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For the Institute, 2009 was a rollercoaster year: *Hubble’s Servicing Mission 4* in May, the passing of Rodger Doxsey in October, the first data delivery by the *Kepler* mission in June, the completion of the Muller Building construction in February, the search for a Deputy Director following Mike Hauser stepping down in October, and *Webb* hardware and systems being built and delivered throughout the year.

*Hubble’s Servicing Mission 4* was a resounding success—all the planned activities were carried out, and the observatory’s capacities are the most powerful and capable since its launch. Both the mission’s flight and the tremendous work done by the astronauts were followed worldwide via television and the Internet. The news of the early release observations was accessible to more than 1.5 billion people. The astronauts who participated in the mission visited the Institute in July, giving all the staff and their families an opportunity to interact with them and thank them for a job well done.

All the Institute family was deeply saddened by the untimely death of Rodger Doxsey. Rodger knew all the ins and outs of *Hubble* like no other. His expertise and leadership were instrumental in making the observatory the scientific marvel it is, and household name it has become. We will miss him, and his legacy will be kept alive by each and every discovery and beautiful image that *Hubble* will produce in the future.

Mike Hauser decided to step down as the Institute’s Deputy Director after the Servicing Mission Orbital Verification 4. Mike saw and participated in many changes at the Institute in his 14 years of service. His steady leadership throughout has been a significant asset to AURA and certainly the Space Telescope Science Institute. His steady and at times “dampening” hand was an essential ingredient in the management of the Institute and its relationship with NASA. His wise counsel and deep integrity have always been appreciated. Marc Postman was appointed interim Deputy Director throughout the search and appointment period.
Other changes in the Institute’s management structure were the appointment of Peg Stanley to the position of Associate Director for Operations and of Ken Sembach as head of the *Hubble* Mission Office.

The Institute was able to hire new staff in 2009 as the scope of its missions grew, allowing it to keep addressing diversity issues and to improve the overall representation of women and minorities. The chart to the left shows the historical trend and positive changes in the composition of the staff.

As the following pages will attest, the Institute accomplished all its goals and is very well positioned for the challenges and opportunities the next year will bring. Committees that assess different aspects of the Institute’s operations, climate, and diversity all agree that the work is progressing at a reasonable pace.
External events and shifting schedules continue to provide project management challenges. The Institute has remained flexible in responding to the various changes encountered in FY 2009, while adhering to the FY 2009 guideline budget.

Quarterly variances for FY 2009 were 2.0%, 6.1%, and 2.8% for FY ’09 Q1, Q2 and Q3, respectively. All quarterly variances with the exception of Q2 are well below the 5% target variance.

We expect to end the fiscal year with an underrun of 0.9% compared to the FY 2008 March re-baseline, and an underrun of .7% compared to the FY 2009 guideline. This is well below the targeted 1.75%. In total dollars, this equates to variances of $360K and $267K, respectively.

FY 2010 is a challenging fiscal year for STScI as we absorb the cost impacts of the FY 2008 carry forward with no additional funding.

The top chart, at left, presents the current staffing plans for the Institute until FY 2015; the cost of operations is covered in the lower table. It does not include the grant funding the Institute disburse to the astronomical community through General Observer, Archival and Theoretical Research, and Education and Public Outreach programs.
Staff Awards

National Academy of Sciences
American Association for the Advancement of Science
International Astronomical Union
NASA Distinguished Public Service Medal

**NASA Public Service Award**
HST One Gyro and Kalman Filter Safemode Design Team

**NASA Group Achievement Awards**

- Science Instrument Operations Team
- ACS Repair Mission Operations Team

**STScI Achievement Awards**

- WFPC2 Closeout Reprocessing Operations
  - STScI Achievement Award
  - Infrared Detector Course
  - STScI Webcasting Team
    - UDO Migration Team
    - pysynphot transition
  - STScI Achievement Award
  - Hubble and Giacconi Fellowships

Adam Riess, Member
Mario Livio, Fellow
Robert Williams, President
George Hartig
George Chapman, Mary Galloway, Carey Myers, and Merle Reinhart
Ilana Dashevsky and Alan Welty
Marco Sirianni and Alan Welty
Chris Rueter
Massimo Robberto and Mike Regan
Thomas Marufu, Calvin Tullos, Susan Rose, and Ed Weibe
Elizabeth Barker, Francesca Boffi, Howard Bushouse, Rosa Diaz, Vicki Laidler, and Daniel Lennon
Pat Brown
Ron Allen, Pat Brown and Mike Wiggs

Continued …
Staff Awards (cont’d …)

STScI Achievement Awards (cont’d)

- WFPC2 and FGS Science Operations
  - John Biretta, Van Dixon, Shireen, Gonzaga, Pey-Lian Lim, Matt McMaster, Colin Cox, Chris Long, Max Mutchler, and Ed Nelan
- APT JWST development
  - Gary Curtis, Tom Donaldson, Rob Douglas, Ron Downes, Kate Henshaw, Karla Peterson, Pat McCauley, Christine Ritchie, and Andy Spina
- STScI Achievement Award
  - Elizabeth Fraser, Amy Gonigam, and Jill Lagerstrom
- Parallel Observations Processing System Design and Development

AURA Awards

- 2009 AURA Science Achievement Award
  - Margaret Meixner
- 2009 AURA Achievement Award
  - Jeff Nesbitt
- 2009 AURA Technology and Innovation Achievement Award
  - Andy Groebner (Lead), Mike Bielefeld, Kerry Clark, Jesse Doggett, Steve Handy, Shaw-Hong Kao, Shelley Marshall, Jinger Mo, James Paranilam, and Fred Romelfanger

CSC Leading Edge Forum

Washington Post one of best books of 2009
Borders Original Voices Non-Fiction finalist

Canon Gold Award

….
Attract and retain the most outstanding administrative, technical and scientific staff.

Provide an invigorating and exciting working environment.

Develop a more inclusive workplace.

Align strategy and operations with goals and values.
STScI Organization

The STScI Directorate

The Institute Directorate is responsible for the strategic and operational management of the Institute. It is the principal interface to the external stakeholders: AURA, NASA/GSFC, ESA, and NASA/HQ.

The members of the Directorate are the Director; Deputy Director; Associate Director for Organizational Change; Associate Director for International Policy; Associate Director for Administration; the Center, Office, Division and Mission Heads; and the Chief of Staff. The Chair of the Senior Science Staff attends the Directorate meetings but is not a member.

The Associate Director for Operations provides oversight to the Institute operational and program management units (divisions and offices) to determine how each will optimize their efforts in a cohesive and coherent fashion to advance the strategic initiatives and tactical objectives of the Institute. The Associate Director for Operations provides leadership to ensure appropriate senior management focus on strategic interests and on tactical approaches for meeting mission needs.

The Associate Director for Administration provides oversight and management of the Institute’s Business Resource Center (BRC) and is responsible for ensuring the Institute operates within AURA and Institute policies and procedures, contractual agreements and relevant federal regulations. The AD for Administration manages the indirect budgets and rates.

The Associate Director for International Policy is responsible for the continued support of ESA for the Hubble and Webb programs. In particular, the Associate Director works to ensure that these programs are visible and well understood in Europe.

Continued …
The Chief of Staff is the management arm of the Directorate and is responsible for the implementation of Directorate actions and oversight of its activities. The Chief of Staff also facilitates communication between the Directorate organization and the Institute at large.

The Program Management Office (PMO) has the responsibility, authority and accountability for the successful performance of the organization’s projects and missions. The office is responsible for the overall Institute operating budget, and determines and controls the mission-based business model for the organization. The PMO provides quality assurance and configuration management services for the Missions.

The Divisions are responsible for the operational delivery of the Institute Missions, in concert with the Mission Heads.

**SMO  Science Mission Office**

The SMO has responsibility for the oversight of the science infrastructure within STScI. The SMO has specific responsibility for managing the *Hubble* time-allocation process and maintaining absolute fairness and equity of opportunity to every General Observer, Archival or Theory proposer. This includes issuing the annual *Call for Proposals* to the astronomical community, organizing the proposal review, handling proposals for Director’s Discretionary observing time, and formulating relevant policies. SMO convenes the Space Telescope User Committee and establishes science metrics to evaluate the success of the science program, has oversight of the science research environment at the Institute, and facilitates the optimal assignment of research staff to the missions.

SMO conducts visitor programs to foster collaborations, to enrich journal clubs, and to support distinguished astronomers for extended visits. It manages the Director’s Discretionary Research Fund and the *Webb* Discretionary Fund, which support staff research projects and investments in the Institute’s research infrastructure. SMO conducts a spring symposium each year on a major area of astronomy, as well
as smaller-scale workshops on specific scientific topics and issues, and manages the Hubble and the Giacconi Postdoctoral Fellowship Programs.

