



“FOTO Finish” for Board Member

Kara Knack

by Kathy Malinski



SOUTH PACIFIC:
Voyage to Totality
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KARA KNACK’S LOVE OF GRIFFITH OBSERVATORY began when she was just five years old, long before her family moved to southern California. Even at that young age, she instinctively knew that the Observatory is a portal to things bigger than we are, and she was fascinated by the possibilities. What Kara did not know, though, was that the magnetic pull of the Observatory she felt on that day would be the beginning of a relationship that would last a lifetime and lead her to challenges and successes she would never have believed possible.

Kara has reached what she laughingly calls her “FOTO finish,” when she recently retired from the FOTO Board of Directors after 27 years of remarkable service. Yet the consensus among those with whom she has worked so closely for so many years is that Kara will never be very far from FOTO and the venerable Observatory to which she has given so much.

When she recalls the years spent deeply involved with FOTO and the Observatory, Kara’s naturally bubbly and outgoing personality takes on even greater animation. Her eyes sparkle like the jewelry in the Cosmic Connection exhibit at the Observatory – Kara’s very special project and one of the most popular parts of the visitor experience. Her smile goes from ear-to-ear. She is clearly passionate about the work that captivated her for so many years.



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Kara’s road to the Board of Directors of FOTO began long before she became a member of the then-fledgling organization. She recalls how the Observatory was the dating proving ground in her teenage years. Her young suitors were gauged by their reaction to a date at the Observatory. “Going to Griffith Observatory provided the opportunity to see if a boy could have a conversation, think about the bigger questions, and appreciate a girl who enjoyed going to a place that was free,” Kara remembers. Over the years that followed, Kara made frequent trips to the Observatory, “just to check in, visit favorite exhibits, and re-infuse myself with the idea that thinking about the very big questions mattered. It elevates all of us.”

When on a visit in 1979, Kara learned about the new Friends Of The Observatory and immediately became a member. In the early 1980s, she took advantage of an opportunity (and a FOTO discount) to join a UCLA-sponsored trip to Yucatán with Observatory Director Dr. E.C. Krupp. Whether it was destiny or good fortune, Kara was seated next

to Dr. Krupp. A marathon conversation with Dr. Krupp on the red-eye flight to Mexico reinforced Kara's affection for the Observatory and crystallized her commitment to its future.

Within a year, Kara was asked to join the Board and thus began her FOTO legacy. Looking back over Kara's long association with FOTO, Dr. Krupp says that one of her most vital roles was her ability to communicate with the Observatory's various constituencies. "She was the perfect advocate to the community for Griffith Observatory to lay the groundwork for the future." "Kara is FOTO," says founding Board member and good friend Natalie Evans. Natalie remembers that Kara was "always up for anything" and recounts her "enthusiasm, giving spirit and generosity of time."

In the more than two-and-a-half decades that followed, Kara served four terms as Board secretary, two as vice-president, and three as president, in addition to her involvement on numerous committees. Her tenure saw many Observatory milestones. One of the most significant was the extraordinary renovation, expansion, and reopening. Throughout she was a passionate advocate for FOTO and the Observatory in the community and became the public face of the renovation at too-many-to-count neighborhood meetings and City committee meetings.



Kara's association with FOTO was filled with events, activities, and people that touched and changed her life. One of her fondest memories is of collecting the Moon rock that is on display at the Observatory (*left photo*) from NASA in Houston: "It was such a great honor and a fun series of events to deliver the rock." The dedication of the *Rebel Without A Cause* monument also sparks special memories, as does the celebration of the 25th anniversary of the Moon landing.

Kara's signature accomplishment, however, was the development of the magnificent Cosmic Connection (*right photo*). This timeline of the universe contains over 2,300 pieces of celestially-themed jewelry — all of which must be cleaned by hand! Kara credits the vision for this unique and spectacular exhibit to Dr. Krupp, whose charter to her was to come up with ideas that would be obvious and thoughtful yet visually random and chaotic. Quite a challenge...but Kara was up to it, and the results delight visitors who are able to follow the timeline and have a cosmic connection.



With all that Kara has contributed, what was perhaps most significant isn't written in meeting minutes, chronicled in articles, or photographed for posterity. It is something more enduring. She was essential in the development of the bond between FOTO and the Observatory that has created the most successful public/private partnership in the City of Los Angeles. This bond has enabled both groups to work together with immense synergy and to strive for and achieve excellence in their joint commitment to public astronomy.

Former FOTO president David Gold says, "I simply cannot imagine a FOTO Board without Kara. Her energy, commitment, and support for Griffith Observatory and public astronomy were simply unmatched during the time that I served."



FOTO Executive Director, Camille Lombardo speaks of Kara's "commitment and devotion to FOTO," and recalls the optimism and excitement that are so much a part of Kara's personality. "I am beyond honored to call Kara a friend," she says.

