Floating more than 600 kilometers (375 miles) above the Earth, NASA's 2.4-meter Edwin P. Hubble Space Telescope is the world's premier orbiting observatory. Since 1992 15 amateurs have had the opportunity to use HST for observations ranging from observing frost on Jupiter's innermost moon to hunting for extrasolar comets around exploding stars. This photograph was taken during Hubble's servicing mission by astronauts aboard the space shuttle *Discovery* last February (see page 34). Courtesy NASA.

The Demise of the HST Amateur Program

ALL GOOD THINGS must come to an end. Take, for instance, the Hubble Space Telescope's amateur astronomy program. Following a much-publicized launch in April 1992, the program quickly set sail with high hopes and expectations before it sank into obscurity. This August James P. Flood, a chemist and amateur astronomer from Scotch Plains, New Jersey, will use the $1.5 billion orbiting observatory to probe the enigmatic nucleus of the galaxy NGC 1808 in Columba. But his will mark the 12th and final observation in the revolutionary, somewhat controversial, program. The question that immediately comes to mind is, What happened?

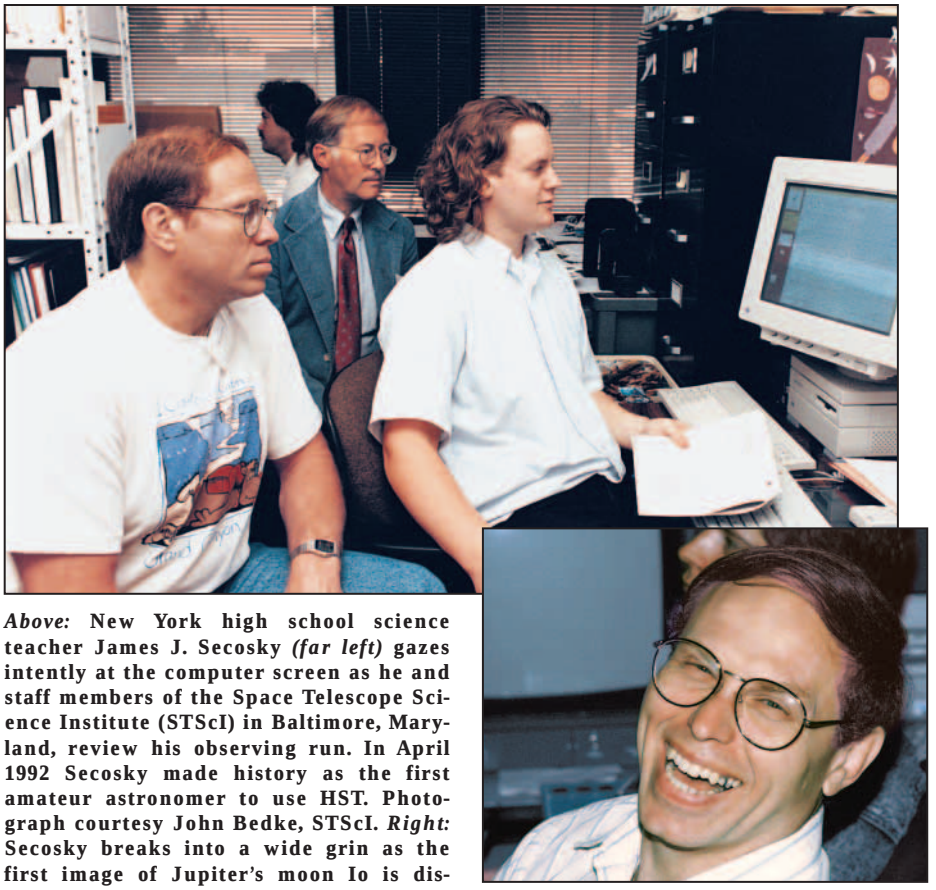
Former Space Telescope Science Institute (STScI) director Riccardo Giacconi conceived the program, which he made public on August 7, 1986. That day Giacconi said he wanted to reward amateurs for their contributions to astronomy by devoting ¼ of 1 percent of his discretionary observing time with HST to amateur programs. All United States citizens were eligible to apply. But the proposals had to pass the screening of the Amateur Astronomers Working Group (AAWG), a team of seven amateur and professional astronomers established to administer the selection process.

"The program required so much manpower that I had to terminate it."
— Director Robert Williams, Space Telescope Science Institute

Giacconi honored his promise, and on April 20, 1992, James J. Secosky, a high school science teacher in Bloomfield, New York, became the first amateur to use the world's premier telescope (*S&T*: August 1992, page 154). News of his historic observation rippled through the astronomical community and paved the way for a homemaker, an electrical engineer, a mathematician, and an electronics technician to follow in Secosky's footsteps (*S&T*: January 1990, page 30).

But HST's flawed primary mirror soon caused massive technical problems, affecting the scheduling of professional, as well as amateur, observations. By the time Hubble was repaired in 1993, the amateur program had lost momentum. Although the future looked bright for the space telescope with its corrected optics, winds of change had rattled STScI and, in turn, the foundation of the HST amateur program.

