open to the public, free parking.



The LSST is a new kind of telescope. Currently under construction in the US and Chile, the LSST will use its unprecedented combination of large field-of-view (40 times the size of the full moon), enormous camera (3200-megapixels) and significant collecting area (27-foot diameter mirror) to rapidly and precisely map the entire visible sky every few nights. The survey will produce a high-resolution multicolor digital movie



of the Southern sky over a ten year period, enabling a wide variety of astronomy pursuits ranging from the Earth's backyard to the edge of the visible Universe.

Individual LSST images will be immediately analyzed to identify objects that have changed or moved: from exploding supernovae billions of light years away to nearby asteroids that

might impact the Earth. Over the ten-year survey lifetime, the images will also be combined to reveal a map of tens of billions of stars and galaxies. With this map, scientists will explore the structure

of our own solar system and the Milky Way, determine the properties of dark energy and dark matter, and make discoveries that we have not yet imagined. Scientists in the US and Chile, LSST's International Affiliates, and the general public are invited to share in this voyage of discovery. What will you find?

In his presentation, Dr. Meyers will cover the LSST science mission, as well as the unique engineering and data analysis challenges and solutions required by LSST.

Dr. Meyers is a Postdoctoral Student at Stanford University with the Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), working on aspects of the LSST. He earned his Bachelor of Science in Physics/Math/Astronomy at the University of Kansas, and his PhD in Physics at the University of California Berkeley in 2012. Before coming to Stanford, he was a graduate student researcher at Lawrence Berkeley National Laboratory.



General Meeting Presentation on October 2, 2015

Polar Trek To Mars

Dr. Pascal Lee, Planetary Scientist, SETI Institute

Friday, October 2, 2015, [College of San Mateo, Building 36](#)

SMCAS General meeting at 7:00 p.m. ISC Room, room 110

Presentation at 8:00 p.m. [Planetarium](#)

Free and open to the public, free parking.



Pressurized rovers are airtight all-terrain motorhomes in which future planetary explorers will live, work, sleep, and drive during multiple-day excursions far away from their home base. Although pressurized rovers are commonly featured in science-fiction lore and technical studies on paper, there is still very little practical experience with the use of such vehicles in terrestrial field exploration.

Since 2003, the NASA Haughton-Mars Project (HMP) has been leading a series of field simulations of planetary pressurized rover traverses on Devon Island, High Arctic, a bleak and barren polar analog often described as Mars On Earth. Rover traverses at HMP are also set in a true exploration environment

in which dangers, while not as unforgiving as on Mars, are nevertheless real and relevant. This talk summarizes the HMP's experience with simulated pressurized rover treks to date, and lessons learned for planning future road trips on the Moon or Mars. Here, the expedition crew encountered conditions and challenges analogous in basic ways to those



awaiting future pressurized rover crews on Mars: hostile environment, dust storm-like blizzards, uncertain route, treacherous terrain, equipment failure, tight crew quarters, limited resources, remoteness, and isolation.



Dr Pascal Lee is a Planetary Scientist at the SETI Institute. He is also Chairman of the Mars Institute, and Director of the NASA Haughton-Mars Project at NASA Ames Research Center in Mountain View, California. Pascal Lee is internationally recognized for his efforts to advance the human exploration of Mars, in particular via its moons Phobos and Deimos. He has led, or participated in, the development of several new mission concepts to explore Mars and its moons, of new spacesuit technologies for Moon and Mars exploration, and of pressurized vehicles for future human planetary exploration. He is author or co-author of over 100 scientific papers, and his first book, [Mission: Mars](#), won the 2015 Prize for Excellence in Children's Science Books from the American Association for the Advancement of Science (copies for signing will be available).

[General Meeting Presentation on September 4, 2015](#)

Weighing Galaxies

Dr. Phil Marshall, SLAC National Laboratory, KIPAC

Friday, September 4, 2015, [College of San Mateo, Building 36](#)

SMCAS General meeting at 7:00 p.m. ISC Room, room 110

Presentation at 8:00 p.m. [Planetarium](#)

Free and open to the public, free parking.



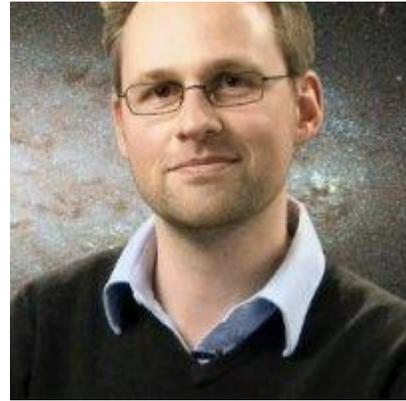
We live in a galaxy of about a hundred billion stars: the Milky Way. How much does that weigh?

Strong [gravitational lenses](#) have become an important astronomical tool: they allow us to make accurate measurements of galaxy masses, they provide a magnified view of the distant universe, and they allow us to constrain cosmological parameters. Dr. Marshall will show how we are mapping out where the Dark Matter is, both in our local group of galaxies and further out in the depths of space. It turns that galaxies are much heavier than they look - but what could that mean for our understanding of how stars form, and what Dark Matter is? (photo left: [LSST Telescope](#))

Dr. Marshall is a research scientist at SLAC National Accelerator Laboratory, and a member of the Kavli Institute for Particle Astrophysics and Cosmology (KIPAC). His main research interest is observational cosmology using strong gravitational lensing: weighing galaxies, measuring distances and the expansion rate of the Universe and mapping out where the mass in the Universe is. He is involved in a number of surveys to find new lenses, using both ground-based and space telescopes - including designing the strong lensing science analysis for [LSST](#) - The Large Synoptic Survey Telescope.

He feels communicating their science is an important part of every scientist's job: he tries hard to reach as wide an audience as possible, in a variety of ways. He is particularly interested in talking to people how science works: the process of enquiry, using models to understand the world, coping with uncertainty, and how knowledge grows.