Kara's spirit and enthusiasm are embedded in Griffith Observatory. They are etched into the hearts of those with whom she has worked so closely. FOTO will miss her participation on the Board, and we wish her every joy and happiness on all the journeys yet ahead.

The 2012 FOTO Holiday Party was a very special celebration, as retiring Board member Kara Knack was honored for her many years of service to FOTO.

Offering best wishes to Kara Knack (*center*) are, (*left to right*) FOTO Executive Director Camille Lombardo, past FOTO Board President David Gold, FOTO President David Primes, Joyce Primes, and Observatory Director Dr. E.C. Krupp.



Message From The Griffith Family:

It goes without saying that Griffith Park and the Observatory are truly special to our family, but this beautiful place wouldn't be what it is today without the amazing people that have worked so diligently to maintain and improve the Observatory while keeping with the spirit and vision of Griffith Jenkins Griffith. Our family truly cherishes and remembers **KARA KNACK** for her passion and service to the Observatory, and she has left a lasting impression on all of us. To celebrate Kara's contributions to the Observatory and her long standing membership in **FRIENDS OF THE OBSERVATORY (FOTO)**, each of us has provided a statement about Kara and our tremendous gratitude for what she has done.

“ Myself and the whole Griffith family are extremely appreciative of everything Kara has done to bring such life and improvement to the Observatory during her time there. She has worked as part of the team for so long that it's more like she's truly a part of the Griffith family. We are beyond grateful for her long service to the Observatory.” ”



VAN GRIFFITH
great-grandson of Colonel Griffith Jenkins Griffith

I just think Kara is so great. She's the hardest working person on the face of the planet.

For her it's not about a title, or a role, she is a dedicated member of the Los Angeles community and a passionate advocate for FOTO and the Observatory. Her contributions to Griffith Observatory, FOTO, the City and our family will forever be remembered and appreciated. ”

CHRISTINE GRIFFITH
mother of Morgan and Trevor Griffith

“ I remember the first time I met Kara and it was like a breath of fresh air. She has a sparkle in her eye and more passion than I can remember finding in a single human being for a long time, if ever. Her upbeat personality, endless drive, and desire to share the wealth of resources available through the Observatory and Park are traits I admire and will always remember her for. Thank you, Kara, for everything you have done for our family, everything you have done for FOTO, the Observatory, the Park and everything you have done for the City of Los Angeles. We will forever be grateful for all that you do. ”

MORGAN GRIFFITH
great-great-granddaughter of Colonel Griffith Jenkins Griffith

“ I've known Kara since I was a very small child and have always held her in high esteem for her kindness, generosity and commitment to making the Observatory a better place. I know that she cares deeply for the Observatory and her role in it, and I'm thrilled that she is receiving the praise that she so rightly deserves. Thank you, Kara, for all of your hard work and service over the years. I hope there are many more to come. ”

TREVOR GRIFFITH
great-great-grandson of Colonel Griffith Jenkins Griffith



From the whole Griffith family we would like to express our sincerest appreciation for everything KARA has done over the years and hope that she will continue to be a valuable member of the Los Angeles Community, FOTO Board and Griffith Observatory team.



There have been many changes since we reopened in fall 2006, and 2012 was a year of major transitions for FOTO. Most noteworthy is that Kara Knack, known by many for her contribution of the universal timeline made from celestially-themed jewelry in the Cosmic Connection, retired from the Board after 27 years of service. She was instrumental in my joining the Board, so this is a particularly bittersweet moment for me. While I wish her every success, and hope to hear her singing with a band again soon, I will miss her. You can read about her remarkable career with Friends Of The Observatory in this issue of the *UPDATE*.

Secondly, we have worked hard to expand our Board of Directors, and amazingly, 60% of the Board is new since we reopened in 2006.

One of the things of which I personally am most proud is the evolution of FOTO into a true fundraising Board. Sherry Dewane, FOTO Vice President, has championed this change. With her leadership and **your** generous support, we achieved our goal of putting FOTO on a sound financial footing by generating a profit of over \$150,000 from our fundraising premieres of *Time's Up* in May 2012. Our next Cosmic Conjunction fundraiser will be held in September of this year, so please watch your mailboxes and emails for information and invitations to this special evening supporting Griffith Observatory's educational programming.

Though not a transition, in July 2012 Griffith Observatory's Dr. E.C. Krupp, Director, Mark Pine, Deputy Director, and Dr. Laura Danly, Curator, along with Camille Lombardo, FOTO's Executive Director, were invited to conduct a panel discussion at the biennial meeting of the International Planetarium Society meeting in Baton Rouge, Louisiana. While the thought of Louisiana in the middle of summer dampened enthusiasm, the opportunity to highlight Griffith Observatory's award-winning renovation and expansion project before planetarium professionals from around the world carried the day. Camille shares more about the conference below. Please enjoy.