One major setback was Giacconi's departure from the institute in 1994 to direct the European Southern Observatory in Chile. Ray Villard, who spearheaded



Above: **New York high school science teacher James J. Secosky *(far left)* gazes intently at the computer screen as he and staff members of the Space Telescope Science Institute (STScI) in Baltimore, Maryland, review his observing run. In April 1992 Secosky made history as the first amateur astronomer to use HST. Photograph courtesy John Bedke, STScI. *Right:* Secosky breaks into a wide grin as the first image of Jupiter's moon Io is displayed on the monitor. *Sky & Telescope* photograph by Stephen James O'Meara.**

public relations for the amateur program, was transferred to another department, and Eric J. Chaisson, a key STScI technical-support scientist, left to join the faculty of Tufts University in Massachusetts. Meanwhile, the institute's new director, Robert Williams, was faced with impending budget cuts; these, he says, forced him to make some difficult decisions. He had to downsize his staff by 60 people — and that included astronomers, technicians, and programmers.

"We lost a lot of capability to help amateurs with their proposals," says Williams. "We tried cutting back the number of amateurs using HST, but still, the program required so much manpower that I had to terminate it. The problem was not the telescope time but the amateurs, and I say that sympathetically. They don't have the technical background necessary to write a professional proposal, or to analyze their results. They needed a lot of help from our staff."

To the amateur astronomers already immersed in the program, William's decision hit hard. "I feel bad about it," Secosky says. "A piece of my life has been chopped away." Secosky, who had the honor of using HST twice, was a public-relations machine for NASA. He, like all the successful candidates, appeared on local television and radio shows, wrote letters to newspapers in support of HST when it was hobbled by bad optics, spoke to community groups about the benefits of the space telescope, and stressed the upside of NASA.

Indeed, public outreach was arguably the program's greatest achievement. And that was one of Giacconi's principal reasons for bringing amateurs onboard. He said he wanted the HST amateur experience to become part of the popular-science culture, and it did. He expected the participants to become local heroes and role models for the youth and spread the gospel about HST, and they did.

Take for instance Nancy K. Cox, a nurse and an HST amateur from San Francisco, California. Cox fought for the prestige of NASA when a myopic HST became the "butt of all the jokes." She says, "I hope [the institute] realizes the benefit of having had amateurs available at such a critical time, because we knew how to communicate the problem without talking over people's heads."

Cox did sense the amateur program wouldn't last. The halls of STScI were reverberating with talk of budget cuts and mass layoffs. "We had to have been taking up a lot of staff time," she says, "and that seemed ominous." Secosky concurs: "I knew the program had to be expensive, and we *did* need a lot of hand-holding. I feel bad about the outcome, but I'm really grateful for the once-in-a-lifetime opportunity I had."

THE SILENT MAJORITY

As far-reaching as Giacconi wanted the HST amateur program to be, it fell short of expectations. When the call for proposals went out, the review committee didn't know how the amateur community would respond — would they be deluged with tens of thousands or just a handful? Out of the estimated 300,000 amateur astronomers in the U.S. at that time, only about 500 submitted nearly 200 proposals during the first cycle; the second cycle produced 30, while the last one saw only 6.

The decline was due partly to a lack of publicity, claims AAWG chairman Stephen J. Edberg, especially when STScI was experiencing changes in management. But one other problem was clear: "There are *not* a lot of amateurs who could have presented the level of documentation necessary to apply," Edberg admits. He says it would have taken several weeks to draft a proposal, to prove the observation's worth, and to demonstrate its feasibility. The proponent had to be thoroughly familiar with related research in professional journals, HST's instrumentation, and other technical data. "Furthermore," Edberg emphasizes, "the Working Group took its job seriously. The amateurs had to know what they were doing. The proposals had to be really innovative and be really good."

Edberg's estimate on the amount of time needed to prepare a proposal is conservative. HST amateur George R. Lewycky of Milltown, New Jersey, says his required seven *months* of research. "Being an amateur in a professional setting is quite difficult," he reveals. "I chose to do a project requiring spectroscopy. I had no idea what was in store for me. Using HST was a great opportunity, and I'd do it again. But I'd do imaging the second time around and not spectroscopy. Heck, I couldn't even pronounce 'spectroscopy' a few years ago. I wish I had known then what I do now."

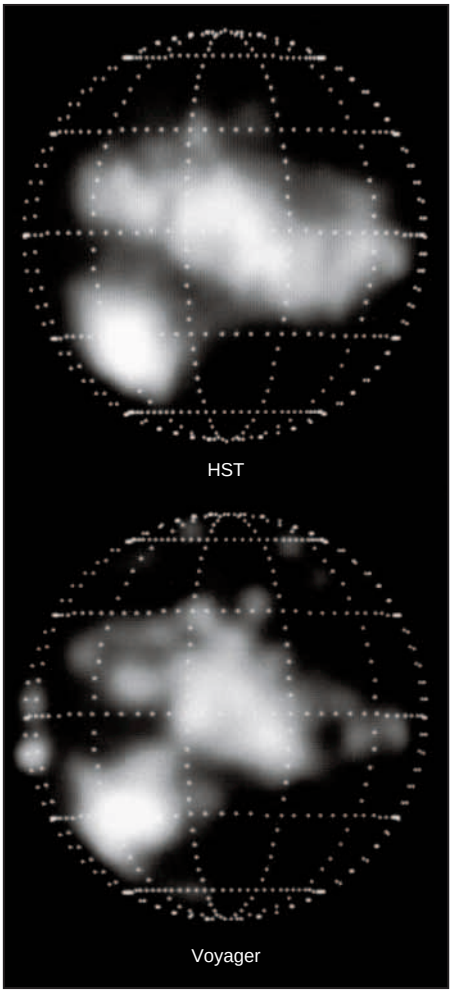
Most everyone in the program agrees that, as an activity, the program did not offer enough amateurs a realistic opportunity to use HST — a few people used the telescope, and a lot did not. Furthermore, few of the amateur observations went smoothly, and some had to deal with the worst. "The amateurs were expecting perfection, but the unexpected happened," Edberg confesses, alluding to the telescope's mirror defect. "Some am-