Phil earned his BA and MS in Physics from the University of Cambridge in 2000, and earned his PhD in Astrophysics from the University of Cambridge in 2003. Since then he has worked on galaxy structure and evolution, and cosmology, in Postdoctoral Research positions at SLAC, the University of California Santa Barbara, the Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), and at the University of Oxford.





San Mateo County Astronomical Society Presentation History

This document contains the history of presentations at the SMCAS meetings from January 2001 to June 2015.

This document contains two sections:

- Pages 2 through 15 contains copies of the presentation web pages that were posted on the SMCAS web site to publicize the presentations from February 2014 through June 2015.
- Pages 16 through 26 contains a chronological list of all talks from January 2001 to June 2015 including the Date, Speaker name, Speaker affiliation, and Presentation title.

Founded in 1960, the San Mateo County Astronomical Society is a 501(c)(3) non-profit organization for amateur astronomers and interested members of the public.

Visitors may attend Society meetings and lectures on the first Friday of each month, September to June, and star parties two Saturdays a month. Presentations are normally held in the College of San Mateo Planetarium. On our meeting nights, parking is free in the adjacent well lighted parking lots.

All events are free for visitors and guests. Family memberships are offered at a nominal annual cost. Information about SMCAS is found at www.smcas.net, where those who want can join SMCAS via our secure Paypal connection.

Speakers: Ken Lum and Tom Stephany
SMCAS Members

Topic: Astronomical Tourism and Solar Eclipse Chasing
Date/Time: Friday, June 5, 2015 8:00 p.m.

Astronomical tourism is a relatively recent activity made possible by the rise of relatively cheap and easy travel. Trips include visits to far away new and historic observatories, rocket launches, picturesque places to observe aurorae, and, especially solar eclipse visits.

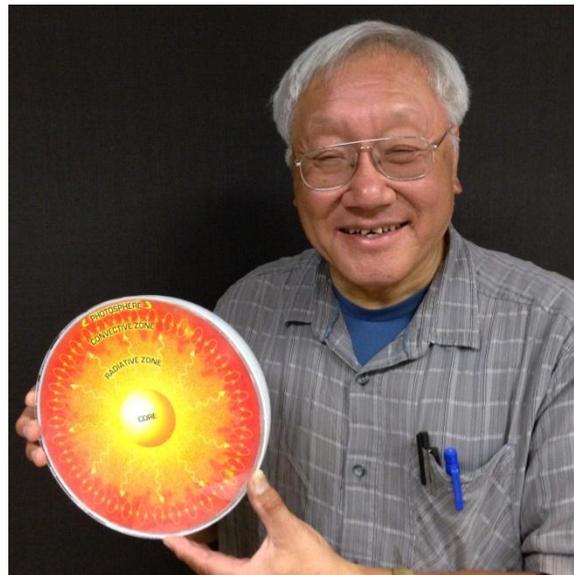
Solar eclipses have been observed by humans for thousands of years and have been recorded in the archives of the ancient Egyptians, Babylonians, and Chinese going back 4000 to 4500 years ago. But exact predictions only became available in the 19th Century, making it possible to plan to be under the path of totality ahead of time with considerable precision.

Recently, travel businesses have been established to cater to people wanting to experience these spectacular and, sometimes rare, astronomical events. This presentation will provide some sense of what participants on these trips have been able to see and do.

Ken Lum and Tom Stephany are both members of SMCAS — both veteran amateur solar eclipse chasers and have been astronomical tourists for many years. Both have a wealth of travel experience. They will discuss some of the logistics of their preparations and the remarkable results of their efforts.



Tom Stephany



Ken Lum

Speaker: **Dr. Graeme Smith**

Professor of Astronomy and Astrophysics, UC Santa Cruz
Astronomer, UC Observatories/Lick Observatory

Topic: Globular Clusters of the Milky Way

Date/Time: Friday, May 1, 2015 8:00 p.m.

Globular clusters are ancient stellar systems that formed at very early times in the history of the Milky Way galaxy. Professor Smith's talk will examine how globular clusters are distributed within the Milky Way, their ages, chemical compositions, and the types of stars found within them. Such basic properties of globular clusters will be described with a particular emphasis on how these systems of stars can serve as an astronomical fossil record.

Much of Professor Smith's research centers on properties of red giant stars within the Milky Way galaxy: their physical evolution, their chromospheric activity and mass loss, and what they can tell us about the chemical enrichment history of the Galaxy. Much of this later work has been directed towards the study of abundance differences among stars within globular clusters. These ancient stellar systems formed at a time when the process of chemical enrichment was just commencing within the Milky Way galaxy.

Striking differences in the abundances of elements such as carbon, nitrogen, and oxygen exist among stars within the same globular cluster. Understanding the origin of these differences can provide information about the early environment in the halo of the Galaxy, within which the globular clusters formed, as well as processes such as deep mixing that occur within the interiors of cluster red giants.

Other areas of interest to Smith include the chromospheric activity among evolved red giants, particularly those of Population II; the spectroscopy of comets in our Solar System; and the chemical composition of red giants in Galactic open clusters.



SPEAKER: Dr. Karel Schrijver, Lockheed Martin Senior Fellow at the Lockheed Martin Solar and Astrophysics Lab

TOPIC: Living with the Stars

DATE Friday, March 6, 2015

TIME: General meeting, 7:00 p.m.

Presentation, 8:00 p.m.

WHERE: [The CSM Planetarium](#), Bldg. 36, Parking Lot 5

FREE: Presentation is free and open to the public.

We are quite literally not who we were years, weeks, or even days before today. The stuff that makes our body is being replaced all the time, from the chemicals in our cells to the very cells themselves. What lasts is not our literal substance but rather a pattern that is renewed with elements captured from the surrounding biosphere. The newly integrated material that replaced what was lost connects our body directly to animals and plants that contribute to



our food and to the bacteria within us that help digest it. All of these depend on the energy of light released in the nuclear furnace deep inside the Sun combined with the carbon dioxide that cycles through the Earth's atmosphere, originating in volcanic eruptions and being released in the burning of fossil fuels made from beings in the distant past. Mixed in with that are radioactive atoms that are caused by stellar explosions across the Galaxy and from the decay of atoms deep inside the Earth. All that makes us, and all that exists around us, is tied to the stardust released in the death throes of ancient stars and ultimately to the formation of the universe itself.

