



Goddard View



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Goddard Construction Update: New Gate in Progress

By Rob Gutro

Goddard is getting a new entry gate. You may have noticed it if you've entered the Center through the north gate from Soil Conservation Road. According to David Larsen, Exploration Sciences Building Project Manager at Goddard, "The construction for the new north gate and Explorer Road around the Exploration Sciences Building (ESB) will be complete in fall 2008. Due to the ongoing construction for the ESB, both the road and north gate will not be operational until fall 2009." ■



Photo Credit: Debora McCallum

Caption: The new north gate under construction.



Photo Credit: Debora McCallum

Caption: A welder works on the new Exploration Sciences Building.



Photo Credit: Debora McCallum

Caption: The east side of the new Exploration Sciences Building.

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Cover caption: Anetra Tucker from the Office of Public Affairs, Code 130, does her part to make LaunchFest a success.

Photo credit: Debora McCallum.

GoddardView Info

Goddard View is an official publication of the Goddard Space Flight Center. It is published biweekly by the Office of Public Affairs in the interest of Goddard employees, contractors, and retirees. A PDF version is available online at: <http://www.nasa.gov/centers/goddard/news/index.html>.

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Editor: John Putman

Deadlines: News items and brief announcements for publication in the Goddard View must be received by noon of the 1st and 3rd Wednesday of the month. You may submit contributions to the editor via e-mail at john.m.putman@nasa.gov. Ideas for new stories are welcome but will be published as space allows. All submissions are subject to editing.

LaunchFest a Huge Success

By John Putman

Thousands converged on Goddard Space Flight Center in Greenbelt, Md. on September 13, 2008 to celebrate LaunchFest. The predicted rain held off, encouraging approximately 11,000 people to visit the Center.

Beyond food, music, and entertainment on the Mall, the day was filled with exhibits and demonstrations from Goddard's many current and future missions. Kids of all ages were filled with wonder at the dozens of interactive activities that filled the many buildings open to the public.

Visitors had the rare opportunity to see actual spaceflight hardware while touring the Building 7/10/15/29 complex. Guests also got to see the centrifuge, and hear the acoustic chamber, in action. "We're having a great time. I really had no idea NASA was doing so much," said Mark Reynolds of Catonsville, Md.

"I liked the Sun movie best, but I haven't been to the Hubble model yet," said Mr. Reynolds's 9-year-old son, Uriah.

One of the more popular events on the Mall was the Festival of Cakes. Warren Brown of CakeLove and *The Food Network* provided cakes, brownies, and cookies to help celebrate NASA's 50th anniversary. Those attending sang "Happy Birthday" with a musical accompaniment by members of the Columbia Orchestra.

Tracy Wright of Laurel, Md. said, "The cake was so good. A little melty, but good." Tracy and her husband Ian said they enjoyed the JAXA Space exhibit most.

The Building 28 tour featured the Flight Dynamics Facility. Part of this facility was the 3D Visualization for Advanced Mission Planning, better known as "The Cave." The Cave is a 12' x 12' room with projection screens for walls. Stars, Earth, and a space shuttle are projected onto the screens, surrounding the group—wearing 3D glasses—in the Cave. The high definition visual experience left many spellbound. "It felt like you had an astronaut's eye view of the Earth," said Jacklyn Putman of Glen Burnie, Md.

Among many activities at the Visitor Center, kids had a chance to design and build their own rockets out of various materials. Tyler Engle of Upper Marlboro, Md. said, "I liked the air rockets. They were the fastest."

The list of hard-working people involved in the success of LaunchFest is way too long to fit here. A good portion of the credit, however, goes to the LaunchFest volunteers. Their light blue t-shirts were seen everywhere on Center, from leading tours to giving directions to directing traffic.

Many Goddard employees gave of their time to share their work with others. LaunchFest could not have happened without their contribution. "All the folks we spoke with were friendly and showed a great enthusiasm for their work," said Tara Schneider.

LaunchFest was sponsored by Ball Aerospace, Honeywell International, Lockheed Martin, Comcast, and other sponsors, and was made possible by a partnership with the National Capital Section of the American Institute of Aeronautics and Astronautics.



Caption: Omar Nasr from the Office of Public Affairs operates the "Picture Yourself in Space" exhibit.

Photo Credit: Bill Hrydyk

After a day full of learning and fun, visitors to LaunchFest left Goddard feeling inspired and more curious about NASA's missions. James Davis, an 11-year old from Alexandria, Va. said, "It was amazing. I hope they do this every year."

Center Director Rob Strain added, "You should all be proud of what you have achieved, and know that LaunchFest will serve as a milestone that will remind us all of why we should be proud of Goddard and the tremendous work we do here."