ateurs got distressed, and rightly so. It took time to try to find solutions to their problems, and not always with success."

For instance, because Hubble could not perform at its optimum level, HST amateur Ana M. Larson of Seattle, Washington, never got a chance to use the telescope; her program to search for extrasolar protoplanets required pushing HST to its optical limits, which was impossible given its astigmatic mirror.

"Just about every amateur had technical problems," Lewycky reveals, "and I can tell you we weren't ready for technical problems, and there were lots of them. These were the same problems professionals would have encountered, but we didn't have an army of graduate students to help solve them."

Lewycky is very grateful for the institute's technical support, but he believes some outside help in the proposal process could have saved some valuable time down the line. For example, his



Io as seen through HST's Wide Field/Planetary Camera *(top)* on April 20, 1992, and by Voyager 1 in 1979. The HST image is a composite of three ultraviolet (3577-angstrom) images, while the Voyager one was taken through a filter centered at 3500 angstroms. Courtesy James Secosky.

HST Amateur Observations

AMATEUR CYCLE 1 (1992)

Proposal: Sulfur Dioxide Concentration and Brightening Following Eclipses of Io

Investigator: James J. Secosky, science teacher, Bloomfield, New York

Overview: Use HST's Wide Field/Planetary Camera (WF/PC) in Planetary Mode to image Jupiter's moon Io in April and May, to see if temporary accumulations of sulfur dioxide (SO_2) frost cause the previously observed brightening of the moon when it emerges from the planet's shadow.

Results: Secosky did not see any brightening after three attempts. He did, however, find some minor, post-Voyager changes on Io's surface. The results appeared in *Icarus,* Vol. 111, 1994, pages 73–78.

Proposal: Imaging the Arc in the Galaxy Cluster 2244-02

Investigator: Raymond E. Sterner II, mathematician, Woodbine, Maryland

Overview: Use the WF/PC to determine whether the mysterious luminescent arc around CL 2244-02 in Aquarius is a gravitational-lens mirage or massive stars that formed along the shock wave generated during the collision of two galaxies.

Results: Because of HST's flawed optics, the resulting images were fuzzy and could not be deconvolved. Thus, the results are inconclusive.

Proposal: Magnetic Field of a Peculiar Type-A Variable Star

Investigator: Peter J. Kandefer, electrical engineer, New Hartford, Connecticut

Overview: Use HST's Goddard High Resolution Spectrograph (GHRS) to record the activity of Epsilon Ursae Majoris for one cycle of variation. In particular, study the intensity changes in the spectral signatures of rare-Earth elements in the star's atmosphere and make inference as to its magnetic-field strength.

Results: Kandefer did detect changes in the spectra of the rare-Earth elements, confirming the existence of a weak magnetic field around Epsilon Ursae Majoris.

Proposal: Search for the Oort Comet Cloud UV Emission, Suitable Nova of Opportunity

Investigator: John Hewitt, electronics technician, Berkeley, California

Overview: Use the outburst of a bright galactic nova (in this case Nova Cygni 1992) as a "probe" to search for evidence of an Oort Cloud of comets surrounding the erupting star. This is done by taking high-resolution, near-ultraviolet images with the WF/PC in Planetary Mode, and trying to detect the cloud's hydroxyl (OH) emission following the passage of the nova's light pulse through the cloud's inner regions.

Results: Saturated image; results inconclusive.

Proposal: Detection of Collapsing Extrasolar Protoplanets

Investigator: Ana M. Larson, homemaker and student, Seattle, Washington

Overview: Use the WF/PC in the near-infrared to search the star-forming regions in Taurus and Auriga for massive protoplanets undergoing gravitational contraction.

Results: Spherical aberration in Hubble's primary mirror prevented Larson from using the telescope.

AMATEUR CYCLE 2 (1993)

Proposal: Transition Comets: UV Search for OH

Investigators: Harald Schenk, civil engineer, Sheboygan, Wisconsin, and James Secosky

Overview: Use HST's Faint Object Spectrograph (FOS) to search asteroids 182 Elsa, 224 Oceana, 899 Jokaste, 944 Hidalgo, and 2201 Oljato for OH emission indicating weak cometary activity.

Results: No sign of OH emission.