**HSTMO  Hubble Space Telescope Mission Office**

The HSTMO is responsible for maximizing the science return from the mission by managing the Institute activities specific to the conduct of the *Hubble* program. It develops the overall Institute plans for *Hubble* science operations and system enhancements by working with the team leads in the operating divisions and centers. It is responsible for establishing effective scientific, technical, and operational interfaces with the Hubble Project at Goddard Space Flight Center and its associated contractors.

**JWSTMO  James Webb Space Telescope Mission Office**

The JWSTMO collaborates with NASA to develop the scientific, technical, and operational vision for the *James Webb Space Telescope*. It manages the development of the *Webb* Science and Operations Center. The JWSTMO works with the community to ensure the best *Webb* observatory possible within the cost constraints of this challenging program. It works with the Institute divisions to ensure proper support to NASA, the science instrument teams, and other *Webb* partners, including the prime contractor, Northrop Grumman Aerospace Systems.

**CMO  Community Missions Office**

The CMO manages the Institute’s involvement in missions and projects other than *Hubble* and *Webb*, including the Kepler Data Management Center and the Multi-Mission Archive at Space Telescope (MAST). It facilitates and coordinates the Institute’s involvement in new initiatives. For missions arising in the community, the CMO promotes new applications for Institute products, services, and operational abilities customized to meet specific mission needs, while striving to maximize the scientific return of the Institute’s involvements by engaging scientific and technical staff members directly in the support of community missions.
INS Instruments Division

INS supports the community of observers in the use of the world-class scientific observatories with maximum effectiveness, providing scientific and technical advice in developing observing programs and interpreting data. It calibrates and characterizes the suite of science instruments. It facilitates the use of new science instruments in Hubble, Webb, and other space science missions by participating in their development, by capturing and transferring information about instrument operation and calibration to the Institute. INS provides leadership to the commissioning of all the instruments following a Hubble servicing mission. For Webb, the INS staff is responsible for mastering the technical details associated with the science instruments, for overseeing the work of the Operations Detector Laboratory, for establishing and maintaining good communications between the Institute and the instrument development teams, and for ensuring that the Institute’s Science and Operations Center systems and procedures meet the needs of the astronomical community. INS also maintains the Hubble focal plane model, monitors telescope focus, and supports the use of the Fine Guidance Sensors (FGS) as astrometry science instruments. It characterizes the anticipated imaging performance of Webb and its scientific capabilities. A small engineering team maintains engineering knowledge of the Hubble instruments and spacecraft, monitors health and performance of the instruments, and tracks the status of their limited-life items.

OED Operations and Engineering Division

OED processes and schedules Hubble observing programs, processes the resulting data in the pipeline, and distributes the data products to the community. It maintains the operational state of the Guide Star Catalog. Their staff works with Hubble users to ensure the optimal translation of their scientific requirements into the technical instructions necessary to execute the observing programs, and prepares the multi-year science-
observing plan, reconciling *Hubble* science program requirements and operational constraints at a high level. It then fits candidate observations into optimal weekly observing schedules with instrument calibration and engineering activities, and creates the detailed command loads that are executed by the telescope. OED operates MAST and is an active participant in the National Virtual Observatory program, bringing the latest in archive and data distribution expertise to the *Hubble* program.

OED is responsible for systems engineering, commanding, and software development at the Institute. Specifically, their staff maintains and enhances the software and database systems used for science mission planning, science operations, the data processing pipeline, and the archive. OED develops and maintains the commanding software for the *Hubble* and *Webb* science instruments; the calibration software and tools used to reduce, analyze and archive data; and the systems used by astronomers to interface with the observatories. Their staff maintains and operates the Project Reference Database System—the repository for mission-critical data for the *Hubble* and *Webb* observatories. It also maintains the Grants Management System software used by the astronomical community.

**ITSD Information Technology Services Division**

The ITSD provides system management and user support services and is responsible for the Institute’s computing and communications infrastructure. It develops technology-based solutions; it supports and ensures the security of the information systems for *Hubble* development and operations, *Webb* development and testing, the Kepler Data Management Center, the Institute Archive, scientific research, and business functions. ITSD is responsible for the production of instrument and data handbooks, Web pages, information management for engineering and business systems (including collaboration tools), and visual communications technology (such as webcasting and video conferencing).
OPO **Office of Public Outreach**

OPO is responsible for the public outreach and education activities of the Institute, providing a national resource for coordination of astronomy and astrophysics content for journalists, other media professionals, the education community and the informal science community. It also supports news, information and exhibit products for other NASA Origins missions, as well as for *Webb*.

OPO develops educational materials that address national education standards and are relevant to K–14 curricula. It also provides pre-service and in-service teacher training on the use of space science educational materials in the classroom. Their staff develops and hosts a variety of Internet sites that provide first-hand information about *Hubble* and its discoveries to the general public and news media. The Office brings the excitement of scientific discovery and technological accomplishment to a wide audience through science museums, planetariums, libraries, and the Internet. It develops press releases, photo releases, and Space Science Updates to disseminate *Hubble* discoveries via print, electronic, and broadcast media.

BRC **Business Resource Center**

The BRC provides business and administrative services to the Institute in the areas of finance, human resources, accounting, contracts, grant administration, procurement, facilities management, property administration, administrative support, and staff support services. The BRC administers all *Hubble*-funded grants.
The Association of Universities for Research in Astronomy (AURA) is an international consortium of universities, educational and other non-profit institutions that operate world-class astronomical centers. One of the centers is the Institute. AURA acts on behalf of the science communities that are served by its centers, and as trustees and advocates for the centers’ missions.

**AURA Board of Directors**

The AURA Board establishes the policies of AURA, approves its budget, elects members of the Management Councils, and appoints the president, the centers’ directors, and other officers. The Board of Directors is responsible to the member representatives for the effective management of AURA and the achievement of its purposes.

**Space Telescope Institute Council**

The Space Telescope Institute Council (STIC) provides oversight and advocacy for the Institute. In that role, STIC makes recommendations to the AURA Board of tenure promotions, financial commitments, and the recruitment or renewal of the Institute’s Director and Deputy Director.
Future of the Workplace Committee

The Future of the Workplace Committee, chartered by the director, is a standing committee to assess and track progress on diversity and climate issues at the Institute. The committee reports to and will make recommendations to the director on improving the climate and diversity representation at the Institute.

During its November 2009 visit, the committee heard from six focus groups and six individuals on topics that included hiring and retention, equal treatment within the Institute, and the overall climate toward a diverse population within the Institute. The committee was pleased to find a very positive attitude and that the diversity and inclusion comments were more institutional than personal. The committee, as it did last year, commended the Institute on the progress made so far, and recommended vigilance to ensure that there is no loss of momentum.

Intern Program

Our vigorous intern program continues to attract many students from the Baltimore metropolitan area. Some of the interns are part of programs at their schools, like the Society for the Advancement of Computer Science and the Computer Club at Morgan State University, the University of Maryland Baltimore County’s Diversity Summit, or Towson High School’s Career Program. In recruiting interns, the Institute also partners with My Sister’s Circle, a comprehensive, relationship-based program designed to mentor girls from disadvantaged Baltimore neighborhoods during their challenging transition to middle school, throughout high school, and into college, and also with the Baltimore Mayor’s Youth Works Program.

Since the beginning of 2008, 28 interns were hosted at the Institute and from 14 to 20 will be joining our staff through the year.
These interns work in many areas, from administration and human resources to data analysis. We were very pleased that four interns were hired into full-time permanent positions, two as test engineers and the other two as IT Assistants.

**Hard Science/Soft Skills**

“Hard Science/Soft Skills: Fostering Civility in the Scientific Workplace,” an innovative speaker series focused on examining relational competence, ethics, quality of life and productivity in the scientific workplace, continued this year. The series seeks to facilitate the transition of traditional paradigms in science, medicine, technology and engineering to enhance and invigorate the successful potential of these organizations, as well as improve the quality of existence for “hard science” professionals and the myriad other partners who share these workplaces.

Our speakers include renowned members of these communities whose life work, research and publications have been devoted to this pursuit. The talks identify issues, suggest solutions and feature successes.


**Youth for Astronomy and Engineering**

The Youth for Astronomy and Engineering (YAE) program at STScI engages children and youth interested in astronomy and engineering as a career. The YAE exposes participants to activities and experiences representative of the work done by astronomers and engineers. It also
provides a supportive environment that encourages diversity in the astronomical and engineering community by increasing awareness of those fields among young women, minorities, and those with special needs.

In late January 2009, boys and girls in grades 6-12 and their families attended “Starrytelling at the Institute”, a stimulating starry theatrical event that included science activities as well as astronomical observations in the evening.

During this year’s “Parent and Son evening under the stars” and “Parent and daughter evening under the stars” around 200 children and their parents enjoyed presentations by Institute staff and assembled their own Galileoscopes. They used these modern reproduction of Galileo’s original telescope to make celestial observations at the end of each event.

More than 260 people attended the three sessions of the “Family Night at the Institute” events. The elementary through high school students and their parents enjoyed keynote presentations by Institute astronomers Matt Mountain, Mario Livio, Alberto Conti and Peter McCullough and made astronomical observations through personal telescopes.