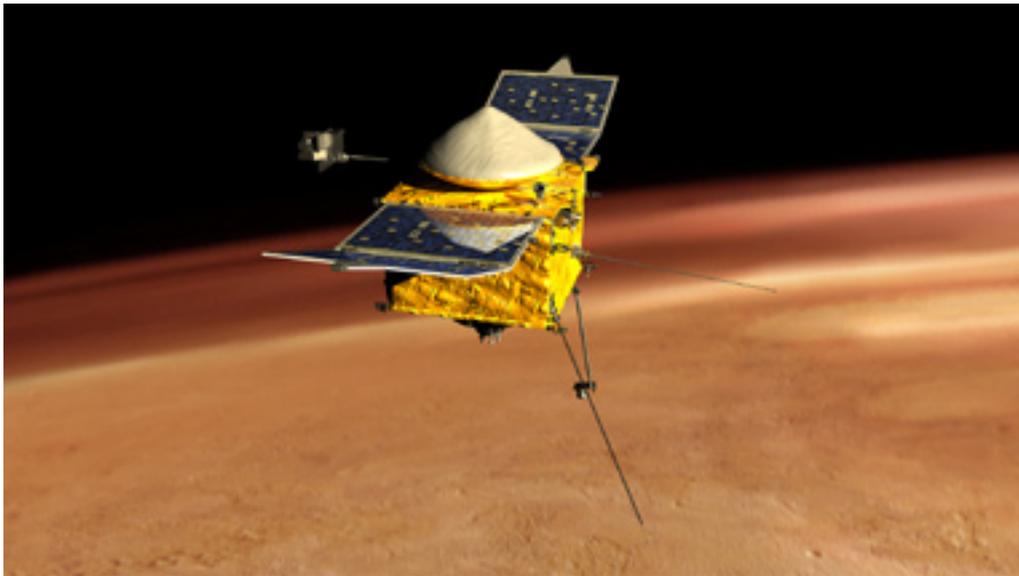
See more pictures from LaunchFest on Pages 6 and 7. ■

Goddard to Manage Upcoming Mars Mission

By Nancy Neal-Jones

NASA has selected a Mars robotic mission that will provide information about the Red Planet's atmosphere, climate history, and potential habitability in greater detail than ever before.

Called the *Mars Atmosphere and Volatile Evolution* (MAVEN) spacecraft, the \$485 million mission is scheduled for launch in late 2013. The selection was evaluated to have the best science value and lowest implementation risk from 20 mission investigation proposals submitted in response to a NASA Announcement of Opportunity in August 2006.



Caption: Artist's concept of the Mars Atmosphere and Volatile Evolution (MAVEN).

"This selection decision is the culmination of several years of effort under a highly competitive environment. First, in Step 1, in 2006 against 19 other teams, and then again in Step 2 in 2007–08," said David Mitchell, MAVEN Project Manager. "The selection of MAVEN was only possible with a lot of hard work by the Goddard MAVEN team and our partner institutions at the University of Colorado Laboratory for Atmospheric and Space Physics, University of California–Berkeley, Lockheed Martin–Denver, and NASA's Jet Propulsion Laboratory. Savor the moment, we are headed to Mars."

In addition to managing the MAVEN project for NASA, Goddard is providing two science instruments. Dr. Mario Acuna (Code 695) and his team are providing the two magnetometers for the mission. Dr. Paul Mahaffy (Code 699) and his team are delivering the Neutral Gas and Ion Mass Spectrometer. The MAVEN Project Scientist is Joseph Grebowsky (Code 695). The Principal Investigator for the mission is Bruce Jakosky of the Laboratory for Atmospheric and Space Physics at the University of Colorado at Boulder. The university will receive \$6 million to fund mission planning and technology development during the next year.

"This mission will provide the first direct measurements ever taken to address key scientific questions about Mars' evolution," said Doug McCuiston, Director of the Mars Exploration Program at NASA Headquarters in Washington, D.C.

Mars once had a denser atmosphere that supported the presence of liquid water on the surface. As part of a dramatic climate change, most of the Martian atmosphere was lost. MAVEN will make definitive scientific measurements of present-day atmospheric loss that will offer clues about the planet's history.

"The loss of Mars' atmosphere has been an ongoing mystery," McCuiston said. "MAVEN will help us solve it."

Lockheed Martin of Littleton, Colo., will build the spacecraft based on designs from two previous Mars missions. The team will begin mission design and implementation in the fall of 2009.

After arriving at Mars in the fall of 2014, MAVEN will use its propulsion system to enter an elliptical orbit ranging 90 to 3,870 miles above the planet. The spacecraft's eight science instruments will take measurements during a full Earth year, which is roughly equivalent to

half of a Martian year. MAVEN also will dip to an altitude 80 miles above the planet to sample Mars' entire upper atmosphere. During and after its primary science mission, the spacecraft may be used to provide communications relay support for robotic missions on the Martian surface.