Proposal: Investigation of the Dynamics of Binary Asteroids

Investigator: Benjamin P. Weiss, college student, Amherst, Massachusetts

Coinvestigators: Winslow Burleson and Rukmini Sichitiu, college students

Overview: Use the WF/PC in Planetary Mode in attempting to resolve the companions of suspected binary asteroids 18 Melpomene, 216 Kleopatra, 532 Herculina, 146 Lucina, and 624 Hektor.

Results: Did not discover any obvious asteroid satellites at the expected distances, but a few of the asteroids remain suspect.

Proposal: Titan's Atmosphere and Evolution Through Disk-Resolved Spectroscopy

The HST Cycle 2 amateurs pose for posterity at the STScI in October 1992. *Front row (left to right):* James Secosky, Rukmini Sichitiu, George Lewycky, and Nancy Cox. *Middle row:* Lewis Thomas and STScI director Riccardo Giacconi. *Back row:* Benjamin Weiss, Winslow Burleson, Karl Hricko, Harald Schenk, and Joseph Mitterando. Photograph courtesy STScI.

Investigator: George R. Lewycky, computer programmer, Milltown, New Jersey

Overview: Use the GHRS to search Titan's atmosphere for formaldehyde (CH_2O) which, when combined with hydrogen cyanide (HCN), can produce simple, precursor organic molecules necessary for DNA formation. (HCN was already discovered by Voyager 1 in Titan in 1980.)

Results: Data analysis is 90 percent complete. Preliminary results look promising. A few mysterious or unexpected absorption lines in the spectrum are under investigation. Updates can be found on Lewycky's Web site at http://soho.ios.com/~lewycky/hubble.html.

Proposal: WFC Observations of NGC 4319-Markarian 205: High-Resolution Morphology of a Galaxy-Quasar Association Displaying an Anomalous Redshift

Investigator: Karl J. Hricko, high school teacher, Carteret, New Jersey

Coinvestigators: Lewis Thomas, college teacher, and Joseph Mitterando, high school student

Overview: Use the WF/PC in Wide Field Mode to study the nature of the "bridge" of material linking the galaxy NGC 4319 (about 80 million light-years distant) and the quasar Markarian 205 (nearly 1 billion light-years away) in Draco.

Results: HST's uncorrected optics resulted in fuzzy images. Data analysis is still ongoing, but preliminary results are inconclusive.

Proposal: The Ultraviolet Emission Spectrum of an HII Region

Investigator: Nancy K. Cox, nurse, San Francisco, California

Overview: Use FOS to obtain ultraviolet spectra of M8, the Lagoon Nebula, in Sagittarius. Also use the WF/PC in Planetary Mode to look for filamentary structure and young, hot stars forming in the Lagoon's Hourglass region.

Results: The UV spectra did not reveal anything new. (The chemical abundances fell in line with other H II nebulae in the area like those in M17, the Omega Nebula.) Until recently, Cox's optical images showed more filamentary detail than any previous image. She was hoping newborn stars would appear in the images, but none did.

AMATEUR CYCLE 4 (1994–96)*

Proposal: UV Spectroscopic Determination of the Deuterium-to-Hydrogen Ratio Along the Line of Sight Toward Epsilon Indi and Lambda Andromedae

Investigator: William R. Alexander, chemist, Huntington, West Virginia

Overview: Use the GHRS to try to measure the abundance of deuterium left over from the Big Bang in the local interstellar medium.

Results: HST's spectral images along the line of sight toward the two target stars clearly separate the primordial deuterium from hydrogen. The observed deuterium-to-hydrogen ratio is about 1.65×10^{-5}. Alexander also discovered walls of hot, compressed hydrogen gas around the two stars he surveyed. These "hydrogen walls" are regions where the stellar wind interacts with the interstellar medium. The results were presented at the January 1996 American Astronomical Society meeting in San Antonio, Texas, and were published in the *Astrophysical Journal*, Vol. 470, 1996, pages 1157–1171.

Proposal: Lyman-Alpha Spectra of Discordant Redshift Systems

Investigator: R. Dennis Tye, computer programmer, San Francisco, California

Overview: Use the FOS to examine the Lyman-alpha forest absorption lines in the spectra of the galaxy MCG 03-34-085 and its associated quasar PKS 1327-206 in Virgo.

Results: Due to time constraints on HST, Tye could make only one observation of the quasar and none of the galaxy. His preliminary results show about 28 absorption lines in the observed spectral range. After eliminating those associated with the galaxy, there were still six to seven lines which might arise from clouds of neutral hydrogen (H I) in an object between the galaxy and the quasar. His results support the 1986 ground-based studies of the galaxy by French researchers; they too attribute the excess absorption lines to an intermediate system. Thus, the quasar is probably a background object and not related to the galaxy itself.

AMATEUR CYCLE 6 (1997)*

Proposal: Morphology of the Active Nucleus and Radial Filaments of NGC 1808

Investigator: James P. Flood, chemist, Scotch Plains, New Jersey

Overview: Use HST's new Wide Field and Planetary Camera 2 (WFPC2) to examine the core of the Seyfert galaxy NGC 1808 in Columba and hopefully reveal the nature of the half-dozen energetic "hot spots" residing there. (These spots could be circumnuclear starbursts, massive supernova remnants, or black-hole accretion disks.) Also study the pronounced radial dust filaments streaming from the galaxy's core. These are associated with large, gaseous polar outflows, suggestive of galactic fountaining.