Karel Schrijver's research focuses on the magnetic activity of the Sun, the coupling of the Sun's magnetic field into the heliosphere and its solar wind, and the manifestations of magnetic activity of other Sun-like stars. In addition to scientific research, he is actively involved in developing and operating space instrumentation: he is currently the Principal Investigator for the Atmospheric Imaging Assembly of the Solar Dynamics Observatory; as Senior Fellow at the LM Advanced Technology Center, he is involved in defining and developing instrumentation for potential future heliophysics missions.



SPEAKER: Dr. Sarah Stokes Kernasovskiy

Kavli Institute for Particle Astrophysics and Cosmology

TOPIC: CMB Polarization and Life at the South Pole**DATE** Friday, February 6, 2015**TIME:** Presentation — 8:00 p.m.**WHERE:** [The CSM Planetarium](#), Bldg. 36, Parking Lot 5**FREE:** Presentation is free and open to the public.

Sarah Stokes Kernasovskiy is a postdoctoral scholar at Stanford University and the Kavli Institute for Particle Astrophysics and Cosmology (KIPAC). Her research focuses on the measurement of B-mode polarization of the Cosmic Microwave Background (CMB), including the technological developments needed for the next generation of telescopes. A positive detection of B-mode polarization could be direct evidence for the theory of cosmic inflation. Finding evidence of inflation is one of the highest priorities in cosmology today.

Sarah's graduate student work focused on BICEP2 and the Keck Array, which are telescopes at the South Pole. Sarah has completed 4 seasons at the South Pole Station on these projects. Outside of research, she is an accomplished trail runner, having completed several 100 milers as well as the Race Around the World, and has also taken time off to trek in another remote area: the Himalayas! Sarah received her undergraduate degree in Physics at California Institute of Technology in 2008, and completed her PhD in Physics at Stanford University in 2014 with her thesis 'Measuring the Polarization of the CMB with the Keck Array and BICEP2'.

Sarah (with John Kovac) at work on part of the Keck Array at the South Pole.



SPEAKER: **Dr. Stephen Kane**
 Assistant Professor, Astronomy and Physics
 San Francisco State University

TOPIC: **Dispelling the Myths and Legends of the Habitable Zone**

TIME: 8:00pm December 5th, 2014
WHERE: [The CSM Planetarium](#), Bldg 36, Parking Lot 5
 Free and open to the public



The field of exoplanets has rapidly expanded from exclusively exoplanet detection to include exoplanet characterization. A key step towards this characterization is determining which planets occupy the Habitable Zone (HZ) of their host stars. As the Kepler data continues to be processed, orbital sensitivity is increasing and there are now numerous exoplanets known to occupy the HZ of their host stars.

In this talk Dr. Kane will describe the properties of the HZ, its dependence on spectral properties, and the current state of exoplanet detections in the HZ. Along the way Dr. Kane will attempt to dispel some common misconceptions regarding the Habitable Zone. Dr. Kane will also relate HZ results to the calculation of 'eta_Earth': the fraction of Sun-like stars with a planet like Earth. Finally, Dr. Kane will present several case studies of HZ Kepler planets, including those around the relatively common binary stars (circumbinary planets) where the HZ is extremely complicated and time dependant.



Dr. Stephen Kane is an Assistant Professor in Astronomy and Physics at San Francisco State University. His primary research interest is detecting and characterizing planets outside our solar system.

Dr. Kane is well traveled. He was born in Goulburn, Australia, and then promptly moved to Tamworth, the Country Music Capital of Australia. He gained his love for Astronomy in 1985 when his 6th grade class visited a planetarium and he made it his goal to one day become an Astrophysicist. He studied Physics & Astronomy at Macquarie University in Sydney, graduating with 1st Class Honours. He then accepted a scholarship from the Space Telescope Science Institute in Baltimore, USA.

He eventually moved to Hobart, Australia, to complete his Ph.D. at the University of Tasmania. In April, 2001 he moved to St Andrews, Scotland to begin a Research Fellowship at the University of St Andrews. In May, 2005 he moved to Gainesville, USA to begin a Postdoctoral Fellowship at University of Florida. He then moved to Pasadena, USA in December, 2007 to join the NASA Exoplanet Science Institute at Caltech as a Research Scientist. And most recently he moved to San Francisco to become an Assistant Professor at SFSU.

Dr. Kane has been author or co-author on 150 scientific publications, and is perhaps best known internationally as co-author of the groundbreaking, compelling, and controversial paper "[A Necro-Biological Explanation for the Fermi Paradox](#)" published on April 1, 2014 which provides a possible explanation for the long-unsolved [Fermi Paradox](#) regarding alien civilizations (Where is everybody?).

Speaker: **Dr. Marusa Bradac**
Professor of Astronomy and Physics, UC Davis

Topic: **Bullet Galaxies and Dark Matter**

TIME: 8:00pm November 7th, 2014
WHERE: [The CSM Planetarium](#) Bldg 36, Parking Lot 5
Free and open to the public

Among the most important questions facing science right now is that of the history of our Universe and its future. To answer the question of the fate of the Universe we need to know what the Universe is made of. The evidence that the normal matter is only a minor component has been increasing since the 1930s, and astronomers today have established the fact that dark matter and dark energy are 25 times more abundant than everything we have ever detected and seen here on Earth (including you and me). But what is dark matter? What are its physical properties? How does it translate into the particle physics model? What is dark energy? The simple answer is that we still don't know. Because it is dark, dark matter has been notoriously hard to detect; it doesn't emit or reflect radiation such as light or heat, and it can have only the feeblest of interactions with itself and ordinary matter. So how do we know it is there? In this talk, Marusa will discuss how astronomers observe the invisible matter in one of the true gems on the sky: a giant cluster of galaxies.