"MAVEN will obtain critical measurements that the National Academy of Science listed as being of high priority in their 2003 decadal survey on planetary exploration," said Michael Meyer, the Mars Chief Scientist at NASA Headquarters. "This field of study also was highlighted in the 2005 NASA Roadmap for New Science of the Sun–Earth System Connection."

The Mars Scout Program is designed to send a series of small, low-cost, Principal Investigator-led missions to the Red Planet. The *Phoenix Mars Lander* was the first spacecraft selected. *Phoenix* landed on the icy northern polar region of Mars on May 25, 2008. The spacecraft completed its prime science mission on Aug. 25, 2008. The mission has been extended through Sept. 30.

NASA's Mars Exploration Program seeks to characterize and understand Mars as a dynamic system, including its present and past environment, climate cycles, geology, and biological potential. ■

NASA and Ocean Tomo Establish Groundbreaking Partnership to Commercialize NASA Technologies

By Darryl Mitchell

NASA and Ocean Tomo Federal Services recently announced the beginning of a new partnership to commercialize NASA-funded technologies. The partnership will focus on maximizing the value of NASA Goddard Space Flight Center's inventions to the Nation by facilitating transfer of over 40 technologies to the private sector for commercial application.

"A major component of NASA Goddard's Innovative Partnerships Program's mission is to transfer NASA technology to the commercial marketplace," said Nona Cheeks, Chief of NASA Goddard's IPP Office, which facilitated the licensing arrangement. "We look forward to working with Ocean Tomo to create greater awareness of the technological innovations available at NASA Goddard."

"The IPP Office works diligently to make the most of all opportunities for Goddard technologies to be utilized beyond NASA's needs, and some innovations are better transferred through nontraditional channels," said Darryl Mitchell, a Technology Transfer Manager in Goddard's IPP Office. "That's why we welcome this opportunity to partner with Ocean Tomo. They have unique expertise and tools, as well as the motivation to make this innovative pathway to the commercial sector successful."

"We are honored to have the opportunity to unlock the value of NASA's patents and other intellectual property for both the Agency's and taxpayers' benefit," said Dean Becker, Ocean Tomo's Vice Chairman. "Given NASA's historic achievements and reputation as an incubator of groundbreaking technological ideas and capabilities, we expect this new partnership to

attract the interest of those in the market who seek rare and high-potential opportunities."

Ocean Tomo Federal Services plans to offer the right to license NASA's technologies through its Internet Protocol transaction platforms. "Licensing Government-owned patents through our transaction platforms is a highly novel approach to technology transfer. The Goddard team has an extensive and successful track record in developing and commercializing breakthrough technologies, and our partnership is an excellent opportunity for us to work with creative and motivated individuals who are committed to excellence in scientific investigation and the advancement of essential technologies," said Connie Chang, Director of Ocean Tomo Federal Services.

"While both NASA and Ocean Tomo stand to benefit from the agreement, the ultimate beneficiary," said Cheeks, "is the taxpayer." "This groundbreaking collaboration between Goddard and Ocean Tomo accelerates the commercialization of NASA technologies into new and advanced products that help improve quality of life," said Cheeks. "A successful partnership between Goddard and Ocean Tomo is just the beginning of an important way for all of NASA, as well as other Federal labs, to maximize the value to the Nation of Federal technological research and development for unique scientific applications."

For more information, please contact Darryl Mitchell at Goddard's IPP Office at 301-286-5169 or Darryl.R.Mitchell@nasa.gov, or Connie Chang at Ocean Tomo at 240-482-8204 or cchang@oceantomo.com. ■



Caption: Representatives of NASA Goddard Space Flight Center and Ocean Tomo met in Chicago, Ill., to launch their new partnership and plan offerings of licenses to Goddard technologies.