Results: Was supposed to use HST in July 1996, but was bumped because of the servicing mission last February. Now slated to observe in early August.

S. J. O.

*Cycles 3 and 5 were cut short due to the HST repair and servicing missions in 1993 and this year, respectively.

project required comparing the spectral data he got from Saturn's moon Titan with spectral data from the Sun. The problem was that he couldn't point HST to the Sun. But no one at STScI thought of taking spectral images of Saturn's moon Rhea and reading the signature of reflected sunlight. "I got that advice from outside astronomers," Lewycky laments. "But the advice came a little too late — the observation had already been completed." The program could have been better, he believes, if professional astronomers had been more involved in the preparation of the proposal rather than just in the data reduction.

HST amateur Raymond E. Sterner II of Woodbine, Maryland, looks at the dilemma this way: "Everyone at the institute was nice to us, and we loved working with them. But they were learning too. The problem was that most of the amateur projects were long shots, but that's what they wanted." Sterner's project called for imaging a mysterious luminous arc in a galaxy cluster. Unfortunately, because of light loss arising from Hubble's defective mirror, the images couldn't be deconvolved — but no one knew that at the time. So his final images remain fuzzy.

"In a sense, we were guinea pigs," John Hewitt, an HST amateur from Berkeley, California, exclaims. "Our observations took place before many of the bugs in the postobservation process had been fully realized or resolved." Hewitt says his emotions went from elation, once he learned he would use Hubble, to despair, after he used it. His project was a longshot: it required using HST's Wide Field/Planetary Camera to detect the ultraviolet hydroxyl (OH) emissions in an extrasolar Oort Cloud. But he had to wait not only for a bright nova to occur, but for its light pulse to collide with the hypothetical comet cloud.

Surprisingly, a bright nova did erupt in the constellation Cygnus in time for him to use HST, and Hewitt carried out his observations — but not when he wanted to. "Ideally, the planned observation should have occurred about a week after the nova's peak luminosity, but I didn't get telescope time until *two months* after the event! This meant the loss of an opportunity to image the suspected circumstellar cloud. The name of the game was for the nova to provide 'illumination' of the Oort Cloud's inner region. The farther the nova's light pulse, the lesser the irradiance. So each day I waited meant a very rapidly decreasing possibility of detecting the hypothetical cloud."

HST Cycle 4 amateur William R. Alexander of Huntington, West Virginia, at the STScI in October 1994 doing his data reduction and analysis. Like other successful candidates, he became an advocate and ambassador of goodwill for NASA and STScI, promoting the cause of the HST amateur program to the public, the media, and the professional community. Courtesy William Alexander.

Despite the problems, Hewitt believes using Hubble was the greatest experience of his life. "There will be another nova someday," he says, "and my dream would be to reapply for HST time. The greatest miracle is that the telescope has been repaired and making stunning observations. I'd like another chance to do my observation right. In fact, I wish more people would have an opportunity to take up the challenge of using Hubble, to be a part in a continuing series of original, innovative observations made by the amateur community."

BUT WAS THE PROGRAM REALISTIC?

"The amateurs came up with good ideas," says Edberg, "and that's what they were asked to do. But was it realistic to expect that amateurs could use a professional instrument without outside help? The answer is, No!"

Villard shares Edberg's view: "The amateurs who used HST certainly followed the spirit of the program, but did the program accomplish its goals? There weren't any real scientific breakthroughs. But I don't think anyone was expecting any. The amateurs fulfilled their part of the bargain by asking new questions in their proposals and for involving the public. We loved working with them, and that was the greatest part of the experience. It's just that something was fundamentally wrong with the existing program."

So, this August the HST amateur experiment will have run its course. And, as with any experiment, the time has come to assess the results. The question now is, how can Hubble be linked with the amateur community without giving observing time to amateurs? That problem is in the hands of the STScI's Education Group, where Villard now works. Villard and Williams have already discussed new ways for amateurs to become involved with HST. "The amateur community is important for astronomy," Williams stresses. "In fact, I still consider myself one. Yet, ironically, I'm the one who killed the program."

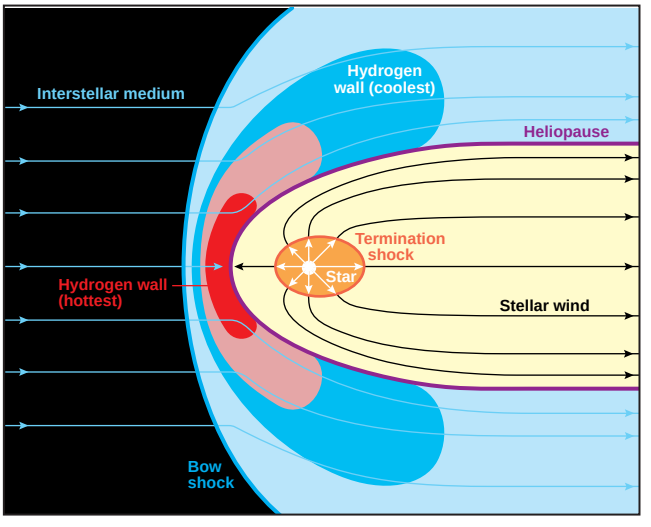
Williams says he wants amateurs to be part of Hubble's scientific activities, but he doesn't think giving telescope time is the answer. He would have a hard time justifying that, especially in the face of budget cuts. "Besides," he asks, "what's more important — having three or four people use the telescope, or sending those same persons into schools? I'd have to say the schools. The thing most beneficial to society is education. I would love to send amateurs into the classroom with materials from the institute and have them communicate the findings of HST. Having amateurs *use* HST, however, would be last on my list."