Originally from Slovenia, Maruša is now a physics professor at UC Davis. Her research includes studying the composition of the Universe, her specialty being properties of dark matter, the elusive “stuff” that makes up a quarter of the universe. Increasingly popular in the media especially with the excitement of the latest discoveries about the Universe’s past. Maruša also studies first galaxies that formed in the Universe. The tools of her trade are telescopes in space (Hubble Space Telescope, Spitzer Space Telescope) and on the ground in Hawaii (Keck). Maruša uniquely combines her passion for the Universe with her outdoor loves of skiing, surfing and mountain biking. She is passionate about her research and is committed to provide the best possible education for her students. The one thing that excites her even more than her own research and the outdoors is seeing young and bright minds excited about the world around them.

SPEAKER: **Dr. Pat Burchat**

Gabilan Professor of Physics, Stanford University

TOPIC: **The Dark Side of the Universe:
Dark Matter and Dark Energy**

TIME: 7:00pm Saturday October 4th, 2014

WHERE: [Family Science and Astronomy Festival Keynote Talk](#)
[The CSM Theatre](#) Bldg 3, Beethoven Parking Lot 3
Free and open to the public. Free parking.



In recent decades, cosmology has become an observational science that has led to two mysterious observations: about a quarter of the energy density of the universe is in the form of "dark matter," which gravitationally attracts but is otherwise invisible, and about two-thirds is "dark energy," which causes space itself to expand at an ever-increasing rate. Only a small fraction of the energy in the universe is due to matter that we understand! In this visual presentation, we will explore the evidence for dark matter and dark energy, and some of the experiments being developed to investigate its fundamental nature.

Dr Burchat's Biography

Patricia Burchat is the Gabilan Professor of Physics at Stanford University. She grew up in a very large family in a very small town in Canada. She studies the Universe at both the *smallest* and the *largest* scales, using accelerators to probe the elementary particles and the fundamental interactions, and telescopes to investigate the cosmological evolution of the Universe. In both cases, she asks similar questions: What is the Universe made of? What are the laws of physics that govern the constituents of the Universe?

Burchat is part of an international collaboration developing a telescope that will provide the best census of the Universe to date -- the Large Synoptic Survey Telescope. Her team will use the gravitational bending of light by "dark matter" to study the evolution of "dark energy", shedding light on the identity of these components that make up the majority of the density of the Universe.

Professor Burchat is passionate about teaching and instilling enthusiasm for science in her students. At Stanford, she has received the Dean's Award for Distinguished Teaching and the Walter J. Gores Award for excellence in teaching. She is a Fellow of the American Physical Society and has received a Guggenheim Fellowship. She is currently Chair of the National Organizing Committee for the APS Conferences for Undergraduate Women in Physics.

SPEAKER:

Dr. Norbert Werner

Astrophysicist, KAVLI Institute for Astrophysics and Cosmology (KIPAC)

TOPIC:

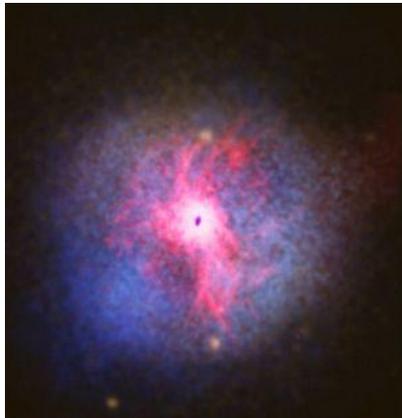
The Beating Hearts of Galaxies

TIME:

8:00pm September 5, 2014

WHERE:

[The CSM Planetarium](#) Bldg 36, Parking Lot 5
Free and open to the public



Dr. Werner will talk about his research into supermassive black holes and the cosmic web. He will show us observations, which reveal how the enormous amounts of energy released when matter falls into supermassive black holes helped to sculpt the galaxies and the surrounding large scale structure of the Universe. Within the context of this talk he will also introduce X-ray space telescopes including the upcoming ASTRO-H mission scheduled for launch in 2015.

Dr Werner is an astrophysicist at the Kavli Institute for Particle Astrophysics and Cosmology (KIPAC) at Stanford University. You can also often find him at the Japanese Space Agency (ISAS/JAXA) near Tokyo where, next to his everyday research, he is helping to prepare the initial observing program for the upcoming Japanese-US Astro-H satellite. He arrived at KIPAC in 2008 as an Einstein/Chandra Postdoctoral Research Fellow. Before he came to sunny California he was awarded a Marie Curie training fellowship at the Max Planck Institute for Astrophysics in Garching, Germany, and did his PhD at SRON Netherlands Institute for Space Research, in the rainy but magically beautiful city of Utrecht in the Netherlands. He spent his undergraduate years at the Safarik University in Kosice in his home country of Slovakia.



SPEAKER: **Landon Curt Noll**
 Mathematician, Astronomer

TOPIC: **Lost in Space:** The Search for Meteorites near the South Pole

TIME: 8:00pm June 6th, 2014

WHERE: [The CSM Planetarium](#) Bldg 36, Parking Lot 5
 Free and open to the public

Landon will present on his 2011, 2013 and 2014 meteorite search expeditions in the land waaaaay down under (below the Antarctic circle).



Speaker Biography:

Landon Curt Noll focuses on High-Performance Computing for Cisco by day, and focuses on our inner solar system as an Astronomer by night. Landon has made astronomical observations during total solar eclipses in the US, Turkey, Zambia, Australia, Antarctica, Libya, China, Eniwetok and French Polynesia. He served as the expedition scientist for a team that searched for meteorites in the Antarctic ice at and near the South Pole.

As a mathematician, he developed or co-developed several high-speed computational methods and as held or co-held eight world records related to the discovery of large prime numbers. Landon Curt Noll is the 'N' in the widely used FNV hash. He is credited in Wikipedia as the co-inventor (with John Horton Conway) of a system for naming numbers of any size.

Landon graduated from Linfield College with a BA in Math/Physics. He is a member of the American Mathematical Society and is an associate of the American Astronomical Society.