Photo Credit: Ocean Tomo

LaunchFest Photo Gallery



LaunchFest Photo Gallery



Photo Credit: Bill Hrybyk



Photo Credit: Debora McCallum



Photo Credit: Bill Hrybyk



Photo Credit: Debora McCallum



Photo Credit: Pat Izzo



Photo Credit: Pat Izzo

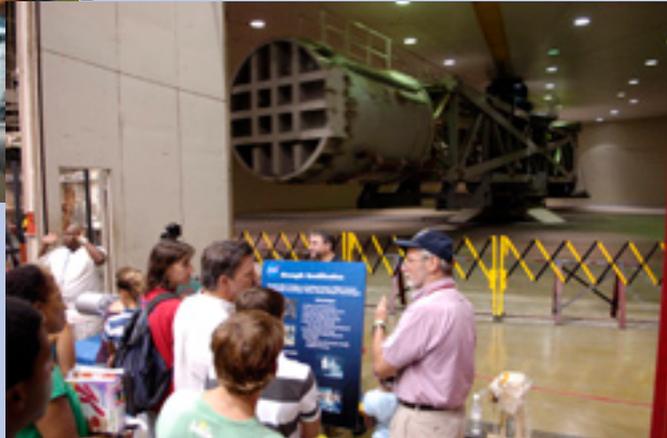


Photo Credit: Debora McCallum



The *Hubble Space Telescope* Observing Program

By Ray Villard

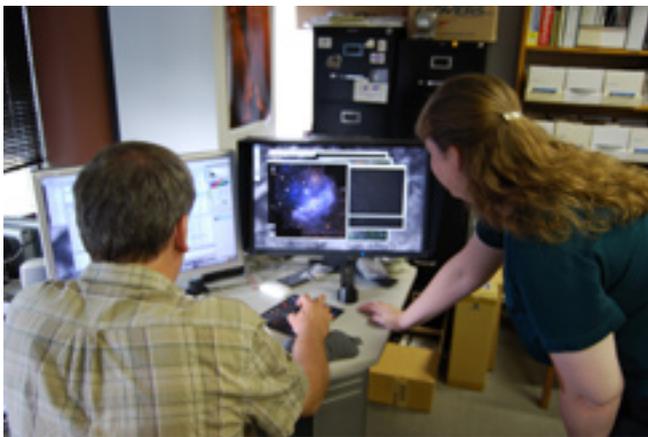
Unlike on many previous NASA space science missions, anyone can apply for observing time on the *Hubble Space Telescope*. The application process is open to worldwide competition without restrictions on nationality or academic affiliation.

Competition for time on the telescope is extremely intense. Potential users must show that the observations can only be accomplished with *Hubble's* unique capabilities and are beyond the capabilities of ground-based telescopes.

Telescope observing time is measured by the number of orbits required for a successful observation. Programs requiring many orbits get much greater scrutiny. The observations must address a significant astronomical mystery.

The demand for time on *Hubble* is so great, that typically only one out of six proposals for telescope time are actually selected. This is because *Hubble* can do breakthrough astronomical research that simply can't be done from ground-based telescopes.

Calls for proposals to use HST are issued annually. The time allocated for a cycle lasts approximately one year. Proposals are divided into several categories such as solar system objects, star formation, black holes in active galaxies, and the far universe.



Caption: Zolt Levay (left), Senior Image Processor, and Vanessa Thomas, Informal Science Specialist, review data retrieved from the Hubble Space Telescope archive.

There are several types of proposals:

- The general observer (GO) proposals are the most common, covering routine observations;
- Snapshot observations are those in which targets require only 45 minutes or less of telescope time. Snapshot observations are used to fill in gaps in the telescope schedule, which cannot be filled by regular GO programs;
- Astronomers may have Target of Opportunity proposals in which observations are scheduled if a unique transient event covered by the proposal occurs during the scheduling cycle, such as observations of comets that have been newly discovered.

Under the category known as "Director's Discretionary Time," the Space Telescope Science Institute (STScI) Director allocates up to 10 percent of total observing time. Astronomers can apply to use this time at any time of year. It is typically awarded for study of unexpected phenomena such as supernovas. Historically, STScI directors have allocated large percentages of their time to special programs that are too big to be approved for any one astronomy team. This allowed for the execution of the *Hubble* Deep Field and *Hubble* Ultra Deep Field, humankind's farthest visible light views into the universe.

The proposal process is organized by STScI. The GO proposals are peer reviewed annually by the Time Allocation Committee (TAC), which is broken up into selected disciplines: planetary science, stellar physics, active galaxies, etc. The committee looks for the best possible science that can be conducted by HST and seeks a balanced program of short, medium, and large number of orbits. The STScI Director approves the final selection and the winning lead investigators on the research teams are notified.

STScI planning and scheduling personnel assemble an observing calendar for executing winning programs. *Hubble* whirls around Earth completing one orbit approximately every 90 minutes, so everything must be pre-planned. This is made even more complex because targets may be visible at only certain times of the year. The carefully assembled calendar maximizes the telescope's observing efficiency by interleaving observations.

"Preparing observations and scheduling them on HST is such a complex process, it's astounding that any of them are successful. And yet, not only have these observations been successful over the years, they have also allowed us to discover more about our universe than we ever imagined existed," says Denise Taylor of STScI's Operations and Engineering Division.

Because HST is not in continuous communication with the ground, a to-do list of observations is uploaded in packets several times a week for the telescope to automatically execute. Images and other data are stored in an onboard solid-state computer memory and then down-linked to Earth at appropriate communications opportunities with the Tracking and Data Relay Satellite System.