Williams would also like to make Hubble's archival data available for research. Such a program, he says, would reach a greater fraction of amateurs. His idea is to create some software, so that amateurs could start tackling the wealth of data in the archives. "Professional astronomers are going ga-ga over it," he says. "Why not the amateurs? And the data is free. Amateurs can get this stuff over the Internet." (Interested amateurs, teachers, and students can visit the HST Web sites at http://icarus.stsci.edu/~mutchler/HSTamateur.html and http://quest.arc.nasa.gov/livefrom/hst.html.)

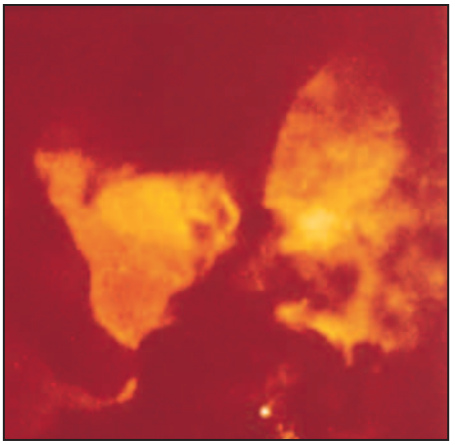
While the idea of a new amateur program is being considered at STScI, the HST amateurs are continuing to analyze their own data. And some important discoveries have already appeared on the horizon. For example, William R. Alexander, who was the first amateur to use HST after its optics were corrected, also became the first person to separate the absorption lines of deuterium from those of hydrogen along the line of sight toward the stars Epsilon Indi and Lambda Andromedae. "Not even the Copernicus or International Ultraviolet Explorer satellites have done that," Alexander exclaims. He gave a poster talk on his results at the January 1996 American Astronomical Society meeting in San Antonio, Texas.

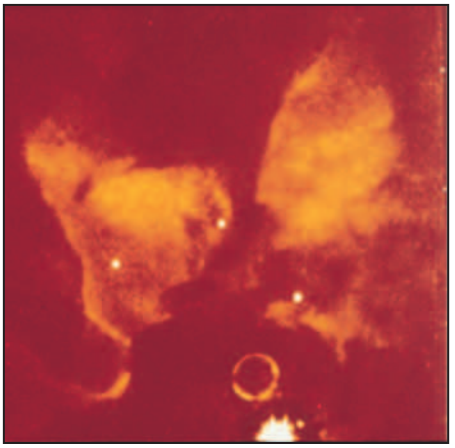
According to cosmological models the amount of deuterium observable at present was left over from the time of the Big Bang. The ratio of this primordial deuterium to hydrogen can be used to determine whether the universe is "open" or "closed." That ratio, as measured toward the two stars Alexander targeted, is about 1.65×10^{-5}, which, according to current Big Bang models, suggests that the universe is open and could expand forever. However, he admits that more research is needed to prove this theory.

Alexander also found some interest-



William Alexander used the HST to measure the abundance of deuterium left over from the Big Bang. But his results also led to the serendipitous discovery of gigantic "hydrogen walls" around the stars Epsilon Indi and Lambda Andromedae. A similar wall around our Sun had been found earlier by other professional HST researchers. Diagram courtesy Brian E. Wood and Jeffrey L. Linsky (University of Colorado) and Alexander.





These HST views of the Hourglass region of M8, the Lagoon Nebula, in hydrogen-alpha light *(top)* and sulfur (S II) were obtained by Nancy K. Cox. Compare them with the image on page 57 of the May issue.

ing features in his spectra, suggesting the existence of cup-shaped walls of hot, compressed hydrogen gas around the stars he studied. These "hydrogen walls," mark the boundary where the stellar wind interacts with the interstellar medium. (A similar wall around our Sun had been detected earlier by other professional HST researchers.) "Until this observation," Alexander says, "no one has been able to detect solar-wind-like outflows beyond our solar system."

The success of Alexander's program is testimony to the amateur vision. Certainly the amateur program as a whole would have been more successful had Hubble's optics been perfect from the start. Of the 13 amateur programs selected, only three will have utilized HST with corrected optics. How could the vast majority of HST amateurs be expected to make scientific breakthroughs when the telescope they hoped would lead them to discovery couldn't perform as promised? Unfortunately, right now, it appears there's little hope for many of these pioneers to get another chance to prove themselves.

Then again, consider the plight of Larson. Last September she earned her Ph.D. in astronomy from the University of Victoria in British Columbia, Canada. Her original HST research project called for the search for protoplanetary systems around young stars. "I actually did end up hunting for planets after all," she exclaims. "And I'm still looking for planets, like I dreamed in my HST proposal, but I'm doing it in a different fashion."