An online Bio/Vita of Landon may be read at: http://en.wikipedia.org/wiki/Landon_Curt_Noll and <http://www.isthe.com/chongo/bio.html>

SPEAKER: **Dr. Thomas Greene**
Astrophysicist NASA/Ames Research Center

TOPIC: **The James Webb Space Telescope:
Science Potential and Project Status**

TIME: 8:00pm May 2nd, 2014
WHERE: [The CSM Planetarium](#) Bldg 36, Parking Lot 5
Free and open to the public



The unprecedented sensitivity and resolution of the James Webb Space Telescope (JWST) will significantly advance a broad variety of astrophysics soon after it is launched in 2018. Its large (6.5-m diameter) primary mirror and infrared instruments will allow it to see some of the very first luminous objects that formed in the Universe after the Big Bang. Other major science themes of JWST encompass studying the assembly of galaxies, the birth of stars and planetary systems, and planetary systems and the origins of life. JWST will be the premier astrophysics space observatory for NASA and ESA over its 5 - 10 year mission lifetime, supplanting the Hubble Space Telescope (which primarily works at visible and ultraviolet light wavelengths). In addition to the topics covered in this talk, many scientists will use JWST to make discoveries that we have not yet imagined.

JWST employs many unique technologies, and the mission has been in development for over 10 years. Many major hardware components - all large optics and all science instruments - have been completed, and integration of major components has begun. In this talk Dr. Greene will illustrate the mission's science potential and highlight the status of this development effort.



Tom Greene is an astrophysicist at Ames Research Center where he has been working on NASA astrophysics observatories and conducting observations of young stars and extrasolar planets for the past 15 years. He received his PhD in Astronomy from the University of Arizona in 1991 and then came to Ames as a National Research Council Postdoctoral Fellow. Dr. Greene then joined the research faculty of the University of Hawaii and the staff of NASA's Infrared telescope facility.

Before rejoining Ames, he worked on developing JWST and Spitzer Space Telescope science instruments at the Lockheed Martin Advanced Technology Center in Palo Alto. Dr. Greene has authored or co-authored over 100 scientific papers, including 60 peer reviewed ones. He is on the science teams of 2 JWST instruments, chairs quarterly meetings of Bay Area exoplanet scientists, and sometimes dabbles in amateur astronomy as well.

April 4th, 2014 Meeting Cancelled

SPEAKER: **Dr. William Clancey**
Senior Research Scientist, Institute for Human and Machine Cognition

Topic: **Working on Mars**
Voyages of Scientific Discovery with the Mars Exploration Rovers

TIME: 8:00pm March 7th, 2014
WHERE: [CSM Planetarium](#) Bldg 36, Free Parking in Lot 5
Free and open to the public

For more than nine years, scientists have been doing fieldwork on Mars in the first overland investigation of another planet. Working through programmed robotic laboratories, called the Mars Exploration Rovers, they have a virtual experience of being on Mars. *The Spirit* and *Opportunity* teams have driven over 28 miles, taken thousands of photographs, analyzed the chemistry of the terrain, and inspected rocks by grinding them and taking microscopic images. And now the Curiosity rover is continuing the work. How does working remotely through a robotic laboratory change the nature of field science? How does it change the scientists? A cognitive scientist with privileged access to mission operations, Clancey explains that the “robotic geologists” are not the rovers, but the scientists who have imaginatively projected themselves into the body of the machine. Dr. Clancey will address these issues as well as give us an update on the Mars Curiosity rover.

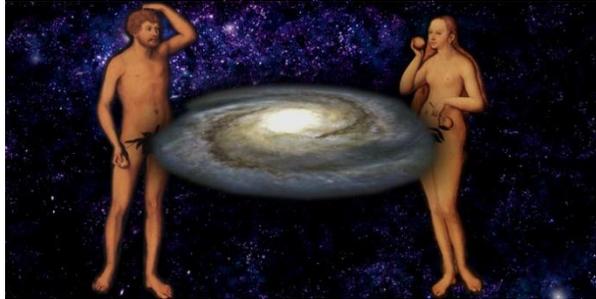


[Dr. William J. Clancey](#) is a senior research scientist at the Florida Institute for Human and Machine Cognition, Pensacola. Recently he completed an assignment as Chief Scientist, Human-Centered Computing in the Intelligent Systems Division, NASA Ames Research Center. Over 15 years in this position provided unparalleled access to the NASA Mars missions and their design. He has spent many seasons involved in research at Mars analog field stations, including the Haughton-Mars Project Research Station on Devon Island in the High Arctic, where our own CSM/SMCAS intern [Luis Alvarez](#) participated in the 2011 field season. He is the Author of [Working on Mars: Voyages of Scientific Discovery with the Mars Exploration Rovers](#).

Speaker: **Dr. Eliot Quataert**
Professor of Astronomy and Physics
UC Berkeley

Topic: **The Modern Origins Story:
From the Big Bang to Habitable Planets**

TIME: 8:00pm February 7th, 2014
WHERE: [The CSM Planetarium](#) Bldg 36, Parking Lot 5
Free and open to the public



In this talk Dr. Quataert will provide an overview of the modern understanding of origins in astrophysics, from the big bang to the discovery of planets around other stars. The story begins in the infant universe, which we now know was remarkably smooth compared to what we see around us today, with only tiny differences in its properties from one part to another. By contrast, in the present universe there are enormous differences in the properties of matter from one part to another: some regions host planets, stars, and galaxies (and even humans!) while others do not. Quataert will describe how the universe evolved from its smooth beginnings to its current state, emphasizing how gravity reigns supreme and builds up the planets, stars, and galaxies required for biological evolution to proceed. In addition to their scientific importance, these ideas also have far-reaching philosophical and religious implications.