IPS CONFERENCE 2012

Negotiating Celestial Renewal

By Camille Lombardo, Executive Director, Friends Of The Observatory



Every even-numbered year, planetarium professionals from around the world gather to discuss their profession at the International Planetarium Society (IPS) conference. It is the place to learn about the latest in technology for domes, to see what your peers are doing, to see old friends, and to make new friends. Having the conference so close to home meant that Griffith Observatory and Friends Of The Observatory would be able to participate and share our experiences with others.

Our group was selected as one of the first concurrent panel discussions of the conference. Our topic was *Negotiating Celestial Renewal*. Dr. Krupp described the focus of our presentation as: "Discoveries, problems, and solutions—inevitable in any highly specialized, technically complex, and public enterprise—surfaced throughout design, construction, and subsequent operation at Griffith Observatory. These offer lessons that may be useful to other planetaria and public observatories. The panel will discuss Griffith Observatory's heritage and recent renewal and will spotlight the exhibit program, planetarium show production and presentation, and capital funding." *The Once and Future Griffith Observatory* video shown daily in the Leonard Nimoy Event Horizon theater covers much of this, and many of you have heard Dr. Danly speak about what it takes to get a show as big as the sky ready for a dome as tall as a three-story building. But you may not have heard much about what FOTO *really* did and does as Griffith Observatory's public partner.

Below is a brief summary of my presentation at the conference, followed by one section that I particularly wanted to share with you. I think it will give you an idea of the depth of FOTO's participation in the renovation and expansion project and a greater appreciation of how important your support of FOTO truly is.

"It takes a lot of money to make these dreams come true." — Walt Disney

Dreaming big is easy in a city like Los Angeles. Hollywood movies and money make fast action, visual complexity, and witty dialogue the barriers to entry for almost all types of experiences. Fortunately, they also set a standard for teamwork, collaboration and respect for expert skills not generally found in other industries. Authenticity, however, is not mandatory, as long as there is entertainment value. As we all know, "edu-tainment" is a term that slips easily off the tongues of exhibit designers, planetarium show developers, and donors, but if your big dream relies on credibility, excellence, and real science, *how do you realize the dream when there is no future revenue stream and no borrowing ability and when the project falls under the rules and regulation of the second largest city in the United States?* The lessons learned from an advocacy and fundraising perspective may be meaningful to others trying to make their own dreams come true.

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With Our Sincere Gratitude



At our January FOTO Board meeting, we were very pleased to receive a \$5,000 check from the **American Contract Bridge League (ACBL) Charity Foundation**. The funds for this donation were raised from League members playing in charity games. The ACBL Charity Foundation makes annual contributions to organizations, such as Griffith Observatory, that support their communities. The ACBL wants all of us to know that bridge is a great game and you don't even have to be good to have a fun time! If you have an interest in playing or learning how to play bridge, please go to ACBL's website: www.acbl.org.



A huge thank you to **United Airlines** for sponsoring FOTO's 2013 **COSMIC MUSINGS LECTURES**, our program of fascinating lectures presented by renowned scientists and other experts. We are grateful for this support.



We are deeply appreciative to long-time FOTO Board of Directors member Arnold Seidel and his wife, Joan, for their new sponsorship of the long-standing *Griffith Observer Science Writing Contest*. The contest will now be known as **The Joan and Arnold Seidel Griffith Observer Science Writing Contest**.

This extraordinary writing contest was first announced in 1972. Griffith Observatory has been honored since the contest's inception with submissions from many well-known and serious contributors who have shared their knowledge, insight and perspectives with us. For more information, please visit www.griffithobservatory.org/skywriting.html.

Arnold Seidel joined the Board of Directors in 2004. He has always been a great supporter of Griffith Observatory and together with Joan has been involved with many activities at the Observatory over the years.

Thanks to the Seidels for their generous sponsorship and for enabling the continuation of this respected and beloved contest.

Your gifts are among our most vital resources as we support Griffith Observatory's mission
TO INSPIRE THE FUTURE, ONE IMAGINATION AT A TIME.



www.FriendsOfTheObservatory.org

So what is the role of a nonprofit? It's not just about raising money. It's about creating a successful public/private partnership. Many people assume a nonprofit's only role is to raise the money that buys the three-story, premium planetarium dome, funds the construction, equipment and people that create the programming, and then walk away. Few expect the nonprofit to negotiate and sign the purchase contracts for the dome, the exhibits, the planetarium projector, or designer consulting contracts.