Larson became a member of the Canadian planet-search team that used data from the Canada-France-Hawaii Telescope atop Mauna Kea, Hawaii, in trying to detect planets around solar-type stars. Her current research at British Columbia's Dominion Astrophysical Observatory in Victoria is hunting for planets around red-giant stars.

"The fact that I didn't get a chance to use HST didn't lessen the experience," Larson explains. "Talking to people at STScI was a real encouragement for me

Although Ana M. Larson didn't get a chance to use the HST, this homemaker from Seattle, Washington, obtained her Ph.D. in astronomy from the University of Victoria, British Columbia, last fall. *Sky & Telescope* photograph by the author.

— a mother of two kids — to enter graduate school. To think that you can come out of nowhere, get an opportunity to use HST, get guidance from professional astronomers, and then share your experience with the world — well that just really bolstered my confidence level. Imagine, the homemaker from Seattle finally made good!"

STEPHEN JAMES O'MEARA

Contributing editor O'Meara has covered the HST amateur program since it was first announced to the public in August 1986.

Amateur astronomer Barbara Wilson is an observing powerhouse. She enjoys hunting down deep-sky objects to the limits of her 20-inch f/5 Dobsonian. Photograph taken by Barbara's husband, Buster Wilson, from their suburban home in Houston, Texas.

STAR TRAILS

From Sixth Magnitude to Seventh Heaven

By David H. Levy

ONE of the top deep-sky observers of our time, Barbara Wilson was introduced to astronomy one evening in 1956 while taking down laundry from the clothesline at her family home in Green Bay, Wisconsin. "What is that bright orange thing in the east?" 9-year-old Barbara asked her father innocently. That "thing," her father explained, was the planet Mars at one of its best oppositions of the century.

Born to a military family, Barbara spent her youth moving all over the world, from Italy, Austria, and finally to Texas. Reading about the lives of great scientists like comet finder Maria Mitchell and physicist Marie Curie, Barbara felt inspired to study science. So she began a systematic study of the constellations, an endeavor later enhanced by her marriage to Buster Wilson in 1976.

In 1982 Buster brought home a vintage Criterion RV-6 Dynascope, a 6-inch f/8 reflector that was popular during the 1960s and 1970s. Since then life at the Wilson household in Houston has become focused on the stars. "I'd wake up at 4 in the morning and Buster would be outdoors with his RV-6!" says Barbara. By 1984 they were observing together, watching events like eclipses and conjunctions in the wee hours of the night.

The following year Buster bought his wife a 13-inch Coulter Odyssey Dobsonian. Barbara was shocked at the big, lanky heap of cardboard tubing and plywood box. "You're not going to bring that ugly thing inside the house," she insisted. "I want something with shiny knobs and gears and stuff coming off it."

Buster persuaded her to give the new scope a try. He set it up just inside the doorway of the front porch, where Barbara could see the clear skies beckoning. Peering skeptically through the eyepiece, she caught sight of an artificial satellite that happened to be moving slowly in the middle of the field. Mesmerized, Barbara nudged the telescope to follow the point of light as it passed from one field to the next. The journey ended abruptly when the telescope tube hit the carpet. That session changed everything. In an instant, Barbara recalls, "I was in love with that 13-inch!"

During the 1986 Texas Star Party she decided to give up her leisurely trek through the constellations to embark on an ambitious project of trying to observe the faintest deep-sky objects visible in amateur instruments. "From sixth magnitude to seventh heaven," is how

Barbara describes her shift from learning the constellations to collecting the bounty of the deep sky.

Barbara threw her energy into that effort with a single-minded intensity that went beyond books and star atlases. She watched her more-experienced colleagues in action at star parties. "I would watch how they observed, the way they used their scopes, and I'd ask lots of questions." For three years she logged observations of progressively fainter objects, including globulars and galaxies that offered her only fleeting glimpses at the limits of her telescope. Soon the 13-inch wasn't big enough.

One evening at the Texas Star Party in 1987 she happened to gaze at NGC 4631, a beautiful edge-on spiral a full quarter degree across, through a 20-inch Dobsonian. Laced with a series of bright knots, this galaxy in Canes Venatici was an amazing sight in such a large aperture. "This galaxy stretched from one edge of the field to the other; it was as big as life!" she exclaimed. "That's it. I gotta have a telescope like this."