The Annual Women Science Forum consisted of two sessions this year, one for high school and another for middle school students. During these events the participants were encouraged to share their career dreams, ask questions and explore the opportunities in a number of engineering disciplines. They also had a chance to observe the Sun through the Johns Hopkins University’s Offit Telescope.
Caring Workplace

The Space Telescope Science Institute re-invigorated its program of family-friendly benefits and activities for the staff. Today, our suite of benefits includes comprehensive medical benefits for our employees and their families, medical and dependent-care flexible spending accounts, same-sex domestic partner health and dental insurance coverage, proactive protection under the Family and Medical Leave Act, flexible work schedules, and teleworking arrangements. For our tenure-track research staff, we offer both male and female researchers the ability to delay the tenure clock in the event of the birth of a child or a serious illness. Since 2007, a private room has been available for female employees with lactation requirements.

In partnership with WellAdvantage and Ceridian Lifeworks, the Institute provides its staff with lifestyle improvement tools and information such as stress-reduction techniques, weight management and nutritional counseling, as well as individual and family crisis counseling. On-site fitness classes and yoga classes are also available.  

*Registration Required - Opens 7/29/09*  
Questions? E-mail customerservice@welladvantage.com or call 410-795-7579

7543 Main Street, 2nd Floor  
Sykesville, Maryland 21784  
 office: 410-795-7579  
 fax: 410-795-7785  
 www.welladvantage.com

Yoga Class  
Class Dates:  
8/26, 9/2, 9/9, 9/16, 9/22, 9/30*  
8:15 – 9:00 AM  
Café Con  
*Class will be held outside

Find Balance at the Start of your Work Day

We believe that the success of our missions depends on the well-being of those who support them.
Our Goals

Maximize the science program of HST.

Develop and operate the best JWST possible.

Operate a world-class archive.

Stimulate education and public outreach.

Maximize the science return of community-based astronomy projects.
Science Mission

Our goal is to define a diverse set of programs to foster a vibrant scientific atmosphere.

May Symposium

Each spring, a symposium is held at the Institute that focuses on major topics in astronomy. The Institute’s May Symposia have gained an excellent reputation in the astronomical community for the timely choice of topics, the quality of the invited speakers, and the scientific and logistical organization of the meeting. The 2009 Symposium was devoted to “The Search for Life in the Universe.” It attracted more than 180 participants, and included about 30 invited and contributed talks by scientists from around the world.

Space Astronomy Summer Program

Each summer, the Institute brings a dozen highly motivated college students to Baltimore, Maryland, for a Space Astronomy Summer Program. The program runs for ten weeks, from mid-June to mid-August, and is designed for upper-division undergraduates with a strong interest in space astronomy. Students work individually with Institute researchers and staff on projects that might include data reduction and interpretation, software development, scientific writing, or preparing data for public releases. The program affords students the opportunity to attend lectures on a variety of exciting topics related to space astronomy, Hubble and Webb.
Giacconi Fellowship

The Giacconi Fellowship Program, named in honor of the Institute’s first Director and Nobel Laureate Riccardo Giacconi, brings outstanding young researchers to the Institute. This program has been highly successful in helping to launch the careers of many leading astrophysicists.

The Giacconi Fellowship is similar in the level of competition and prestige to the prize fellowships at other leading astrophysics institutions. It is for research only, on topics of the holder’s choice, and carries no other duties. The research may be theoretical, observational, or instrumental. The fellowship has a generous salary and research grant.

The current Giacconi fellows are Alceste Bonanos (until September 2009) Jennifer Donley (from September 2009), Rebecca Martin, and Asaf Pe’er.

Hubble Fellowships

The Hubble Postdoctoral Fellowship Program supports outstanding postdoctoral scientists whose research is broadly related to NASA Cosmic Origins scientific goals as addressed by any of the missions in this program: the Herschel Space Observatory, the Hubble Space Telescope, the James Webb Space Telescope, Stratospheric Observatory for Infrared Astronomy, and the Spitzer Space Telescope.

The research supported by the Hubble Fellowship Program may be theoretical, observational, or instrumental. This program is open to applicants of any nationality who have earned (or will have earned) their doctoral degrees on or after January 1, 2007, in astronomy, physics, or related disciplines. The fellowships are tenable at U.S. host institutions of the fellows’ choice, subject to a maximum of one new fellow per host institution per year.

Each year, the Hubble Fellows present the results of their research at a symposium at the Institute. The Hubble Fellows Symposia are unique in
that they include the latest research, not from just one field, but from all fields in astronomy. They are an excellent opportunity to hear about the latest hot topics and to talk with young experts at work on them.

This year the symposium was held at the Institute from March 9–11, 2009. The program and recorded video of the symposium are available at this site: [http://www.stsci.edu/institute/itsd/information/streaming/archive/HubbleFellowsSymposium2009/](http://www.stsci.edu/institute/itsd/information/streaming/archive/HubbleFellowsSymposium2009/).

**John Bahcall Lecture**

To honor John Bahcall’s seminal contributions to the *Hubble Space Telescope* and the Institute, an annual lectureship series by a senior astronomer takes place at the Bahcall Auditorium at the Institute, and later at GSFC. When appropriate, and if schedules allow, the Institute arranges a public evening lecture in Washington at the National Air and Space Museum.

The Institute Director, upon the recommendation of the John Bahcall Lecture committee, chose Prof. Sandra Faber of the University of California, Santa Cruz as the 3rd Bahcall Lecturer, in recognition of her fundamental contributions to understanding galaxy evolution, and Prof. Sara Seager of MIT for her fundamental contributions to the study of planets outside of our solar system as the 4th Bahcall Lecturer.

Prof. Faber gave her Bahcall Lectures in February 2009 on the topic “The Galaxy-Forming Main Sequence,” making presentations at the Institute. She also gave a very well attended, free, public evening lecture at the National Air and Space Museum IMAX Theater, entitled “The Milky Way: Why We Need Her and How She Was Formed.”

Prof. Seager gave her lectures titled “Exoplanets from Discovery to Characterization and Beyond” in December 2009. She also gave a very well attended, free, public evening lecture at the National Air and Space Museum IMAX Theater, entitled “Astrobiology and the Search for Life beyond Earth.”
Caroline Herschel Distinguished Visitor Program

The Caroline Herschel Distinguished Visitor program was created by the Institute to enable eminent scientists with an exceptional track record of advancing the status of women and minority scientists to visit the Institute and engage our scientific community. During the visit, Distinguished Visitors pursue their personal research; they work and lecture on their scientific interests, as well as discussing diversity issues with Institute staff and management. We particularly encourage local mentoring activities, as Caroline Herschel Distinguished Visitors are widely seen as role models by women and minority scientists at the Institute.

This year’s Distinguished Visitors were:

Xander Thielens, Leiden University
Christine Jones-Forman, Center for Astrophysics

2009 Jamboree

It is the proud tradition of the Institute and the Johns Hopkins University astronomy group to host a joint “astro-jamboree” every few years. The Jamboree is an exciting, action-packed event, an opportunity to share one’s research, to foster communication between the two institutions and enhance cross-collaborations that could lead to new, innovative research.

The 2009 Jamboree took place on Friday, April 10th and consisted of (strict) 2-minute presentations by around 60 graduate students, postdocs, Institute research staff, and Hopkins faculty.

The two morning sessions took place in the Institute’s Bahcall Auditorium and the two afternoon sessions in the Hopkins Physics and Astronomy Department’s Schafler Auditorium.
During the past year, the focus of activities was naturally on the very successful Servicing Mission 4 (SM4), which flew from May 11 to May 24, 2009. All preparatory and training activities were completed before the mission. It was followed by the Servicing Mission Orbital Verification (SMOV) period of several months. In spite of being the most complex SMOV to date—due to the number of new or repaired science instruments and to a series of schedule-impacting anomalies occurring at the observatory level, as well as with individual instruments—by the beginning of October 2009 the verification period was successfully completed for all instruments except the Near-Infrared Camera and Multi-Object Spectrometer (NICMOS). Following its successful restart in August 2009, this instrument’s verification activities were planned to extend into November 2009.

On September 9, 2009, after several months of anticipation by both the astronomical community and the public, Early Release Observations (EROs) from the upgraded Hubble were unveiled in a televised news conference that garnered worldwide coverage. The EROs generated approximately 1,800 news stories worldwide, ranging from articles and images in all major national and international newspapers, to coverage by numerous television newscasts, and to online news sites and blogs. It is estimated that this event reached more than a billion individuals.

In addition, the first scientific results from observations with the new and refurbished instruments appeared within hours of the ERO release.