In addition to straightforward fundraising for Griffith Observatory's renovation and expansion project, Friends Of The Observatory had the leadership role in advocacy with all the project's constituents encompassing local neighborhoods, foundations, corporations, donors, and most City officials, including the man whom the *Los Angeles Times* called "the most powerful man in City Hall." From negotiating a commitment with the City of Los Angeles to fund the outstanding building costs in exchange for assuming the financial responsibility for all the programmatic elements, to picking up the tab for a BBQ lunch on site for the construction workers, to sitting on the project's guiding Renovation Steering Committee, FOTO

was more than a "support group." It was an integral part of the team. Being such an important part of the team helped tremendously in fundraising because we could speak very credibly about every aspect of the project at all times.



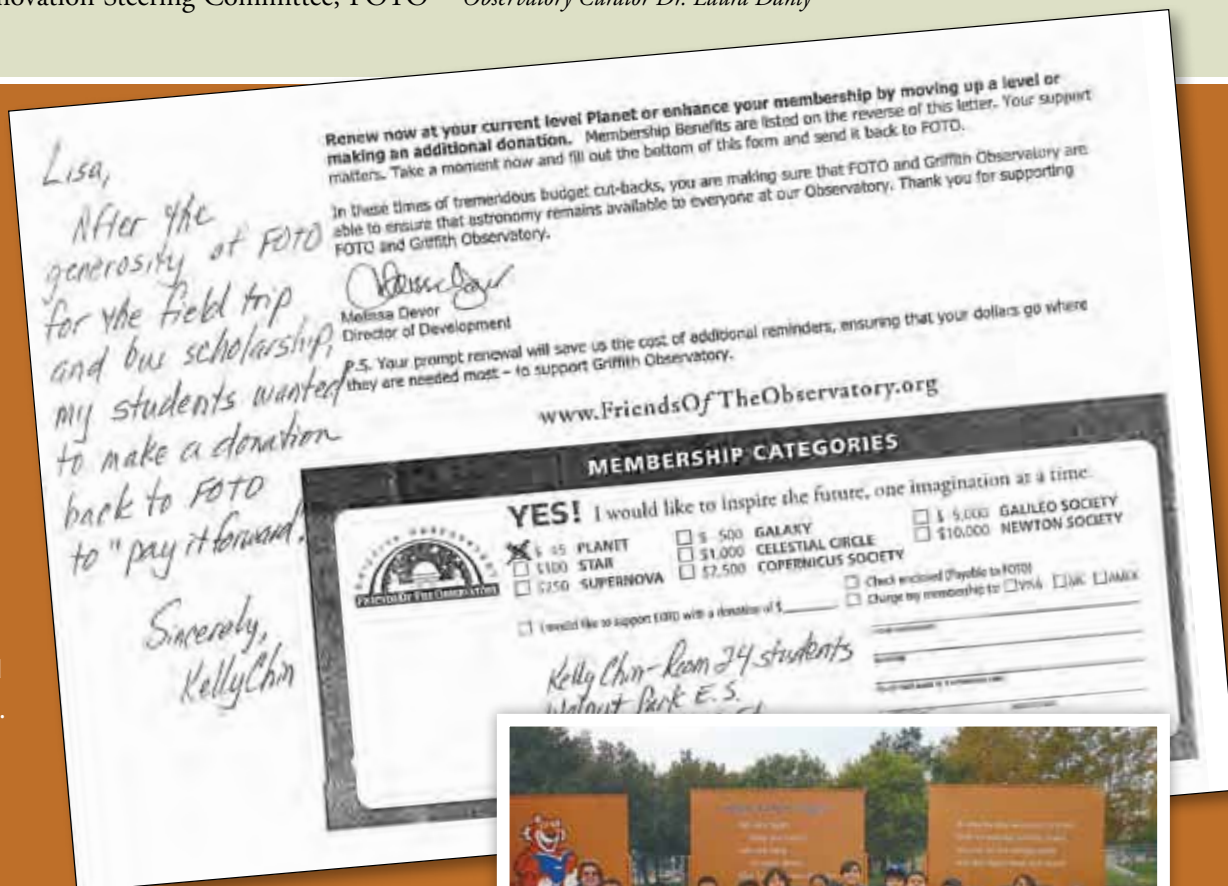
LEFT TO RIGHT: FOTO Executive Director Camille Lombardo, Observatory Deputy Director Mark Pine, Observatory Director Dr. E.C. Krupp, and Observatory Curator Dr. Laura Danly

Every year, Los Angeles Unified School District fifth-graders participate in the School Field Trip Program through the FOTO Bus Scholarship Program. FOTO provides funds for school buses to those schools for whom a field trip to Griffith Observatory would otherwise be unaffordable.

MAKE AN IMPACT IN OUR COMMUNITY. SUPPORT FOTO.