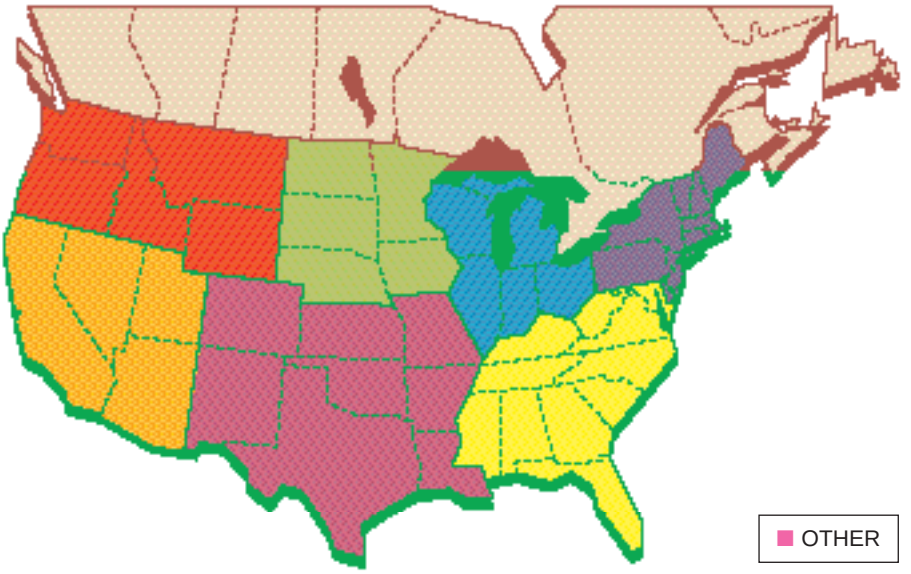
The following year Barbara arrived at TSP with a new 20-inch f/5 Dobsonian. Its primary mirror was handcrafted by the then-fledgling Galaxy Optics. With the 20-inch, Barbara extended her list of must-see objects to include the faintest globular clusters, including the seemingly impossible Palomar globulars (*S&T:* October 1991, page 423, and October 1994, page 97).

In 1986 some ten thousand people clogged the approaches to the Brazos Bend State Park where telescopes were set up to observe Halley's Comet. Although many were turned back, the sheer interest in the sky shown by Houstoners led to the construction of a permanent public observatory at the site. Involved in fundraising and other activities from the start, Barbara helped turn the project into reality with the opening of George Observatory in 1989. Her dedication eventually paid off. Burned out from being a real estate broker, in 1993 she happily accepted a teaching job at the observatory.

When Barbara sees a faint galaxy appear and disappear at the limits of her vision, she is living her dream. "Each session I try to push back the edge of the deep sky a little more. It's a thrill to imagine that these things, so distant and so faint that they offer me just a few photons, have now been seen by human eyes. Whatever lurks out there, there is some warmth to them."

An avid deep-sky enthusiast himself, author David Levy likes to observe at the limits of his 16-inch telescope from his home in Arizona.

Calendar of Events



■ **June 8–13** (New Mexico). The first annual Observational Astronomy Retreat will take place at the Lama Foundation near Taos (elevation 8,600 feet). Bring your own telescopes or use the site's 20-inch Dobsonian and 7-inch refractor. Camping facilities only. Cost is $250 per person. For details contact the Lama Foundation at 505-586-1202 or -1269; e-mail: 76375.2726@compuserve.com.

■ **June 10–14** (Florida). The Southeastern Planetarium Association's annual conference, hosted by the Space and Science Theatre of Pensacola Junior College, will be held at the Hampton Inn in Pensacola Beach. For more information contact Clint Hatchett, Science and Space Theatre, 1000 College Blvd., Pensacola, FL 32504, or call 904-484-2516; e-mail: chatchett@pjc.cc.fl.us.

■ **June 13–14** (Ohio). The Dayton Museum of Natural History in Dayton will be the site of the 27th annual Apollo Rendezvous convention. Call Terry Mann at 937-678-5032, or send e-mail to starsrus@infinet.com; WWW: http://www.mvas.org/.

■ **July 4–6** (Canada). The Royal Astronomical Society of Canada's Regina and Saskatoon Centres will host the Saskatchewan Summer Star Party at Cypress Hills Provincial Park (elevation 1,200 meters). Contact Erich Keser, RASC Saskatoon Centre, P.O. Box 317, RPO University, Saskatoon, SK S7N 4J8, Canada, or call 306-374-4262; e-mail: keser@duke.usask.ca.

■ **July 14–15** (West Virginia). The Society of Amateur Radio Astronomers (SARA) will hold its annual conference at the U.S. National Radio Astronomy Observatory in Green Bank. For details call Hal Braschwitz at 212-252-8177, or write to Vince Caracci, 247 N. Linden St., Massapequa, NY 11758; phone: 516-798-8459; e-mail: vinhell@juno.com.

■ **July 25–26** (Canada). The 15th annual telescope-making contest of the Montreal Planetarium and the Société d'Astronomie de Montreal will be held at the Parc des Iles de St-Timothée in Québec. For details contact Yvan Prégent at 514-377-2493; e-mail: ypregent@rocler.qc.ca; or Patrice Gérin-Rose at 514-257-9613; e-mail: pgr@cam.org.

■ **July 25–August 3** (Massachusetts). All are invited to the sixth annual Summer Star Party & Family Camping Vacation at Shady Pines Campground in Savoy. Contact the Rockland Astronomy Club, c/o Don Urban, 73 Haring St., Closter, NJ 07624; e-mail: durban1@aol.com.

■ **July 28–August 18** (Germany). The 33rd International Astronomical Youth Camp, open to anyone between age 16 and 24, will be held at the Jugendgastehause Mortelgrund hostel near Sayda, 50 kilometers from Dresden. The cost for the entire program is DM790 (approximately $520). Contact Gwendolyn Meeus, Parkstraat 91, B-3000 Leuven, Belgium; e-mail: gwendolyn@ster.kuleuven.ac.be.

An expanded version of this listing, including active links to e-mail addresses, is available on our World Wide Web home page. Point your browser to SKY Online at http://www.skypub.com/calendar/calendar.html.