**Hubble Space Telescope**
Hubble observing cycles generally have an annual cadence. The transition of Cycle 16 to 17, however, was set to coincide with SM4, resulting in the transition to an entirely new suite of instruments. The delay of SM4 from August 2008 to May 2009 led to a corresponding slip in schedule for the Cycle 18 Time Allocation Committee (TAC) process, now scheduled for May 2010. As a corollary, the catalog of TAC-approved Cycle 16 programs was increasingly depleted. The situation was compounded by the failure of the NICMOS Cooling System (NCS) in early September 2008, the failure of the Side A electronics on the Science Instrument Command and Data Handling (SIC&DH) unit on September 26, 2008, and the subsequent interruption in Side B operations in October 2008.

The first program augmentation was made in the period when the SIC&DH was off-line, limiting Hubble to Fine Guidance Sensor (FGS) observations; additional proposals using the FGSs for Director’s Discretionary Time were solicited from the FGS user community. The formal announcement delaying SM4 to mid-2009 extended Cycle 16 by more than nine months. It was clear that it would be necessary to supplement Hubble’s portfolio with additional proposals. Following consultations with the Hubble Project, the Cycle 17 TAC Chair, Prof. Robert Kennicutt (University of Cambridge/University of Arizona), and the Space Telescope Users Committee, additional steps were taken to add to the Cycle 16 science program. First, a Call for Supplemental Proposals was issued to the community on November 17, 2008. Programs accepted through that process, however, could not be implemented before February 2009. After consultations with Prof. Kennicutt and the chair of the Space Telescope Institute Council, Prof. Bradley Peterson (Ohio State University), the director tasked the Institute scientific staff with identifying programs that would be of broad community interest and could be executed through January 2009 to maintain Hubble’s scientific productivity until supplemental programs could be implemented.
Prof. Kennicutt oversaw the Cycle 16 Supplemental Call and review process. Given the exceptional circumstances there was insufficient time to organize a face-to-face TAC meeting, so the review was conducted remotely. Twenty-seven reviewers, recruited from the community, agreed to read and grade the supplemental proposals in a two-stage process.

The Cycle 16 Supplemental Call specified two types of proposals: large programs with more than 75 orbits to tackle substantive scientific issues; and smaller “innovative” programs that were either scientifically risky or of high science impact. The latter category proved difficult to define, but the aim was to encourage programs applying novel methods or observing strategies to investigate key scientific questions and push the boundaries of Hubble science. This was also an opportunity to tackle observing programs that may offer only a small chance of success, but potentially could produce results of major scientific impact. Small proposals for observations of time-critical phenomena could be submitted at any time for Director’s Discretionary Time. We encouraged TAC members to set a high threshold for innovation, but to be flexible in assessing those programs.

Two hundred eighty-three proposals were received, including 126 large and 157 innovative proposals. Those proposals requested a total of 16,098 orbits and 1,084 SNAPs. Six small proposals requested time-critical observations, and were reviewed separately through the standard Director’s Discretionary Time process. A further 55 proposals requested extensive NICMOS observations, and their review was initially deferred. In mid-January, the Hubble Project decided to delay attempts to restart the NCS until after SM4; consequently, those proposals were eliminated from further consideration. The remaining 222 proposals requested 14,230 and 989 SNAP targets. With only ~950 orbits available for scheduling for a mid-May SM4, this represented an oversubscription rate exceeding 14:1.
Hubble continued …

Multi-Cycle Treasury Program

The Multi-Cycle Treasury Program provides an opportunity for the Hubble research community to address high-impact scientific questions that require observations on a scale that cannot be accommodated within the standard time allocation process.

These General Observer programs must require at least 450 orbits to achieve their science objectives and will be assessed by a dedicated Time Allocation Committee without any restriction or pre-selection of science topics.

Thirty-nine proposals requesting a total of 26,801 orbits were submitted in response to the first Call for Proposals in November 2009. These proposals will be evaluated in January 2010. Calls for Multi-Cycle Treasury Programs will not be issued on an annual basis. A future call may be issued, depending on the response to the current call and the future health of Hubble.

An active program to calibrate and characterize the observatory with an on-orbit program continued this year. The pre-SM4 instruments (Wide Field/Planetary Camera 2 [WFPC2], FGS, Advanced Camera for Surveys [ACS]/Solar Blind Channel) participated in the program. The WFPC2 calibration program was supplemented early in the year to address the contingency science programs selected to maintain Hubble productivity during the extended Cycle 16. Initial Cycle 17 calibrations for active instruments (ACS, COS, FGS, Space Telescope Imaging Spectrograph [STIS], WFC3) were woven into the end of the post-SM4 SMOV period for a smooth transition to Cycle 17.

Major efforts to produce final archives of calibrated data for WFPC2 and NICMOS were largely completed during the year. The STIS on-the-fly reprocessing (OTFR) pipeline was activated to accommodate post-SM4 STIS data.
All Institute science instrument teams provided observer support through updates to the Instrument Handbooks and Data Handbooks, the HST Primer and Cycle 18 Call for Proposals, and instrument team websites. The science instrument teams also fielded Helpdesk calls throughout the year.

During most of the past year WFPC2 served as the primary science instrument on-board Hubble; hence considerable effort was made to maintain excellent calibration and performance of the instrument. In preparation for the decommissioning of WFPC2, the closeout program was continued with an emphasis on studying and calibrating long-term changes in the instrument during its 15+ years on-orbit.

The full recalibration of the entire NICMOS archive was completed and transferred to the Hubble Legacy Archive (HLA), where they have been passed through a subsequent set of pipelines that use Multidrizzle to produce clean, geometrically corrected, combined images of all exposures in a given filter, for each Hubble visit or pointing, all aligned to a common pixel grid. These geometrically corrected, combined images are intended to be science-ready and can be directly downloaded from the HLA; since each set of images is aligned to a common grid, this readily enables cross-comparison between filters, as well as with other observations.

The average scheduling efficiency for “prime (GO) plus SNAP” observations (i.e., those that define pointings to produce GO data) was 41.35% for the period from August 6, 2008 to September 14, 2009. However, the efficiency for approximately 24 weeks of this 58-week interval was significantly reduced as a result of anomaly events, SM4 and SMOV. When adjusted for these non-standard events, the average scheduling efficiency for normal science observing weeks was 48.06%. The peak orbit and efficiency of 99 orbits and 88.51% occurred on the week of December 22, 2008, which included the bulk of a 10-day FGS Director’s Discretionary Time program crafted to take full advantage of all possible observing time in that interval.
A Measurement of the Impact of Hubble

For nearly two decades, the Hubble Space Telescope has provided astronomers with scientific data from new observations. New knowledge based on the analysis of these observations is communicated in many ways among astronomers and to the public. The ultimate, official record of research and discovery is the publication of results in peer-reviewed journals.

The scientific productivity of Hubble is also indicated by the continuing high publication rate of refereed papers in scientific journals. The total number now exceeds 7,800 papers. In addition, a comparison with papers based on observations with other major observatories is very favorable for Hubble. For the coming years, this scientific productivity is expected to rise significantly, given the availability of powerful new capabilities and the return of refurbished instruments following the successful SM4.

To assess and help maximize the scientific impact of Hubble, a team that includes members of the Science Mission, the Archive and the Library has systematized the identification of Hubble papers published in peer-reviewed journals. The resulting database includes not only the references to the publications using Hubble data but also all the papers that cite them and the complete list of approved proposals. From the tables we can see that although the Director’s Discretionary programs are slightly more productive than the General Observers’ ones, they have twice the impact (as measured by citations per papers).

Some of the data from this database is illustrated on the left, where we show the total number of papers published, the number of publications per Hubble instrument, the productivity and impact of Guest Observer and Director Discretionary observing programs and a distribution by journal.
Grants

NASA provides funding to the Institute each year to award grants to the astronomical community for General Observer, Archival Research, Education Outreach, and Hubble Fellowship Programs. Science programs with U.S. investigators which have been approved by the Telescope Allocation Committee are eligible to request *Hubble* funding. Following a peer review by the Financial Review Committee, funding recommendations are presented to the Institute Director for final approval.

The Institute’s Grants Administration Office manages the grant program for NASA and is responsible for the administration of the entire grant process. The office provides support to astronomers and institutions throughout the United States and works closely with all customers to ensure that grant requirements are met. The office provides one-on-one support to help with any grant-related issues, and also provides assistance to users of the Space Telescope Grants Management System. Maintained and updated on site at the Institute, the grants system provides its users (both internal and external) with a functional and friendly tool. This system will also be used to manage grants awarded for the *James Webb Space Telescope*.

The table lists the total amount of grant funding distributed for each fiscal year of the *Hubble Program*.
The development of the James Webb Space Telescope continued at a fast pace in 2009, but the year also brought us a launch delay—the first in the last five years. This delay stems from the recommendations of the Non-Advocate Review Team following the Mission Preliminary Design Review in 2008. One recommendation was to increase the schedule reserve, which would otherwise be too small to accomplish a 2013 launch. The President’s 2009 budget included a new launch date of no earlier than June 2014 and sufficient funds to support the new launch date with adequate reserves. While the delay gave some breathing room in some of the areas more pressed for time, most activities continued on the original schedule.