5-Jun-2015	Ken Lum & Thomas Stephany	SMCAS members	Eclipse chasing and Astronomical Tourism
1-May-2015	Dr. Graeme Smith	UCSC	Globular Clusters of the Milky Way
3-Apr-2015	Mohsen Janatpour	Physics, CSM	Art & Science lecture
6-Mar-2015	Dr. Karel Schrijver	Lockheed Martin	Living with the Stars
6-Feb-2015	Dr. Sarah Stokes Kernasovskiy	KIPAC/Stanford	CMB Polarization and Life at the South Pole
2-Jan-2015	Holiday break		
5-Dec-2014	Dr. Stephen Kane	UCSF	Dispelling Myths and Legends of the Habitable Zone
7-Nov-2014	Dr. Marusa Bradac	UC Davis	Bullet Galaxies & Dark Matter
4-Oct-2014	Dr. Pat Burchat	Stanford	Dark Side of the Universe
5-Sep-2014	Norbert Werner	KIPAC	The Beating Hearts of Galaxies
1-Jul-2014	Ken Lum	Annual Banquet	History of the Telescope
	Summer break		
6-Jun-2014	Landon Curt Noll	Mathematician, Astronomer	Lost in Space: The search for Meteorites Near the South Pole
2-May-2014	Dr. Thomas Greene	NASA Ames	James Webb Space Telescope
4-Apr-2014	Spring break 3/30-4/5.	no meeting	
7-Mar-2014	Dr. William Clancey	NASA Chief Scientist; IHMC	Working on Mars - Voyages of Scientific Discovery with the Mars Exploration Rovers
7-Feb-2014	Dr. Eliot Quataert	UC Berkeley	The Modern Origins Story; from the Big Bang to Habitable Planets
3-Jan-2014	No meeting	Semester break	
6-Dec-2013	Dr. Mandeep Gill	KIPAC	What We Can Learn About the Origin and Evolution of our Universe from Gravitational Lensing
1-Nov-2013	Dr. Ken Wharton	Professor of Physics and Astronomy at San Jose State University	Physics vs. Time Travel
4-Oct-2013	Dr. Mary Barsony	SFSU	Origin of the Elements
6-Sep-2013	Dr. Jonathan Fortney	UC Santa Cruz	Characterizing the Atmospheres of Low-Mass Low-Density Transiting Exoplanets.
	Summer Break		
7-Jun-2013	Faride Khalaf	Space Science Presenter	SLS - Our Next Ride
3-May-2013	Dr. Peter Jenniskens	SETI	CAMS - The nighttime Survey of Meteor Showers
1-Apr-2013	Cancelled. Planetarium closed for maintenance		
1-Mar-2013	Dr. Mariska Kriek	UCB - Asst Prof Astronomy	A Deep View on the Early Universe: Extreme Makeovers and Overweight Galaxies

1-Feb-2013	Dr. Nathalie Cabrol	SETI - Senior Research Scientist. Astrobiology	A decade of revolution in Astrobiology
Jan, 2014	No Meeting		
7-Dec-2012	Dr. Sebastiano Cantalupo	UCSC Post Doctoral Researcher	How to Illuminate a Dark Galaxy with a Black Hole
2-Nov-2012	Dr. Thomas Zobrist	National Ignition Facility - LLNL	Building the World's Largest Telescopes
5-Oct-2012	Dr. Chris Melton	SLAC	Multi-Spectral Remote Sensing: . 21st Century Tools For Astronomy and Space Science
7-Sep-2012	Paul Wieland	Author	Space is not just a vacuum: the case for the continuing exploration of space
28-Jul-2012	Dr. Robert Brauer	NASA - Project Assurance Manager SOFIA	The SOFIA Program
1-Jun-2012	Landon Curt Noll	Mathematician, Astronomer	The Tides that Unbind (the Jovian Laplace Resonance)
4-May-2012	Dr Ralf Kaehler	KIPAC/SLAC	Simulating the Early Universe
6-Apr-2012	John Westfall		Transit of Venus
2-Mar-2012	Dr. Joshua Bloom	UC Berkeley	Gamma Ray Burst Boom
3-Feb-2012	Dr. Geoff Marcy	UC Berkeley	Planet hunting with Kepler
6-Jan-2012	Member meeting		
2-Dec-2011	Faride Khalaf	Space Science Presenter	Saturn V; The First 700 Seconds
4-Nov-2011	Dr. Terry Fong	NASA-Ames	Application of robotics to planetary exploration
7-Oct-2011	Dr. Chris McKay	NASA Ames	Titan
2-Sep-2011	Dr. Bart De Pontieu	Lockheed Martin's Solar Physics lab, Palo Alto	Solar Interface Region
5-Aug-2011	No Meeting - summer		
23-Jul-2011	Annual Banquet		Video.
1-Jul-2011	No meeting - summer		
3-Jun-2011	Dr. Rus Belikov		
7-May-2011	Dr. Murad Hamidouche	NASA SOFIA	SOFIA Mission
6-May-2011	Dr. Joel Primack & Nancy Abrams	UCSC	The First Stars in the Universe.
2-Apr-2011	CSM Spring Break	April 2 to 11	
1-Apr-2011	Dr. Natalie Batalha	NASA Ames - SJSU	Kepler update
4-Mar-2011	Dr. Bryan Mendez	UCB	WISE mission
4-Feb-2011	Dr. Lynn Rothschild	NASA Ames Astrobiologist	Expanding the Envelope for Life in the Universe