Call: 213-473-0879
Email: FOTOfriend@FriendsOfTheObservatory.org

FOTO Bus Scholarship Program



Upcoming Events

MARCH

3/10 Daylight Saving Time begins!
3/16 2:00 p.m. - 9:45 p.m.
PUBLIC STAR PARTY (Free admission)

3/18 7:30 p.m. - 9:30 p.m.
COSMIC MUSINGS LECTURE
brought to you by United Airlines.

Is the Universe Lively or Lonely?

Speaker: Carl B. Pilcher, former NASA Astrobiology Institute Director, NASA Ames Research Center
FOTO members: \$10, Non-members: \$25.
Registration deadline: 3/15.

TO REGISTER:

www.FriendsOfTheObservatory.org • 213.473.0879

APRIL

4/5 7:30 p.m. - 9:00 p.m.
ALL SPACE CONSIDERED (Free admission)

4/20 2:00 p.m. - 9:45 p.m.
PUBLIC STAR PARTY (Free admission)

4/22 7:30 p.m. - 9:30 p.m.
COSMIC MUSINGS LECTURE
brought to you by United Airlines.

Love, Fear & Greed:

Why We Should Go to the Asteroids

Speaker: Martin Elvis, Ph.D. Senior Astrophysicist, Harvard Smithsonian Center for Astrophysics
FOTO members: \$10, Non-members: \$25.
Registration deadline: 4/19.



FOTO'S ANNUAL HOLIDAY PARTY

on December 17 was great fun! More than 350 FOTO members and friends joined in the festivities. The Observatory was open for exploration; there were festive holiday refreshments and the opportunity to mingle with FOTO friends and acquaintances. For the first time, the annual gathering of FOTO members included a fantastic 11-piece live swing band. Retiring Board member Kara Knack delighted us all with her wonderful talent as a songbird.

IT WAS TRULY A NIGHT TO REMEMBER.



Mt. Wilson Observatory Trip

Another splendid trip to Mt. Wilson Observatory. This was a nighttime observation opportunity that allowed FOTO members and friends a chance to look through the Hale 60-inch telescope on a night when the sky was pristinely clear. We were able to see: M13 Globular cluster in Hercules; NGC 6543 Cat's Eye planetary nebula in Draco; M57 Ring Nebula (planetary) "ghost of cheerio" in Lyra; Epsilon Lyra "double double"; PK64+51 Campbell's Hydrogen star in Cygnus; Alberio=double star in Cygnus (UCLA star); NGC 7027 blue green protoplanetary nebula in Cygnus; M15 globular cluster in Pegasus; NGC 7662 Blue snowball planetary in Andromeda; Neptune in Aquarius; M31 Andromeda galaxy; Jupiter. (NGC-New General Catalog, M-Messier). What a spectacular experience! Look for the next Mt. Wilson field trips, scheduled for:

June 1 & July 27, 2013
To register: (213) 473-0879



Cosmic Musings Lectures by Stuart Bernthol

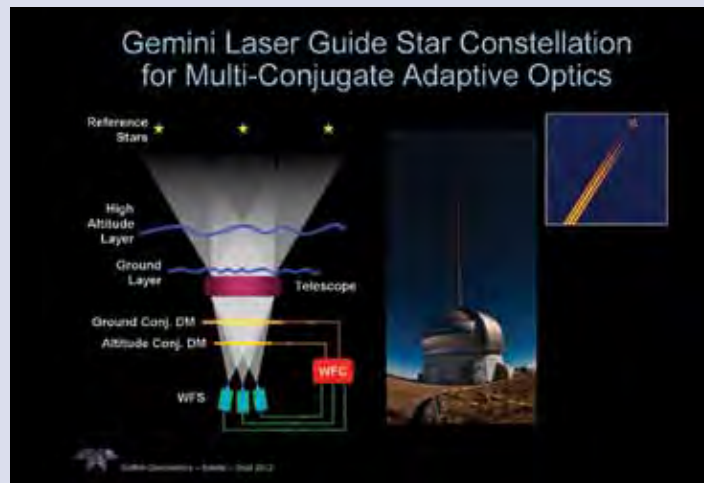
The Fantastic World of Adaptive Optics by Dr. James Beletic

September 24, 2012

This talk presented the interesting physics and unique technologies of adaptive optics. Dr. James Beletic, Vice President, Space and Astronomy at Teledyne Imaging Sensors was our speaker.

In the 400 years since Galileo first used a telescope to explore the heavens, no other instrument has provided more information about the Universe and our place in it. While space telescopes have provided many of the most stunning discoveries, most of astronomy is done with ground-based telescopes, which are experiencing a golden age. In the past two decades, 17 very large optical /infrared ground-based telescopes have been commissioned, with apertures from 6.5 to 10 meters in diameter. In the next decade, up to three “extremely large telescopes” (ELTs), with 24 to 42 meter apertures, will see first light.