The data stream into STScI where they are calibrated and archived. The GO for the program receives an e-mail notice that his or her observation is complete and ready to be downloaded from the STScI archive. The lucky astronomer has to start analyzing the data quickly and publish a science paper. That is because the astronomical observations are proprietary for only one year. After that time, other astronomers can look at the data and do their own research.

Astronomers using *Hubble* data have published more than 8,000 scientific papers, making it one of the most productive scientific instruments ever built.



Finding Fireflies Next to a Lighthouse: Goddard's New Technology to Study Alien Worlds

By Lori Keesey and Bill Steigerwald

Goddard scientist Rick Lyon has been working on potential missions and technologies to find planets around other stars (called exoplanets or extra-solar planets) since the late 1980s. Only recently has he begun to believe that NASA may actually fly a planet-finding mission in his lifetime. "This is the closest it's come to being real," he said.

Lyon and other scientists and engineers at NASA's Goddard Space Flight Center in Greenbelt, Md., have joined teams studying optics technologies for three possible exoplanet missions: the Extrasolar Planetary Imaging Coronagraph (EPIC), the New Worlds Observer (NWO), and the eXtrasolar Planet Characterization (XPC) mission.

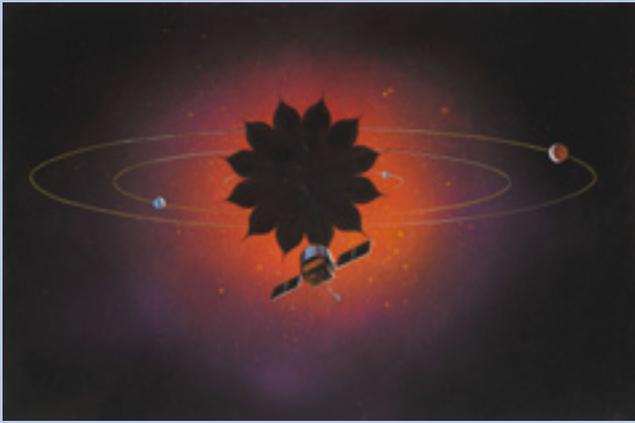


Image Credit: NASA and Northrop Grumman

Caption: Artist's concept of the New Worlds Observer. The dark, flower-shaped object in the center is the star shade.

The possibility of a mission devoted to planet finding is tantalizing, especially to those interested in ratcheting up a science that began 13 years ago when astronomers found and confirmed the existence of the first planet outside the solar system. Since then, scientists have confirmed nearly 300 other planets. Most of these detections, however, have been indirect because the planets are too faint to be seen directly. Instead, their presence is revealed by measuring how much the unseen world's gravity pulls on its parent star.

The proposed missions will use new technology to directly detect exoplanets by suppressing the light from their parent stars. Which mission will garner favor is still an open question—it's a challenge that Goddard scientist Mark Clampin likens to "trying to distinguish a firefly next to a lighthouse."

Starlight suppression is essential to finding exoplanets because direct starlight is much brighter than the starlight that's reflected off of any planets that are orbiting the star. Without starlight suppression technology, exoplanets get lost in the glare.

The visible nulling coronagraph (VNC) is a technology for directly detecting and characterizing Jupiter-sized gas giants, one of EPIC's science goals.

The VNC suppresses starlight because waves can interfere with each other and cancel out. This is true for waves of water and waves of light. If you

drop two stones into a calm pond at the same time, you'll see flat areas where the ripples meet. These are where the ripples are out of step with each other—the peak of one ripple meets the trough of the other ripple, and the waves cancel out.

The VNC works on the same principle. It splits incoming light from the telescope into two beams. One beam travels a slightly longer path, so the light waves from the star get out of step with the waves of starlight in the second beam. When the beams are recombined, the light waves from the star cancel like the out-of-step ripples in a pond, leaving just the light from the planet. This technique is called interferometry. The VNC would be coupled to a single telescope, using interferometry to suppress starlight and increase the contrast of the region surrounding the star. This would allow astronomers to image the planet.

This year, the EPIC team received Internal Research and Development funding to demonstrate the VNC in a vibration-isolated vacuum tank. The aim is to make sure the technology can achieve a stable level of contrast in white light. "We're going to get the required contrast this year," said Petar Arsenovic, lead technologist for the Center's Optics Branch. "This technique is certainly possible."

NWO and XPC, on the other hand, would look for planets that lay within the habitable zones of their parent stars. Although the two missions vary in many ways, both would employ a large deployable occulter, or starshade. It would fly in formation with the telescope, separated by thousands of miles.