7-Jan-2011	Member social		
3-Dec-2010	Dr. Jennifer Heldmann	USF	Lunar Impact; LCROSS mission update
5-Nov-2010	Dr. Pascal Lee	Mars Institute	Houghton-Mars Project
1-Oct-2010	Dr. Steve Stahler	Research Astronomer, UCB	The Birth of Star Clusters
3-Sep-2010	Member meeting	Chanan Greenberg	Yosemite Star Party photos
24-Jul-2010	Gordon Myers Annual Banquet	American Association of Variable Star Observers	The Fascinating Universe of Variable Stars
2-Jul-2010	No General Meeting		
4-Jun-2010	Member meeting, planetarium show		
7-May-2010	Dr. David Des Marais	NASA Ames	Exploring Mars for evidence of habitable environments and life
2-Apr-2010	Ken Croswell	Author	The Lives of Stars
5-Mar-2010	Darryl Stanford	CSM Astronomy Professor	Full dome video - Egyptian Astronomy, plus planetarium show
5-Feb-2010	Chris Ford	RenderMan - Pixar Animation Studios	CG Visualization in Astronomy: From Hollywood, NASA and Beyond
8-Jan-2010	Joint Meeting at PAS		Dr. Don Johnson, UC Santa Cruz Fermi PI
4-Dec-2009	Dr. Eduardo DiSilva	SLAC	The Violent Universe Seen Through the Fermi Gamma Ray Space Telescope
6-Nov-2009	Dr. Michael Carr	Planetary Scientist USGS	Mars: the water story and the search for life.
2-Oct-2009	Dr. Jeffery Van Cleve	Ball Aerospace & Technologies Corp	Roundup at the Kepler Corral: the Race to Detect the First Earth-sized Planet in the Habitable Zone of a Sunlike Star
4-Sep-2009	Dave Wolf	SMCAS	Eclipse adventure in China
7-Aug-2009	No speaker		
18-Jul-2008	No Annual Banquet		
5-Jun-2008	Norm Sperling	Editor JIR	This Book Warps Space and Time
1-May-2008	Dr. Ross Beyer	NASA/AMES - SETI	Google Mars
4-Apr-2009	No speaker		Astronomy Day
3-Apr-2008	Spring Break		
6-Mar-2009	Dr. Patricia Burchat	Chair, Physics Dept Stanford	The Dark Side of the Universe
6-Feb-2009	Dr. Tom Berger	Hinode Solar telescope	
9-Jan-2009	Dr. Chris McKay	NASA	Mars Phoenix Lander
2-Jan-2009	No meeting		
5-Dec-2008	Dr. Chris Mauche	Lawrence Livermore National Laboratory	The X-Ray Universe

7-Nov-2008	Dr. Tom Malzbender	HP Research	the Antikythera Mechanism.
3-Oct-2008	Dr. Phil Scherrer	Center for Space Science and Astrophysics, and Hansen Experimental Physics Laboratory (HEPL). Stanford.	What is the 'H' of HMI: Future Prospects for Helioseismology
5-Sep-2008	Darryl Stanford	Astronomy Professor, CSM	Film. History of Space Exploration
1-Aug-2008	Member meeting		
26-Jul-2008	Jim Berkland	USGS geologist	Earthquakes caused by moon
4-Jul-2008	No meeting		
6-Jun-2008	Dr. Nick Kanas	Star Maps: History, Artistry, and Cartography	
10-May-2008	Dr. Peter Backus	SETI	National Astronomy Day SETI and Radio Astronomy in the 21st Century
2-May-2008	Brian Day	NASA - LCROSS education lead	Shooting for the Moon: LCROSS mission and observing opportunities
4-Apr-2008	Prof. Mohsen Janatpour	CSM	Symvisio
7-Mar-2008	Dr. Peter Jenniskens	SETI	Getting a Grip on Meteor Showers

Feb 1st 2008: Dr. Devon Burr, SETI

The planetary habitability of Mars and Titan

Dec 7th 2007: Dr. Friedemann Freund, NASA AMES, Carl Sagan Institute, SETI

All Those Organics Up in the Sky

Nov 2nd 2007: Dr. Joe Barranco, SFSU

Proto Planetary Vortex

Oct 5th 2007: Dr. Geoff Bower, UC Berkeley

Allen Telescope Array

Sep 7th 2007: Norm Sperling

Back to the Future

Jun 1st 2007: Dr. Tom Gates

40 years of Bay Area Astronomy

May 4th 2007: Dr. David Peet, Physicist

The life and times of David Bohm

Apr 21st 2007: Dr. Dale Cruikshank, NASA AMES

Spectroscopy and Ices

Apr 6th 2007: Dr. Joshua Bloom, UC Berkeley

Giant Cosmic Explosions: The Gamma-ray Burst Boom

Mar 2nd 2007: Richard Bennion, CCDWare

Astrophotography

Feb 2nd 2007 Prof Darryl Stanford, Astronomy Professor, CSM

First Planetarium Show in the New Facility!

Jan 5th, 2007 Dean Drumheller, Observatory and Planetarium Manager, CSM

Tour of the new Observatory

Jan 2007 The new CSM Planetarium opened, and SMCAS began meeting there.

Dec 1st 2006: Dr. Marusa Bradac, Stanford SLAC

First Evidence for Dark Matter

Nov 3rd 2006: Dr. Jack Lissauer, NASA

Meteorites and the formation of the Solar System

Oct 6th 2006: Bob Naeye, Editor Sky and Telescope

Update on Cassini and Saturn

Sep 1st 2006: Ken Lum and Jaques Guertin

Eclipse Chasing Adventures

Jun 2nd 2006: Dr. Michael Kelsey, Stanford - SLAC

Origin of Visible Matter in the Universe

May 6th 2006: Dr. Scott Sandford, NASA

Project Stardust

May 5th 2006: Mark Mir, University of San Francisco, Ricci Institute

The Mechanics of Heaven

- Apr 7th 2006: Dr. Tom Abel, Kavli Institute for Particle Astrophysics
The First Thing in the Universe. Supercomputer visualizations
- Feb 3rd 2006: Dr. Nathalie Cabrol, NASA AMES Astrobiologist
Mars Rover Update
- Jan 5th 2006: Dr. Lynn Rothchild, NASA AMES Astrobiologist
Extremeophiles & life in the universe
- Dec 2nd 2005: Dr. Michael Peskin, SLAC - Theoretical Physicist
Dark Matter
- Nov 4th 2005: Dr. Eliot Quataert, UC Berkeley
Black Holes: The Science Behind the Science Fiction
- Oct 7th, 2005 John Dillion, Director Randall Museum
Searching for the First Telescope
- Sep 2nd, 2005 Bob Garfinkle, Fellow, Royal Astronomical Society
The Crab Nebula
- Jul 16th, 2005 Ilona Magyary, SMCAS Program Director
Retrospective on Hubble Images
- Jun 3rd, 2005 Dr. Jaques Guertin, Chemist & Eclipse Photographer
Eclipse Chasing Around the World
- May 6th, 2005 Prof. Darryl Stanford, Astronomy Professor CSM
Update on Comet Temple 1 Mission
- Apr 16th, 2005 Dr. Cynthia Phillips, SETI
Cassini-Huygens Mission
- Apr 1st, 2005 Ken Lum
History of the 20th Century Telescope
- Mar 4th, 2005 Dr. Douglas Huggins, NASA AMES Astrochemist
Planetary Nebulae: Why They Look Like They Look