Ground-based telescopes have become extremely precise and complex machines, but they still suffer from the distortions of the Earth’s atmosphere first recognized by Isaac Newton nearly three centuries ago. The blurring caused by the atmosphere has traditionally limited the angular resolution of the largest telescopes to the resolution of a small backyard telescope...until the invention of adaptive optics, a technique for sensing and removing distortions. Adaptive optics is used at most major observatories, and is central to the ELT designs.



When the candles were placed near a camera focused on a picture of the cosmos across the room, you could see the “twinkling” effect. When the candles were moved further away, the effect was reduced to nothing. This clearly demonstrates that the closer to the camera the distortion, the greater the effect.

The solution for ground-based telescopes to compensate for the atmospheric distortion is to use an ingenious system which combines ground-based atmospheric lasers and computer generated adaptive mirrors to correct the distorted images. This results in a similar improvement in clarity as that achieved with the Hubble telescope when it was fitted with the corrective devices that compensated for its improperly ground mirror.

Death from Space by Dr. David Jewitt

October 29, 2012

Dr. David Jewitt, recipient of the 2012 Kavli Prize in Astrophysics and Shaw Prize in Astronomy, discussed the physics of cosmic impact in an accessible way and described the consequences for life and Earth.

Earth is hit by a constant rain of debris from shattered asteroids and disintegrated comets. The threat posed by these impacts is now reasonably well understood, and Dr. Jewitt spoke eloquently about the impact as both a destructive and constructive natural process.

To begin, Dr. Jewitt used a graphic with an explanation of the nature and size of material hitting the Earth. About 40,000 tons of debris hit the Earth each year—roughly 1 kg/sec. Most of this is in the form of dust. The effects depend on the impactor size and secondly, on impactor strength. Bodies smaller than a few meters are completely stopped by the atmosphere unless they are iron and very strong. Bodies larger than a few hundred meters cannot be stopped, even if they are strengthless.

The nature of the particles were described as:



Dr. Beletic’s explanation of the principles of adaptive optics to compensate for the distortions caused by the atmosphere, which causes the stars to “twinkle,” was augmented by a wonderfully graphic visual presentation.

While the concept of atmospheric distortion was first recognized by Isaac Newton, it was Andrei Kolmogorov who first described the mechanism of the atmospheric distortion. Dr. Beletic used an ingenious method to demonstrate atmospheric distortion by placing a tray of burning candles in front of a video camera, whose picture was projected to the overhead screen.



LEFT TO RIGHT: David Reitzel, Ph.D., Observatory Astronomical Lecturer, Dr. Laura Danly, Observatory Curator, and Dr. David Jewitt

Brownlee particles: very tiny 10um=.01 mm and smaller. They come from comets that may have been part of the interstellar grains of the protoplanetary disc. They are heated by friction, but do not melt, as they radiate the heat.

Meteors = shooting stars (mm sized). Larger grains cannot radiate their energy fast enough and burn up from friction from the air. Most burn up within 1 second and are destroyed 90 km high. Most are random, but some occur as showers as the result of the Earth passing the debris of comets. Halley's Comet gave us the "Orionid and Aquarid showers."

Impact speed-30 km/sec: classification of objects: Large meter-sized meteorites are called Bolides and can be iron, 100 meter sized bodies remain coherent but may break up with an atmospheric airburst explosion from a comet, like Tunguska or 20 MT asteroid ground explosion, like Arizona's Meteor Crater. Tektites are glassy rocks that are the result of melted Earth rocks that have been blasted upwards and fell back through the atmosphere at high speed. Many have aerodynamic shapes, showing they were hot in flight.

Effects of Giant Impact: 10 km body would hit the ground with cosmic speed, 30 kms/sec, and vaporize itself and 1000X its own mass of rock. Lots of material would travel at sub-escape speed and fall back to the Earth and burn up as wall-to-wall meteors. The result to Earth's surface would be similar to what a toaster oven looks like when its surface has been burned. Earth would have an "extinction event" such as Earth suffered through 65 million years ago.

Dr. Jewitt discussed detection and deflection strategies, which at this point include gravity tractor, push rocket, giant space mirrors, and wrap and go. The bottom line: We are unwilling to invest in projects that may alert us to the danger, and as of now, we will probably not see it coming.

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NASA's Dawn Mission to the Asteroid Belt

by Dr. Marc Rayman

November 26, 2012

Our speaker for this presentation on the *Dawn* mission was Dr. Marc Rayman, Chief Engineer, Jet Propulsion Laboratory and the only person to have won both the Exceptional Technical Excellence Award and the Exceptional Leadership Award, two of JPL's most prestigious honors.

Dawn orbited Vesta from July 2011 to September 2012 and returned astonishing views of this fascinating world. It is the only spacecraft ever to orbit an object in the asteroid belt and is the first ever targeted to orbit any two solar system destinations. Such a mission would be impossible without the use of ion propulsion, a technology that has mostly been in the domain of science fiction, but was tested extensively on the Deep Space 1 mission, paving the way for *Dawn*.