Several reviews took place during the year to prepare for the Mission Critical Design Review to be held in 2010. The most notable was the successful Optical Telescope Element (OTE) Critical Design Review in October 2009. The OTE comprises the primary, secondary, tertiary, and fast-steering mirrors. The first segments of the primary mirror were successfully tested at cryogenic temperature early in the year, leading the way for the testing and delivery of the remaining 18 flight segments and spares by 2011.
Development work has continued on the Science and Operations Center. The first of a series of three reviews of the Proposal and Planning System was held at the Institute in March 2009, and successfully passed. Users writing Webb observing proposals will use a tool derived from the Astronomer’s Proposal Tool (APT) used for Hubble. Indeed, Webb templates and tools were included in the version of APT distributed to Hubble users so that the user community can become familiar with the look and feel of Webb proposals. For example, astronomers proposing for the upcoming Hubble Cycle 18 could use the mosaic tools developed for Webb wide-field imaging programs.

Institute staff has worked closely with the science instrument development teams to develop procedures and on-board scripts. In May 2009 the Institute hosted a Calibration Summit, bringing together all the Webb instrument teams to discuss calibration issues common to many of the instruments.

In 2009, the Institute increased outreach efforts to the astronomical community. In addition to having display booths at both the winter and summer 2009 American Astronomical Society meetings held in Long Beach (CA) and Pasadena (CA), respectively, and planning for the Winter 2010 meeting in Washington, DC, the Institute also supported the Division of Planetary Science Meeting in Puerto Rico. The first of the Behind the Webb webcasts of 2009 was produced by the Institute (see movie at left). These high-definition videos highlight the work of the engineers and scientists who are developing the Webb observatory. One of the two webcasts released in 2009 features scientists at the Jet Propulsion Laboratory characterizing the Mid-Infrared Instrument (MIRI) detectors; the other spotlights the design and testing of the deployable sunshield at Northrop Grumman.
The Community Missions Office

The Community Missions Office is the focal point for bringing the cumulative expertise and experience of the Institute to other missions and projects. The Office serves as the conduit between mission teams and Institute personnel, tuning relevant support for mission science operations, data curation and analysis, Call for Proposals, peer reviews, grants administration, and education and outreach initiatives.

Our expertise and long experience with *Hubble*, *Webb*, *Kepler*, *GALEX*, and other observatories allow us to adapt our tools to a wide variety of mission contexts. Our philosophy is to integrate scientific perspective into all aspects of the missions, maximizing scientific return through cost-effective application of the Institute’s products, services, and operations abilities.

The Institute currently operates the archives of *Kepler* and *GALEX* (in addition to *Hubble* and *Webb*). The Institute has also provided key support for data processing, archiving, planning and scheduling, outreach and other facets of the science operations of the *Spitzer Space Telescope, FUSE, CHANDRA, EUVE, ASCA*, the Gemini Observatories, and SOFIA.
Multimission Archive at STScI

MAST

The Multimission Archive at Space Telescope (MAST) supports active and legacy mission datasets and related catalogs and surveys, focusing primarily on data in the ultraviolet, optical, and near-IR spectral regions. Support includes the curation of the data, providing expert support to users of the data, providing access to data-specific calibration and analysis software, providing user support for this software, and maintaining public access interfaces to the data.

The Hubble Data Archive

The Hubble Archive ingested 8.38 Terabytes of data from August 2008 through July 2009, bringing the total size of the archive to 41.4 Terabytes. 26.1 Terabytes of archive data were distributed, up 19% from last year. This brings the total volume of data distributed since launch to more than 198 Terabytes.

During FY’09, 25,237 new observations were processed through the Institute data pipeline and stored in the Hubble Data Archive. On average, users were able to access their science data from the archive within 15.1 hours after the observations successfully executed, including the time the data spent on the spacecraft. Of all the observations, 98.7% were processed and archived within 48 hours of their receipt.
MAST missions

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| STIS Next Generation Spectral Library (AR10659) | Sally Heap |
| Standard Stars: IUE | Chi-Chao Wu |
| White Dwarf Spectral Atlas: High Dispersion IUE | Jay Holberg |
| alpha Ori Spectral Atlas (HST/GHRS) | GHRS Team |
| chi Lupi (B9.5 pHgMn) Spectral Atlas (HST/GHRS) | GHRS GTO team |

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| Ultra Deep Field NICMOS Parallels | Steven Beckwith |
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| Ultraviolet Imaging of the UDF and the HDF | Harry Teplitz |
| VLA-A Array AL218 Texas Survey Source Snapshots | Ray Lucas |
| Deep Optical Photometry of Six Fields in the Andromeda Galaxy | Thomas Brown |
| FUSE Survey of Cataclysmic Variables | Cynthia Froning |

### INDIVIDUAL OBJECTS

| 10 Lac (O9V) Spectral Atlas (HST/GHRS) | J.C. Brandt |
| A Hubble Space Telescope Gallery of Merging Galaxies | Max Mutchler |
| Grayscale of Time Variations of gamma Cas Near SiIV Doublet (HST) | Myron Smith |
| HST Treasury Program on Eta Carinae | Kris Davidson |
| Hubble Helix Observations | Margaret Meixner |
| Hubble Heritage Project | Keith Noll |
| Hubble Space Telescope ACS Mosaic Images of M51, the Whirlpool Galaxy | Steven Beckwith |
| Hubble Space Telescope ACS Mosaic Images of M82 | Matt Mountain |
| Magellanic Cloud Planetary Nebulae | Letizia Stanghellini and Richard Shaw |
| Procyon (FV-IV) Spectral Atlas – Chromospheric Lines (HST/GHRS) | Brian Wood |
| alpha Ori Spectral Atlas (HST/GHRS) | GHRS Team |
| chi Lupi (B9.5 pHgMn) Spectral Atlas (HST/GHRS) | GHRS GTO team |
| The HST Treasury Program on the Orion Nebula Cluster | Massimio Robbetto |
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| FUSE Survey of Cataclysmic Variables | Cynthia Froning |

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The *Hubble* Legacy Archive (HLA) project aims to revolutionize *Hubble* archival research by creating advanced, science-ready *Hubble* data products (stored online for immediate access) with powerful and flexible user interfaces that enable rapid exploration of our archive holdings in the wider context of the Virtual Observatory. The HLA is built around a “footprint” database that accurately describes the sky region covered by each exposure and by the combined images constructed from the exposures. The HLA also includes lists of sources identified within *Hubble* images. The HLA user interface uses new web browser capabilities to enable very fast archive searches and interactive browsing for images and catalogs.

The highlights of HLA’s Data Release 3 include several new kinds of products:

- Reprocessed NICMOS single exposures and combined images.
- Individually validated spectra for 1235 objects observed with the ACS GRISM.
- Preliminary source lists for about 80% of the WFPC2 science data.
- Sample prototypes of ACS mosaics, which combine overlapping data obtained over multiple visits with the same detector/filter combination.
**FUSE**

The *FUSE* team at The Johns Hopkins University and MAST personnel have worked together to design a completely revamped site that will be the long term home of the *FUSE* mission on the web. The site not only includes access to enhanced data products, but also contains new documentation written specifically for archival users. The enhanced data products include a fully reprocessed and re-calibrated science data set from the mission, performed with the final version of the CalFUSE pipeline.

**GALEX**

*GALEX* Release 5 (GR5) has been available since the beginning of 2009. It includes significant additions over the previous GR4 release. First, for all surveys except the AIS, the sky coverage has increased by 25% to 100% compared with the old GR4, depending on the *GALEX* survey. Second, this package includes a considerable addition of previously proprietary data from the Guest Investigator program.
*Kepler Data Management Center*

*Kepler*, a NASA Strategic mission, was launched into an Earth-trailing heliocentric orbit on March 6, 2009, and is now observing a 105 square degree region of the sky in the constellations of Cygnus and Lyra. The goal of the mission is to obtain precise long-term light curves of up to 100,000 cool stars and to search for periodic transits of planets as small as the Earth.

The Institute is partnering with the Kepler Project to serve as the mission’s Data Management Center (DMC). The Institute is responsible for data processing, and for populating and managing the *Kepler* data archive, including the storage and dissemination of the light curve data. The MAST *Kepler* website ([http://archive.stsci.edu/kepler/](http://archive.stsci.edu/kepler/)) is now public.
In the interim period between the conclusion of the National Virtual Observatory development project and the start of the Virtual Astronomical Observatory (VAO) operational facility, Institute staff focused on supporting core Virtual Observatory services and prototyping key new capabilities. The Institute operates the primary directory service used throughout the NVO to locate and access data collections. Major improvements were made to the directory user interface, and a new interface for publishing data collections was developed. The Institute worked closely with staff at the Johns Hopkins University in the development of “footprint services,” which are used to describe the sky coverage of observations and combinations of observations, such as in a survey. Institute staff also developed prototype Table Access Protocol (TAP) services. TAP will be the primary way astronomers will query databases and tables, regardless of where the data are located, and will construct cross-matched comparisons between large databases. Team members contributed to ongoing standards development activities in the International Virtual Observatory Alliance.
Office of Public Outreach

Fiscal Year 2009 will be remembered as the year of Servicing Mission 4 (SM4). Given the crucial role that OPO played during this year—keeping Hubble in the public eye during the delay in the mission, planning and executing all the activities leading up to SM4, and planning and publicizing the Early Release Observations (EROs)—FY ’09 will also be remembered as a glorious year for OPO. This was a year in which much of the activity involved OPO as a whole.