"The arrangement of NWO's flower-shaped starshade and telescope in the starshade's geometric shadow allows planets as close as about 50 milli-arcseconds from the star to be imaged with little interference from the star's light," said Doug Leviton, who is serving on the NWO team. "Trying to see a planet 50 milli-arcseconds from a star is like trying to make out the fine eyebrow hairs of the nice lady at the other end of the soccer stadium with your unaided eye."

With this technology, NWO would directly image exoplanets and analyze their light (spectrally) to look for evidence of water, oxygen, and methane, which are indicators of life.

XPC also would fly an internal coronagraph, a telescopic attachment that would assist in blocking direct light from a star so that the telescope could resolve orbiting planets and perhaps look for signatures of life.

"Any of these methods will in principle work, but how realistic are they in terms of cost, technology readiness, and risk?" Lyon said. "How do you perform the integration and testing? That's the purpose of these studies," Lyon said. "Which approach is the lowest risk, buildable within a defined budget and schedule, and provides the most value to NASA, the science community, and the public?" ■

Goddard Shooting for a Stellar Year of Charitable Giving

By Dennis Woodfork

This year's Combined Federal Campaign (CFC) kick-off event will be held on Monday, September 29 in the Building 8 Auditorium at 10:30 am. Speakers will include Goddard Center Director Rob Strain, and Karen Weaver, who will reflect on how CFC has personally touched her family's life. Several charities, including Fidos for Freedom, Friends of the National Zoo, The Peregrine Fund, Prince George's County Habitat for Humanity, Save Our Schools, and WETA public television will be on hand to inspire your participation in the CFC. Also featured at the kickoff will be kids from the Goddard Child Development Center performing two song selections. Refreshments will be served.



Broad employee participation is the key to a successful campaign and integral to the CFC national theme for this year, "Be a star in someone's life!" CFC contributions are voluntary and tax deductible and may be easily pledged through a few different ways. From September 29 through December 6, employees can give via the electronic WebTADS Time and Attendance System. This is the easiest method of giving available to Goddard employees. Donations can also be submitted through paper pledge cards. Volunteer CFC workers from throughout the Goddard community will distribute these pledge cards to all employees once the campaign kicks off next week.

These workers will also ensure that all employees receive the 2008 Catalog of Caring, which provides information on almost 4,000 participating charities. CFC material is also available online at the official Web site for Federal employees working in the National Capital Area: <http://www.cfcnca.org>. The Web site features an easy online e-giving option that allows you to electronically search for the charity of your choice by subject or keyword.

The CFC, established during President John F. Kennedy's administration, is the world's largest workplace charity drive. As part of the CFC National Capital Area, Goddard employees have a long tradition of contributing to thousands of charities through the annual campaign. Last year, the CFC raised \$271 million nationwide, with Federal employees in the Washington, D.C. area contributing over \$60 million.

In 2007, Goddard employees contributed generously beyond the fundraising goal of \$540,000, raising \$583,304 over the course of the campaign. With a higher initial goal of \$552,000 for 2008, the Goddard CFC is striving to build on the Goddard community spirit by giving to the many CFC charities operating in our area. Other 2008 campaign goals are to personally ask 100 percent of the Goddard civil servant employees to consider contributing to the CFC charities of their choice and to have at least 40 percent of the Center's employees at Greenbelt contribute to the CFC. Forty percent participation will keep Goddard on par with the CFC participation level of the National Capital Area—approximately 42 percent.

Nancy Abell, the Goddard Associate Center Director and 2008 Campaign Chair; and the Team Captains led by Paul Mexcur, the 2008 Campaign Manager, are working together as the Goddard CFC Steering Committee to plan, organize, and conduct this year's campaign. Please feel free to contact your Team Captain or the Campaign Manager (listed below) with any questions you may have. ■

Paul Mexcur (6-8888), Campaign Manager
 Marjorie Ott (6-6066), Deputy Campaign Manager & Code 600
 Jonathan Root (6-0077), Campaign Adviser
 Kelly Farrell (6-5282), Codes 100, 101, 120, 130, and 140
 Odessia Becks (6-5247), Code 110
 Joseph Poist (6-8938), Code 150
 Amanda Heslep (6-5091), Code 200
 Daniel Simpson (6-0280), Code 200
 Donna Lynch (6-6086), Code 300
 Linda Dyson (6-7003), Code 400
 Mary McKaig (6-7707), Code 500
 Dennis Woodfork (6-6009), Code 500
 Carol Krueger (6-8811), Code 600
 Denise White (6-3438), Code 700

Goddard Community Gathers to Learn About *Hubble* Servicing Mission 4

By John Putman

Next month, astronauts will fly aboard the Space Shuttle *Atlantis* to rendezvous with the *Hubble Space Telescope* to begin Servicing Mission 4 (SM4). On September 24, the Goddard community got an in-depth overview of what the crew of *Atlantis* will be doing to bring *Hubble* to the apex of its capabilities.