The ambitious and exciting *Dawn* mission, launched in September 2007, is one of NASA's most remarkable ventures into the solar system. The spacecraft has recently completed a spectacular exploration of Vesta and is now traveling to Ceres; these were among the last uncharted worlds in the inner solar system. They are the two most massive residents of the main asteroid belt, that vast collection of bodies between Mars and Jupiter. Ceres is so large that it is included in the category of dwarf planets, along with Pluto. The alien landscapes *Dawn* reveals provide humankind with a new perspective on the solar system. Remnants from the time that planets were formed, Ceres and Vesta hold clues that will help scientists understand the dawn of the solar system.



Dr. Rayman began by reminding us of our earlier understanding of our solar system and the discoveries made in the early 1800s that led us to our current understanding of its evolution from a cloud of gas and dust some 4.6 billion years ago. From that cloud, a finger of gas collapsed to form a star, while the remaining cloud debris first began, through the process of accretion, to form rocks and then planets. It is thought that Vesta and Ceres were stopped from becoming planets by the gravitational attraction of Jupiter. These two massive bodies, with Ceres at 600 miles in diameter, and the smaller Vesta at 350 miles in diameter, were both affected by the hot and cold environments in which they were created.

Ceres is 38% the size of the United States and has a thin, dusty crust with a rocky core and water ice, indicating that it might have more fresh water than the Earth.

Vesta, the first destination, has a massive impact crater, with a mountain in the center, twice as high as Everest. The impact crater probably has melted rock that splashed back in place. It has the most extreme topography in our solar system. While its northern hemisphere is more heavily cratered than the southern hemisphere, of its three craters, the largest is 1 billion years old, while the smaller one is 2 billion years old.

What makes the *Dawn* mission so spectacular is that because of the ion engine we can, for the first time, orbit a "planet" and then go on to orbit a second. Dr. Rayman noted during his presentation that an early Star Trek episode declared that an alien craft was using an ion engine and that Star Fleet didn't have this advanced technology yet. Another example of how science fiction presages our own scientific advances.

From: Camille Lombardo

Date: November 14, 2012

Subject: What An Eclipse!



WHAT AN ECLIPSE! Beginning with a gorgeous sunrise painting the sky and clouds sorbet colors – to magnificent totality – to the big black cloud that blotted out the Sun five minutes after totality – everything was perfect! Totality began with scattered Bailey’s beads and a bright diamond ring. Then the chromosphere appeared silvery blue with dazzling magenta prominences – huge loopy ones at 5 o’clock. Next the corona began to materialize. It was pale and very feathery. Because of solar max, it framed the black spot in the sky nearly symmetrically at about one solar diameter, save for some longer streamers at about 2 and 4 o’clock. There was a lot of variation in the breadth, color, and “hairiness” of these ribbons. No bow tie, but none expected, again because of the solar max effect.

Third contact produced the biggest, brightest diamond ring I have ever seen. It was thrilling and unexpected to see such light with the naked eye.

It got really, really dark; the darkest I can recall. We saw the Moon’s shadow racing across the glass-like sea. Others saw shadow bands, but Bonnie (Winings, FOTO Board member) and I were busy selling the beautiful FOTO T-shirts. The temperature took a dramatic drop soon after first contact and it continued to chill throughout totality. Very cold actually.

We were told the reason for the swift cloud formation so soon after totality was that we had just sailed through a cold front and were lucky (or good planning by the Captain?) to be on the dry trailing end of the weather system. As we continued on center line, we headed into more tropical weather that created the moisture-filled clouds.

THIS IS A HAPPY CREW!

South Pacific: Voyage to Totality What an Eclipse!

By Camille Lombardo, Executive Director, Friends Of The Observatory

On November 2, 2012, 33 FOTO members boarded the *Celebrity Millennium* for a 19-day cruise to see the 2012 total solar eclipse. We departed from Honolulu, docked the next morning in Hilo on the Big Island, then watched glowing rivers of lava flow down from the mountains as we began five days at sea. Two more FOTO members joined us in Pago Pago, American Samoa, and Suva, Fiji, in time for the race at 22.5 knots to our rendezvous with the Sun on the centerline. Having crossed both the equator and the International Date Line, we viewed the eclipse on November 14 for three minutes and thirty seconds — longer than any other group on Earth.

The next morning, I wrote a few friends and family about the beauty of this eclipse and am pleased to share the immediacy of that email (*adjacent column*) with you, too.