- Feb 4th, 2005 Dr. Dana Backman, NASA - Associate Director, SOFIA
Searching for Alien Earths
- Jan 7th, 2005 Prof. Darryl Stanford, Astronomy Professor, CSM
Updates on Cassini/Huygens and Comet Macholz
- Dec 3rd, 2004 Ken Frank, Sam Eddie, Scope City
Astro Toys
- Nov 15th, 2004 Dave Rodriques, Astro Wizard
Astro Wizardry
- Nov 15th, 2004 Doug Brown, VP Fremont Peak Observers Association (FPOA)
Mars Rover Mission
- Nov 5th, 2004 Dr. William Borucki, NASA Ames Planetary Systems
Kepler: The Search for Extrasolar Planets
- Oct 1st, 2004 Richard Bennion, Ewell Observatory; CEO CCDWare
Astro Photography Without Film
- Sep 3rd, 2004 Dr. Scott Sanford, Astrophysics Scientist, NASA Ames
Stardust Spacecraft Encounter with Comet Wild II
- Jun 4th, 2004 Dr. Mark Marley, Planetary Scientist, NASA Ames
Exploring Brown Dwarfs and Extra Solar Giant Planets
- May 7th, 2004 Dr. Michael Kelsey, Physicist, SLAC
Spectroscopic Applications to Astronomy
- Apr 24th, 2004 Richard Bennion & cast, Ewell Observatory
Real Sky Star Show
- Mar 5th, 2004 Tom Gates, Aerospace Education, NASA
Forty Years of Public Astronomy in the Bay Area:
from Sputnik to the 2001 Theme song
- Feb 4th, 2004 Dr. Alex Luebke, Satellite Engineer, Stramler Group, Inc.

Satellites, Rockets and Space Environments

Jan 9th, 2004 Prof. Darryl Stanford, Astronomy Professor, CSM

Overview of Missions to Mars

Dec 5th, 2003 Dr. Chris McKay, Space Scientist, NASA Ames

Astrobiology of Europa

Nov 7th, 2003 Dr. Virginia Gulick, SETI, NASA Ames

The New Era of Mars Exploration.

Oct 3rd, 2003 Prof. John Westfall, SF State University, Geography

Transit of Venus

Sep 5th, 2003 Dr. Douglas Huggins, NASA Ames Astrochemistry lab, astrophysics branch

Top 10 Infrared Objects you can see thru your Telescope

Aug 27th, 2003 Dr. Jeff Moore, Planetary Scientist, NASA

Mars Overview and Thru the Telescope

Aug 1st, 2003 Dr. Manfred Bester, Space Sciences Dept, UC Berkeley

(missing title)

Jul 12th, 2003 Ernie Piini

My Life Chasing Total Solar Eclipses

Jun 3rd, 2003 Brad Lobitz, NASA Ames - Earth Science

An Introduction to Globular Clusters

May 10th, 2003 Dr. Tim Castellano, NASA Ames

(missing title)

May 10th, 2003 Norm Sperling, Author/lecturer

What Astronomy Books Don't Tell You

May 10th, 2003 Tim Tully, Multimedia author

Universe DVD

May 2nd, 2003 Darryl Stanford & Mike Ryan

Introduction to Amateur Astronomy' 5/15 Total Lunar Eclipse

Apr 4th, 2003 Dr. Ron Marzke, SF State University

Galactic Evolution

Mar 7th, 2003 Dr. Alexander G. Kosovichev, Sr. Research Scientist, Stanford University

Unlocking the Mystery of Sunspots

Feb 7th, 2003 Mike Ryan, SMCAS

How Do They Do That? Learn So Much About the Universe From a Distance

Jan 3rd, 2003 Norm Sperling, Author/Lecturer

What Astronomy Books Don't Tell You

Dec 2nd, 2002 Dr. Andrew Mattioda, NASA Ames Astrochemistry lab

Chemistry of the Stars

Dec 2nd, 2002 Tim Tully, Multimedia author

The Universe DVD

Nov 1st, 2002 Dr. Steven Stahler, Astrophysicist, UC Berkeley

How Stars are Made

Oct 4th, 2002 Robert Naeye, Editor Mercury Magazine

Solving the Universe's Mysteries Through Extra Dimensions

Sep 6th 2002 Dr. Gibor Basri, UC Berkeley

What is a Planet

Aug 2nd, 2002 Dr Adrienne Cool, SF State University

Globular Clusters

Jul 13th, 2002 Dr. Virginia Gulick, SETI PI, NASA Ames

Mars and Upcoming Missions

Jun 2nd, 2002 Dr. Manfred Bester, UC Berkeley

The HESSI Project (High Energy Spectroscopic Imager)

May 3rd, 2002 Missing speaker and title

Apr 5th, 2002 Dr. Peter Backus, SETI

SETI: On the Brink of Discovery?

Mar 1st, 2002 Missing speaker and title

Feb 1st, 2002 David Rodriques, Morrison Planetarium

Space Art: The Works of Chesley Bonestall

Feb 2002 SMCAS began meeting in the old CSM Planetarium (bldg 13)

Sep 2001 Dr. Jeff Cuzzi, NASA

Ring and Planet Formation

Jul 2001 Dr. David Morrison, NASA Ames

Near Earth Asteroids

May 2001 Dr. Carl Pennypacker, LHS-LBS

Discovery of Astrophysics

Feb 2001 Robert Naeye, Editor Mercury Magazine

The Chandra X-Ray Observatory

Jan 2001 Dr. Michael Kelsey, SLAC

Measuring Gravity: Traditional Ideas and Current Research

This list assembled courtesy of SMCAS member Marion Weiler.