Of particular note are the “Hubble’s Next Discovery—You Decide!” campaign, the multitude of activities surrounding SM4, the “Visions of the Universe” library project, and the EROs that topped off the year.

Two of these activities truly stand out in creativity, execution, and impact. In the “Hubble’s Next Discovery—You Decide!” contest, people around the world were able to vote online to select one object from six possible targets for Hubble to observe. About 140,000 people voted on HubbleSite. More than 50 elementary school classes from across the U.S. then participated in a follow-up collage activity, in which students created Hubble-related projects. The activity was also highlighted in the context of the “100 Hours of Astronomy” broadcast, which was a part of the International Year of Astronomy celebrations.

The second one, done in collaboration with the American Library Association and the Smithsonian Astrophysical Observatory, OPO created the traveling exhibit “Visions of the Universe: Four Centuries of Discoveries.” This spectacular 12-panel exhibit was conceived and designed with the goal of serving smaller communities that do not have easy access to large science centers. The exhibit celebrates the discoveries made in the heavens since Galileo’s first observations with
missions

Students participate in the *Hubble Early Release Observatory* projects

a telescope. Each panel was supported by a series of supplemental educational materials. The exhibit is scheduled to travel to about 60 libraries, many of which cater to underserved populations in rural areas.

The partnership with AccuWeather (one of the major providers of weather data to the media, business, government and institutions) established in FY’08 continued. This endeavor resulted in the dissemination of OPO’s video podcasts in the astronomy weather section of AccuWeather.

OPO’s Education Branch develops products and programs for the formal and informal education communities. Using *Hubble* images and data, educators and scientists work in collaboration to develop curriculum support tools, exhibits, exhibit support materials and professional development workshops that meet the needs of the formal and informal education communities. Among the projects this year was the agreement for our Office to be the caretaker of the Astronomy Center section of the ComPADRE Digital Library, a joint project of the American Association of Physics Teachers, American Astronomical Society, American Institute of Physics and American Physical Society.

ViewSpace—the self-updating, multimedia presentation developed for museums and other informal venues—added 27 new institutions to its network.

The creation and dissemination of press releases highlighting newsworthy *Hubble* discoveries is the major effort of the News Office. During 2009 a total of 40 press releases were issued, reaching approximately 12 million readers of daily newspapers, 1.7 million readers of consumer magazines and 3.9 billion Internet readers.

During SM4, OPO’s News team produced a series of videos entitled “Access *Hubble*: SM4 Special Edition.” Filmed on location at the Kennedy Space Center and the Johnson Space Center, this series captured a front-row view of all the SM4-related activities. The series was broadcast daily on NASA-TV, and it consistently received a 5-star rating on YouTube.

Going beyond collaborating just between branches, OPO worked with the NASA HQ Web Portal team, GSFC Hubble Project team, and GSFC
Public Affairs Office staff to create content for the NASA portal Web site (www.nasa.gov). This effort produced a rich Internet experience for the SM4-interested public. During the mission, the special SM4 section was highly promoted on the portal and received heavy traffic. This was a great example of what we can accomplish acting in concert, as one NASA team.

Also during SM4, OPO’s online team launched an SM4 portal page, which quickly became the go-to page for all SM4 internet traffic. Concomitantly, the SM4 portal on the Amazing Space Web site was updated daily in a series of Star Witness News articles prepared by OPO’s expert education team. OPO’s Informal Education group joined the flurry of activities by preparing three new ViewSpace shows, and by creating special SM4 programming during the servicing mission.

OPO was directly involved in the choice of the ERO targets, in the processing of the data, and in the release of the images and the associated activities. The EROs resulted in hundreds of stories in the media, and they reached an estimated audience of 1.6 billion people. In addition, OPO’s education team created a pilot project for K–12 students and educators in Ohio, California, New York, and Maryland. Student projects will be displayed in science centers in these states.

To conclude, FY ’09 can be considered to be one of the most successful years in OPO’s history. OPO’s performance this year demonstrated yet again what can be achieved with a professional team committed to excellence.
2009 Press Releases

1. **STScI Senior Astrophysicist Mario Livio Elected AAAS Fellow**
   In November, the American Association for the Advancement of Science (AAAS) Council elected Space Telescope Science Institute’s senior astrophysicist... (More)

2. **Hubble Finds Smallest Kuiper Belt Object Ever Seen**
   NASA’s Hubble Space Telescope has discovered the smallest object ever seen in visible light in the Kuiper Belt, a vast ring of icy debris that is encircling... (More)

3. **Hubble’s Festive View of a Grand Star-Forming Region**
   Just in time for the holidays: a Hubble Space Telescope picture postcard of hundreds of brilliant blue stars wreathed by warm, glowing clouds. The festive portrait... (More)

4. **Hubble’s Deepest View of Universe Unveils Never-Before-Seen Galaxies**
   NASA’s Hubble Space Telescope has made the deepest image of the universe ever taken in near-infrared light. The faintest and reddest objects in the image are galaxies... (More)

5. **Galaxy on Edge**
   The magnificent galaxy NGC 4710 is tilted near edge-on to our view from Earth. This perspective allows astronomers to easily distinguish the central bulge of stars from its pancake-flat... (More)

6. **NASA’s Great Observatories Celebrate International Year of Astronomy**
   A never-before-seen view of the turbulent heart of our Milky Way galaxy is being unveiled by NASA on Nov. 10. This event will commemorate the 400 years since Galileo... (More)

7. **Hubble Image Showcase Star Birth in M63, the Southern Pinwheel**
   The spectacular new camera installed on NASA’s Hubble Space Telescope during Servicing Mission 4 in May has delivered the most detailed... (More)

8. **Hubble Project Pioneer Rodger Doxsey Passes Away**
   Dr. Rodger Doxsey, head of the Space Telescope Science Institute’s (STScI) Hubble Mission Office, passed away on October 13 after a prolonged illness. (More)

9. **Hubble Observes LCROSS Impact Event**
   NASA’s Hubble Space Telescope has made a series of observations immediately preceding and following the Lunar Crater Observation and Sensing Satellite (LCROSS) Centaur... (More)

10. **Hubble Opens New Eyes on the Universe**
    NASA’s Hubble Space Telescope is back in business, ready to uncover new worlds, peer ever deeper into space, and even map the invisible backbone of the universe. (More)