Another highlight of the trip was sailing through the rare ocean phenomena known as a pumice raft stretching for hundreds of miles across the ocean. This is caused by an underwater volcano erupting lava that instantly cools into small, pale, porous stones that form floating ribbons and islands. If Kelly Beatty, senior contributing editor for *Sky & Telescope*, hadn’t explained what the light brown froth we were seeing actually was, I would foolishly have thought it was dirty sea scum like you sometimes see on shore. Perhaps this was part of the raft with an estimated area of 10,000 sq. miles that was observed near New Zealand by the Royal New Zealand Navy in August.*

On every trip I have the great privilege of meeting new FOTO members and deepening relationships with FOTO friends I’ve known for a long time.

In SEPTEMBER 2013 we are planning a cruise departing from Norway to the Arctic Circle to see the aurora borealis at solar maximum. More information will be available shortly. I hope to meet you then.

*Citations about this observation can be found on Wikipedia.



ENDEAVOUR TO DREAM

By Kathy Malinski

Children who dream of someday becoming astronauts and pilots were undoubtedly among the thousands of people who packed Griffith Observatory's grounds and surrounding hills and trails on September 21, 2012. And very likely, there were more than a few engineers who were lucky enough to land a dream job working on the Space Shuttle project when it was in its heyday in southern California. But everyone who braved this hot Los Angeles day, to wait and watch, shared one thing — a dream come true: the fly-over of the Space Shuttle *Endeavour* on her final aerial journey.

Television coverage captured cheers, applause and more than a few tears as the *Endeavour* came into view, perched on top of a specially outfitted 747 and escorted by two sleek fighter jets. *Endeavour* and her entourage twice flew over the Observatory slowly and at a very low altitude, affording the crowd an unprecedented opportunity to experience a part of history.



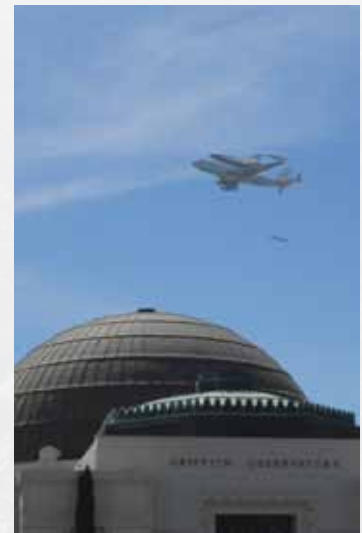
© NASA. One of the NASA chase planes captures a spectacular in-flight view of the shuttle and the Observatory below.

While the crowds at the Observatory were watching and waiting for *Endeavour* to make her appearance, our FOTO friends at Jet Propulsion Laboratory in Pasadena were waiting for voice mails and texts from their FOTO “spotters” to let them know when *Endeavour* was headed their way. The Curiosity team, including our good friend and former FOTO Board member Nagin Cox, were hard at work and could only take a few minutes to join in the fly-over experience. The relay spotters were now-retired Board member Kara Knack, reporting from Malibu, and FOTO Executive Director Camille Lombardo, on hand at the Observatory. Kara reported to Nagin when *Endeavour* was near Malibu, and Camille took over with the announcement that the Space Shuttle was at the Observatory, giving the JPL team a heads-up so they could plan their viewing. Now that's teamwork!

Although there were several venues in southern California that were honored with an *Endeavour* fly-over, perhaps none was more touching than Griffith Observatory. For she was passing over the building that houses the Samuel Oschin Planetarium on her way to the Samuel Oschin Space Shuttle *Endeavour* Display Pavilion at the California Science Center. Here she will stay until completion of the California Science Center's new addition, the Samuel Oschin Air and Space Center, which will be *Endeavour*'s permanent home. The Mr. and Mrs. Samuel Oschin Family Foundation has provided remarkable support to astronomy in southern California, and has helped make the dream of displaying the *Endeavour* in southern California, where she belongs, possible.

So as we endeavour to dream our own dreams, this remarkable day will live in our memories as a fitting tribute to Griffith Observatory, southern California, the space program, and everyone who dares to keep “looking up.”

© Nicole Balonick, Griffith Observatory
The Shuttle and chase planes pass over the dome of the Samuel Oschin Planetarium.



For those who missed this momentous event, check out videos and photos from Griffith Observatory's Livestream page —

<http://new.livestream.com/GriffithObservatoryTV>



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LOVE, FEAR & GREED: WHY WE SHOULD GO TO THE ASTEROIDS

Speaker: Martin Elvis, Ph.D. Senior Astrophysicist, Harvard Smithsonian Center for Astrophysics

Monday, April 22, 2013, 7:30 p.m. at Griffith Observatory

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WELCOME FOTO New Board Members

FOTO is very pleased to announce two new members of our Board of Directors: Ethan Eller and Rich Semler. Please join us in welcoming them to the Board and thanking them for their dedication and participation. We'll be introducing Ethan and Rich to you in the next issue of *UPDATE* and soon on our website.

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