Photo Credit: Debora McCallum

Caption: Interested Goddard Hubble fans filled the Building 8 Auditorium.

Laurie Leshin began the presentation with an anecdote. She related how a room full of lawyers she was addressing let out an audible gasp upon seeing one of the many spectacular images collected by the *Hubble Space Telescope*. Leshin used the story to remind the audience of *Hubble's* impact on everyone. She called *Hubble* a "signature mission of Goddard Space Flight Center." She then introduced *Hubble* Deputy Program Manager, Mike Weiss.

Weiss took a moment to reflect on NASA Administrator Michael Griffin's announcement of Servicing Mission 4. Weiss pointed out that the announcement had been made in the very auditorium in which the audience was gathered. Weiss projected a startling image of both *Atlantis* and *Endeavour* on their respective pads ready for launch. Never before have two orbiters been on the pad and ready to launch at the same time. "This is a remarkable time for this Agency," Weiss said.

Weiss stressed the important role Goddard played in *Hubble's* mission and in the upcoming servicing mission. He pointed out that all the equipment aboard *Atlantis* was built, tested, and integrated here at Goddard.

Weiss used dramatic *Hubble* images and videos to review the priorities of this servicing mission. Along with the *Atlantis* payload, the videos in Weiss' presentation were also produced here by Goddard-TV Producer Mike McClare.

The videos provided more information about some of the tasks to be accomplished during SM4 and descriptions of some of the instruments being installed on *Hubble*. The highest priority part of the mission is the installation of the Wide Field Camera 3, which will increase *Hubble's* view into the universe. Another important piece of equipment is the Cosmic Origin Spectrograph (COS), the most sensitive spectrograph ever flown. As mentioned in the COS video, it puts the physics in "astrophysics."

The overview was preceded by light refreshments and sales of *Hubble* t-shirts. The presentation was followed by a brief question and answer session. ■

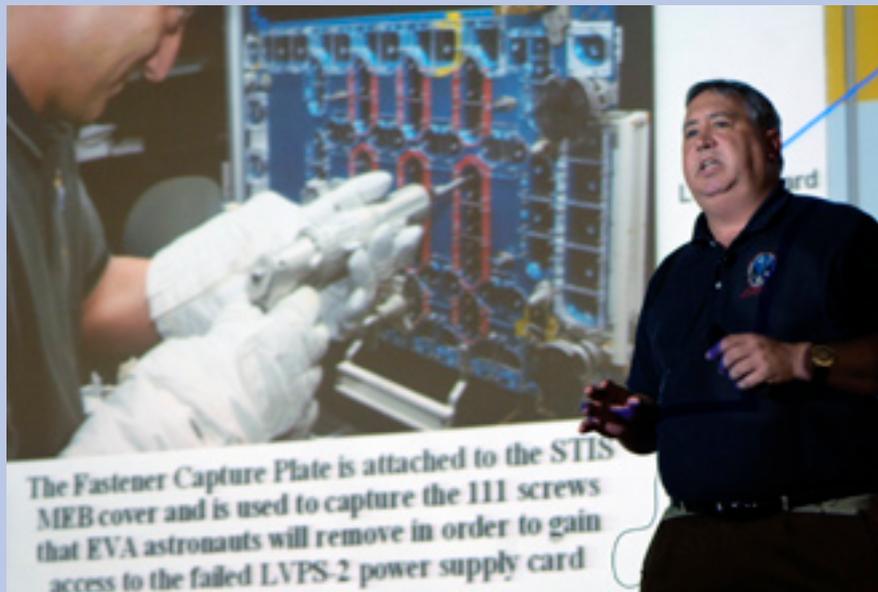


Photo Credit: Debora McCallum

Caption: Hubble Deputy Program Manager Mike Weiss speaks about Hubble Servicing Mission 4.

In Memoriam: Elihu Boldt

By Nicholas White and John Putman

Goddard astrophysicist Elihu Boldt, 77, died Sept. 12 at Doctors Community Hospital in Lanham, Md. after an apparent heart attack.