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<td>Even some galaxies may have been hyperactive youngsters. Looking almost 11 billion years into the past, astronomers have measured the motions... (More)</td>
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<td></td>
<td>12. Hubble Captures Rare Jupiter Collision</td>
<td>NASA scientists have interrupted the checkout and calibration of the Hubble Space Telescope to aim the recently refurbished observatory at a new expanding spot on the giant planet Jupiter. (More)</td>
</tr>
<tr>
<td>6/25/2009</td>
<td>13. STScI Joins the Search for Other Earths in Space</td>
<td>The Space Telescope Science Institute (STScI) in Baltimore, Md., is partnering on a historic search for Earth-size planets around other stars. (More)</td>
</tr>
<tr>
<td>5/7/2009</td>
<td>15. Refined Hubble Constant Narrows Possible Explanations for Dark Energy</td>
<td>Less than 100 years ago scientists didn’t know if the universe was coming or going, literally. It even fooled the great mind of Albert Einstein. He assumed... (More)</td>
</tr>
<tr>
<td>4/30/2009</td>
<td>16. Starbursts in Dwarf Galaxies are a Global Affair</td>
<td>Bursts of star making in a galaxy have been compared to a Fourth of July fireworks display: They occur at a fast and furious pace, lighting... (More)</td>
</tr>
<tr>
<td>4/28/2009</td>
<td>17. Space Telescope Science Institute Astrophysics: Elected to National Academy of Sciences</td>
<td>Adam Riess was among 72 scientists elected today to membership in the National Academy of Sciences at the organization’s 146th annual meeting... (More)</td>
</tr>
<tr>
<td>4/21/2009</td>
<td>18. Hubble Celebrates Its 19th Anniversary with a &quot;Fountain of Youth&quot;</td>
<td>Over the past 19 years Hubble has taken dozens of exotic pictures of galaxies going &quot;bump in the night&quot; as they collide with each other and have a variety... (More)</td>
</tr>
<tr>
<td>4/16/2009</td>
<td>19. Galaxy Cluster MACS J0717</td>
<td>The most crowded collision of galaxy clusters has been identified by combining information from three different telescopes. This result gives scientists a chance to learn what happens... (More)</td>
</tr>
<tr>
<td>4/14/2009</td>
<td>20. Hubble Witnesses Spectacular Flaring in Gas Jet from M87’s Black Hole</td>
<td>In our violent, discordant, and effervescent universe, reality always seems to be stranger than fiction. (More)</td>
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<td>Date</td>
<td>Title</td>
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<td>4/3/2009</td>
<td><strong>21. Hubble Celebrates the International Year of Astronomy with the Galaxy Triplet Arp 274</strong></td>
<td>On April 1-2, the Hubble Space Telescope photographed the winning target in the Space Telescope Science Institute's &quot;You Decide&quot; competition...  <a href="#">More</a></td>
</tr>
<tr>
<td>4/1/2009</td>
<td><strong>22. Hubble Finds Hidden Exoplanet in Archival Data</strong></td>
<td>In 19 years of observations, the Hubble Space Telescope has amassed a huge archive of data. That archive may contain the telltale glow of undiscovered extrasolar planets...  <a href="#">More</a></td>
</tr>
<tr>
<td>3/22/2009</td>
<td><strong>23. Hubble Uncovers an Unusual Stellar Progenitor to a Supernova</strong></td>
<td>Astronomers have detailed theories about what type of stars self-destruct in titanic supernova explosions. However, it would be useful to test stellar...  <a href="#">More</a></td>
</tr>
<tr>
<td>3/17/2009</td>
<td><strong>24. Quadruple Saturn Moon Transit Snapped by Hubble</strong></td>
<td>Saturn's comparatively paper-thin rings are tilted edge on to Earth every 15 years. Because the orbits of Saturn's major satellites are in the ring plane, too, this alignment...  <a href="#">More</a></td>
</tr>
<tr>
<td>3/12/2009</td>
<td><strong>25. Hubble Provides New Evidence for Dark Matter Around Small Galaxies</strong></td>
<td>When it comes to finding dark matter in space, astronomers need to go on a sort of a ghost hunt. Dark matter can't be directly seen or isolated in a laboratory...  <a href="#">More</a></td>
</tr>
<tr>
<td>3/3/2009</td>
<td><strong>26. Trio of Galaxies Mix It Up</strong></td>
<td>Though they are the largest and most widely scattered objects in the universe, galaxies do go bump in the night. The Hubble Space Telescope has photographed many pairs of galaxies...  <a href="#">More</a></td>
</tr>
<tr>
<td>2/25/2009</td>
<td><strong>27. NASA Announces 2009 Astronomy and Astrophysics Fellows</strong></td>
<td>NASA has selected fellows in three areas of astronomy and astrophysics for its Einstein, Hubble, and Sagan Fellowships. The recipients of this year's postdoctoral fellowships...  <a href="#">More</a></td>
</tr>
<tr>
<td>2/10/2009</td>
<td><strong>28. NASA's Great Observatories Celebrate the International Year of Astronomy with a National Unveiling of Spectacular Images</strong></td>
<td>In 1609, Galileo first turned his telescope to the heavens and gave birth to modern astronomy. To commemorate...  <a href="#">More</a></td>
</tr>
<tr>
<td>1/28/2009</td>
<td><strong>29. Hubble's Next Discovery, You Decide</strong></td>
<td>In 1609, Galileo turned his telescope on the night sky for the first time. Now, 400 years later, your vote will help make the momentous decision of where to point modern astronomy's...  <a href="#">More</a></td>
</tr>
<tr>
<td>1/15/2009</td>
<td><strong>30. Hubble Snaps a Splendid Planetary Nebula</strong></td>
<td>The Hubble Space Telescope has imaged striking details of the famed planetary nebula designated NGC 2818, which lies in the southern constellation of Pyxis (the Compass). The spectacular...  <a href="#">More</a></td>
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<td>Date</td>
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<td><strong>1/7/2009</strong></td>
<td>31. <strong>Hubble Finds Stars That ‘Go Ballistic’</strong>&lt;br&gt;Resembling comets streaking across the sky, these four speedy stars are plowing through regions of dense interstellar gas and creating brilliant arrowhead structures and trailing... <em>(More)</em></td>
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<td><strong>1/6/2009</strong></td>
<td>32. <strong>Star Light, Star Bright, Its Explanation is Out of Sight</strong>&lt;br&gt;This pair of NASA Hubble Space Telescope pictures shows the appearance of a mysterious burst of light that was detected on February 21, 2006, brightened... <em>(More)</em></td>
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<td><strong>1/5/2009</strong></td>
<td>33. <strong>Hubble Views Galactic Core in Unprecedented New Detail</strong>&lt;br&gt;This composite color infrared image of the center of our Milky Way galaxy reveals a new population of massive stars and new details in complex structures... <em>(More)</em></td>
<td></td>
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<td><strong>1/5/2009</strong></td>
<td>34. <strong>Brown Dwarfs Don’t Hang Out With Stars</strong>&lt;br&gt;Brown dwarfs, objects that are less massive than stars but larger than planets, just got more elusive, based on studies of nearby multiple-star systems... <em>(More)</em></td>
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Innovation

OUR GOALS
Optimize the science from state-of-the-art astronomical instruments.
Promote new applications for STScI products.
Foster new missions and mission concepts.
For four centuries new technology and telescopes of increasing diameter have driven astronomical discovery for the simple reason that astronomy is a photon-limited field. Conceptual breakthroughs in understanding astrophysical phenomena happen when our observatories allow us to detect and characterize faint structure and spectral features on the relevant angular scales. The Hubble Space Telescope, to date the largest UV/optical astronomical space telescope, has demonstrated the breadth of fundamental astrophysics that can be extracted from space-based observations in the UV-optical-near IR. The paradigm-shifting discoveries in the next two decades will be made with ever more capable instruments and facilities.

The Advanced Technology Large-Aperture Space Telescope (ATLAST) is a set of mission concepts for a highly versatile ultraviolet-optical-near IR observatory in space, larger and more capable than either Hubble or its IR-optimized successor, the James Webb Space Telescope. ATLAST concepts for the next generation of ultraviolet-optical-near IR space observatory, shown above, have a primary mirror aperture diameter in the 8-m to 16-m range. By virtue of its ~12 milli-arcsecond angular resolution at ~500 nm coupled with its ultra-high sensitivity, superb stability and low sky background, ATLAST will make great scientific breakthroughs—both on its own and in combination with other telescopes with different capabilities.
ATLAST has the performance required to detect the potentially rare occurrence of biosignatures in the spectra of terrestrial exoplanets, to reveal the underlying physics that drives star formation, and to trace the complex interactions between dark matter, galaxies, and the intergalactic medium. Because of the large leap in observing capabilities that ATLAST will provide, we cannot fully anticipate the diversity or direction of the investigations that will dominate its use—just as the creators of Hubble did not foresee its pioneering roles in characterizing the atmospheres of Jupiter-mass exoplanets or measuring the acceleration of cosmic expansion using distant supernovae. It is, thus, essential to ensure ATLAST has the versatility to far outlast the vision of current-day astronomers.

Two different ATLAST architectures, but with similar optical designs, have been studied: a telescope with a monolithic primary mirror and two variations of a telescope with a large segmented primary mirror. The concepts invoke heritage from Hubble and Webb design, but also take significant departures from these designs to minimize complexity, mass, or both. The Institute, in collaboration with academic, industry, and NASA partners, recently completed a two-year NASA Strategic Astrophysics Mission Concept study of ATLAST. The report, available at http://www.stsci.edu/institute/atlast, provides details on the mission concepts, shows the extraordinary scientific progress they would enable, and describes the most important technology development items. These include the mirrors, the wavefront sensing and control system, the starlight suppression system (for exoplanet observations and other high-contrast imaging applications), and the detectors. Experience with Webb has shown that determined competitors, motivated by the development contracts and flight opportunities of the new observatory, are capable of achieving huge advances in technical and operational performance while keeping construction costs on the same scale as prior great observatories.
In March 2009, the Institute co-hosted a Town Hall Meeting with the Johns Hopkins University as part of the Decadal Survey process, providing an opportunity for the Baltimore astronomical community to interact directly with representatives from the National Research Council and several Astro2010 panels.

The scope of the papers submitted to the Astro2010 Decadal Survey by Institute astronomers spanned all of the five science panels of the Committee. They provided a wonderful review of what is hot and fascinating in contemporary astronomy.

Of particular interest, a paper co-authored with colleagues from the Chandra X-Ray Center and the Spitzer Science Center discussed the value of observatory-class missions. It highlighted the virtues of a flexible mix of general-purpose capabilities, allowing investigations in a wide range of areas. There are very few areas of astrophysics that have not been profoundly affected by these observatories. These Great Observatories continue to serve as a model for what is possible when the astronomical community comes together to create a coherent vision to humanity’s progressive understanding of the Universe.