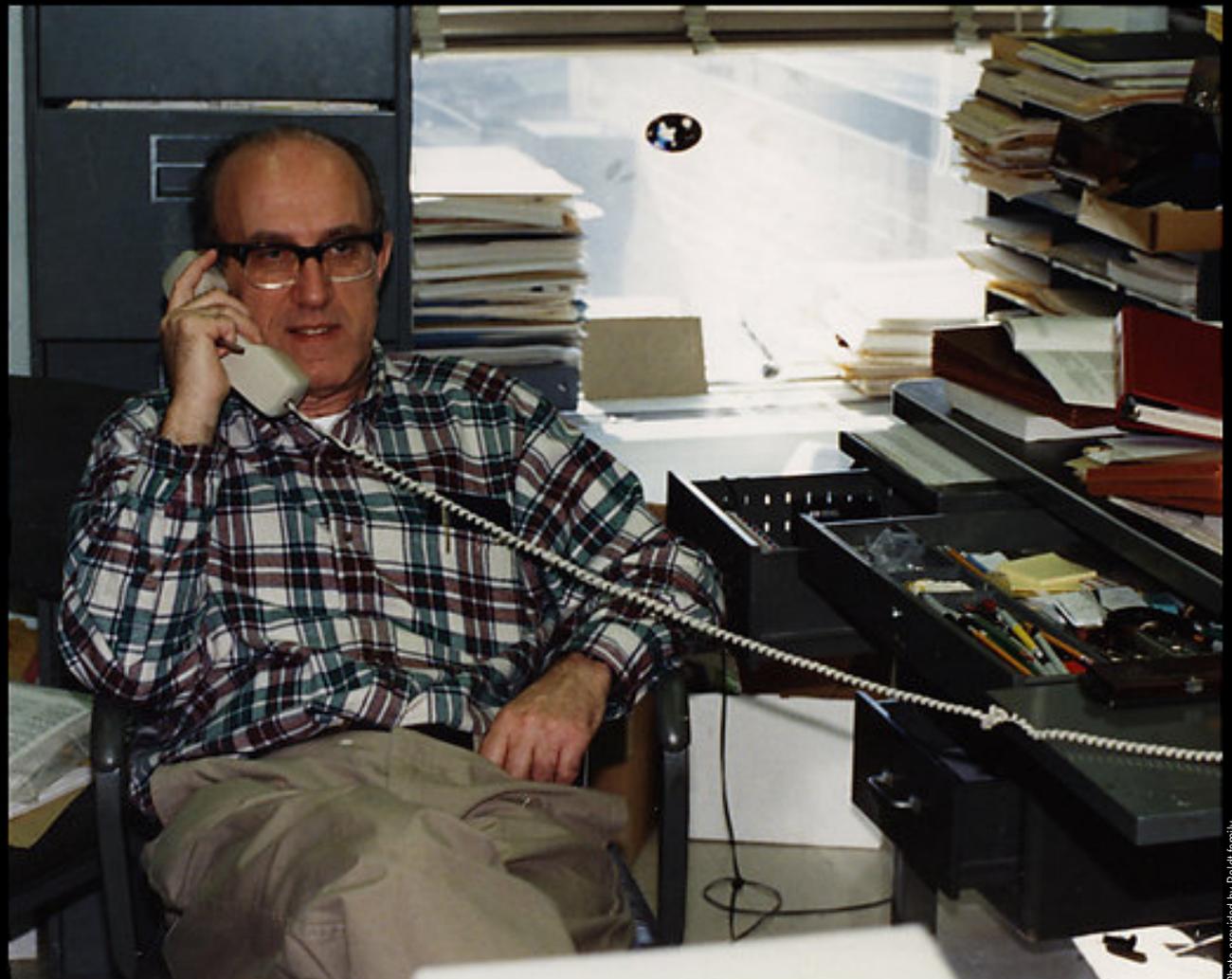
Boldt came to Goddard in 1965 and initiated the Center's X-ray astronomy program. Under his leadership, the program grew into one of the world's premier groups. From the early days of launching sounding rockets and balloons, to full missions, Boldt was involved in all of them. He was the Principal Investigator on the High Energy Astrophysics Observatory (HEAO) 1 A2 experiment, which was launched in 1977 and made the definitive measurement of the X-ray sky background.

Boldt retired in 2004, but continued to undertake research at Goddard as an Emeritus. A notable recent Small Explorer Program Phase A win for Goddard, the Gravity and Extreme Magnetism (GEMS) mission, which will open up the frontier of X-ray polarization, was strongly influenced by Boldt's interest in this subject several decades ago.

Elihu Aaron Boldt was born July 15, 1931, in New Brunswick, N.J. He was a 1953 graduate of the Massachusetts Institute of Technology, where he also received a doctorate in physics in 1958.

Boldt was a fellow of the American Physical Society, among other professional affiliations, and served on scientific panels and committees. Aside from his scientific pursuits, Boldt belonged to the La Chaîne des Rôtisseurs, the world's largest gourmet society.

Boldt lived in Greenbelt and was an adjunct physics professor at the University of Maryland, College Park. Boldt married Yvette Benharroch in 1971. They had three children: Adam Boldt of Pikesville, Md., Abigail Tram of Chandler, Ariz., and Jessica Boldt of Weehawken, N.J. ■



Caption: Elihu Boldt.

Photo provided by Boldt family.