Institute staff not only submitted materials but also participated in the actual panels: Mike Hauser and Adam Riess (Panel on Electromagnetic Observations from Space), Neill Reid (Panel on Optical and Infrared Astronomy from the Ground), Kathy Flanagan (Panel on Particle Astrophysics and Gravitation), Jason Tumlinson (Panel on Galactic Neighborhood), Antonella Nota (International and Private Partners Study Group), Bob Hanisch (Computation, Simulation and Data Handling Study Group co-chair) and Carol Christian (Education and Public Outreach study group).
The Space Telescope Employee Network was created to foster community and communication among Institute staff. This electronic network is a place for Institute employees to connect and share information about their interests.
Over the course of two days, more than a hundred astronomers from around the world met at the Institute to discuss future directions in the ultraviolet–optical–near-infrared astrophysics in the era beyond the James Webb Space Telescope. What emerged was an inspiring narrative of where modern astrophysics, enabled by new, forefront observations from space, can lead human discovery. The consensus results from the workshop were compiled in a document that was submitted to the Astro2010 Decadal Survey.

Observational astrophysics is a photon-limited field. The paradigm-shifting discoveries in the 2010–2030 era will require ever more capable instruments and facilities. In particular, extrasolar planet characterization, as well as in the fields of star and galaxy formation and evolution—the next big steps—require making observations at high angular resolution of sources with flux densities from a few to tens of nanoJanskys. The key photometric and spectroscopic signatures that will, for example, enable the search for life in the universe, or provide the foundation for a comprehensive theory of star formation, or enable direct measurements of interactions between galaxies and the cosmic web of matter, lie in the wavelength range 0.1 to 2.5 microns.
Community Involvement

OUR GOALS

Be a good community partner.

Develop community partnerships to expand our programs in the greater Baltimore area.

Engage young people to encourage their interest in science, technology, engineering and mathematics.
Institute staff—along with Johns Hopkins University staff, students and faculty—and the public at large are invited to attend monthly Meridian Speaker events at the Institute. Meridian speakers discuss scientific topics on a less technical level than they would in a scientific colloquium. Topics and speakers in 2009 included “Is God a Mathematician?” by Mario Livio, “When Freezing Cold Is Not Cold Enough—New Forms of Matter Close to Absolute Zero Temperature” by Wolfgang Ketterle, and “MIRROR MIRROR” by Mark Pendergrast.
The Institute conducts the Public Lecture Series program on the first Tuesday of every month. The lectures are a well-attended series of public talks hosted in the Institute’s auditorium and presented by an Institute staff member. The lectures start with an overview of recent Hubble discoveries or other science-related items of interest to the public. A video of the program is made available by the Institute and disseminated via HubbleSite.

Community-Supported Agriculture

Last year the Institute initiated a Community-Supported Agriculture (CSA) pilot program. CSA is a great way to support community farmers by buying fresh local and seasonal food directly from nearby farms. Basically the farm offers “shares” to the public. These shares are generally some number of vegetables and, occasionally, fruits. Some CSAs also offer meats, dairy and baked goods.

It is a great way to obtain really fresh food, be exposed to vegetables with which you are unfamiliar or fear (beets!), and share recipes and recommendations with your colleagues.

One Straw Farm in White Hall, Maryland, delivered shares directly to the Institute every Wednesday from approximately June 15–November 15. In the first year, 40 individuals participated in the program, consuming 20 shares and volunteering to coordinate the distribution of bounty each week.
The White House celebrated the International Year of Astronomy by hosting an Astronomy Night on the White House South Lawn. The event brought the President together with 150 local middle-school students. It was a way to increase awareness of the incredible discoveries, inspiration, and expansion of human knowledge that the field of astronomy can deliver. The Star Party was broadcasted live on the White House Web site and on NASA TV, and was linked with simultaneous events at museums and planetariums across the country.

Two Institute staff members were invited to participate and bring their telescopes. More than 20 other telescopes were set up on the White House lawn, as were interactive dome presentations and hands-on activities that included scale models of the solar system, impact cratering, and investigating meteorites and Moon rocks.
2009 Assessments

James Webb Space Telescope
from the June 2009 assessment letter:

For this period [October 1, 2008 – March 30, 2009] AURA’s overall performance was evaluated as “Excellent” [...].

This period, the Government evaluated the ITAR exposure noted in the previous fund determination letter and this evaluation is captured in the Technical Performance Score. We remind AURA of the seriousness of such incidents and we fully expect that AURA’s corrective measures will prevent future recurrences. [...] We recognize the fact that AURA has filed the necessary paperwork with the Department of State and has taken adequate corrective and preventive measures against future exposures.

The Government has also observed several areas of declining performance. Two particular areas are in the Optical Telescope Element (OTE) Simulator (OSIM) Integration & Test (I&T) and in OTE support. In the case of OSIM I&T, several actions assigned to AURA personnel with mutually agreed due dates were not completed. In the OTE, the AURA Lead OTE Scientist continues to provide consistently outstanding support to the Webb mission; however, work on the multiwave interferometer testbed by other team members did not progress as requested.

Aside from these issues, AURA continues to provide excellent support in many areas. In mission systems engineering, AURA’s excellence was exemplified by the in-depth analysis of Webb momentum management and support to the resolution of the data compression shortfall. Outstanding support was also provided to the OTE center of Curvature test planning and the product integrity team. Support to the Project Reference Database Subsystem (PRDS) was also excellent [...].

AURA’s [support for the planning and coordination of the test activities of the Ground Segment Verification and Validation (V&V) efforts] was excellent and demonstrated the thorough planning being done by the Ground Segment V&V team.

AURA continues to be very responsive to requests from the JWST Business and Contract Management team. [...] [W]e are pleased that AURA has been very active in workforce diversity activities. Lastly we appreciate AURA’s efforts to work with the Government with respect to budget profile exercises.

Support for Long Range Planning, Science Outreach and Community Outreach were all excellent.

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Continued…
**Institute Visiting Committee (IVC)**

**From the July 2009 Report:**

The IVC concludes that the *Hubble* component of STScI has a very strong and successful partnership with GSFC, based on mutual respect and understanding of the needs of the entire project.

The IVC is pleased with the current policies whereby proposals for archival support are evaluated in direct comparison with proposals for new observations.

[The IVC endorses] the formation of the *JWST* Advisory Committee (JSTAC) to advise the STScI Director for *JWST* operations.

The IVC fully endorses the smooth staff profile approach taken by the Institute.

The scientific output of the *Hubble* continues to be outstanding. The scientific performance of the Institute staff is also very good.

As with any large organization suitable and effective forms of communications are a balancing act. The IVC suggests that even a simple weekly paper broadsheet, describing comings and goings, achievements, etc. available at reception and in the cafeteria, would enhance communication with staff.

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**Space Telescope Users Committee (STUC)**

**From the June 2009 Report:**

The STUC wishes to offer its most sincere thanks to the many people who made SM4 possible and who made it such a spectacular success. […]

The STUC commends STScI for its prompt actions that maximized scientific output of *HST* during the difficult period between the cancelled Oct 2008 launch date for SM4 and the actual launch of the mission in May 2009. The extraordinary efforts to put out a call for supplementary proposals, review them, notify PIs and run Phase II, then schedule and execute them were truly remarkable, and helped to ensure that *HST* remained scientifically productive during this unanticipated and difficult transition period.

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Continued …
**Hubble Fellows Committee Chair**

*From a letter by Prof. James S. Bullock:*

[...] I can assure you that the 2009 Hubble Fellows will rank among the very top individuals spanning the national and international astronomical communities. Indeed the scientific accomplishments and future promise inherent in even the long short list of candidates was so impressive that reading their applications and distinguishing among them amounted to both the most enjoyable and simultaneously the most difficult aspects of the selection process [...] 

With the 20th anniversary of the Hubble Fellows program now upon us, The Fellowship’s currency and relevance within the community has never been higher. It is difficult to overstate the quality and promise of the top thirty or so applicants, and the top seventeen with offers were certainly of the highest caliber. Past Hubble Fellows now include directors of large national observatories, department chairs, and elected members to prestigious academic societies. This inspiring legacy will be passed on to a truly impressive group of individuals. It seems clear that the long legacy of excellence for Hubble Fellows is in very good hands.

**Future of the Workplace**

*From the November 2009 Report:*

[...] We saw and heard two overarching themes. First, people were overall the most positive we have seen them. Second, many comments regarding diversity and inclusion shifted context from personal toward organizational. We heard a range of general organizational concerns about management styles and culture change. We believe this is tied to the Institute’s evolution toward being a long-term institution with multiple goals. [...]
Previous Summer Student
From a letter by Juan Rafael Martinez Galarza

Dear Dr. Mountain,

As a former intern of the STScI program in 2004, I would like celebrate the continuation of this program which is now in its application phase for 2010. Both from a personal and a professional point of view, my experience in Baltimore was exceptional, and it is mostly thanks to that opportunity that I have been able to pursue my career as an astronomer (now as a 3rd year PhD student in Leiden, The Netherlands).

I want to salute the program and to congratulate the Institute in its effort to give this opportunity to other enthusiastic students around the world. I really hope this will continue in the JWST era.

Best wishes from Leiden,

Rafael