



# Newsletter

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## The PLANET Project: study of unseen lenses, stars and extra-solar planets through microlensing

Kailash C. Sahu, STScI [ksahu@stsci.edu](mailto:ksahu@stsci.edu)

The idea of microlensing is not new. More than half a century ago, Einstein wrote a small paper in *Science* where he did ‘a little calculation’ at the request of R.W. Mandel, and showed that if a star happens to pass very close to another star in the line of sight, then the background star will be lensed. However, he also dismissed the idea as only a theoretical exercise and remarked that there was ‘no hope of observing such a phenomenon directly’ since the probability of observing is less than one in a million.

Times have changed. The technologies have been put to use to beat the enormous odds. The herculean experiments designed in late 80s to look for microlensing events — by monitoring millions of stars towards the Magellanic Clouds and the Galactic Bulge — have borne fruit. After the first detection of a microlensing event in 1993, microlensing events have been detected at a prodigious rate by the microlensing survey programs MACHO, OGLE, EROS, and DUO, and there has been a steady and increasing interest in the study of microlensing phenomena. By now, more than 200 microlensing events have been detected towards the Galactic Bulge, and more than a dozen microlensing events have been detected towards the Magellanic Clouds.

The microlensing survey programs have an ‘Alert’ capability that has opened the possibility of carrying out independent follow-up study of the microlensing events while the events are in progress. Now, at any given time during the months when the Galactic Bulge is up in the sky, there are typically 10 or more microlensing events in progress, so it is possible to even plan and dedicate some telescope time to carry out such follow up studies of the microlensing events.

### *Science with microlensing monitoring programs*

Traditionally, microlensing events are thought to be symmetric, non-repeatable and achromatic — which is true only for point source, point lens cases. While most microlensing light curves can indeed be approximated in that way, the departure from such an approximation can provide very useful information on the source and lens characteristics. The number of additional and interesting science programs that can be done by studying such finer structures in the light curve is large. For example, frequent monitoring of a caustic crossing caused by a binary lens can potentially provide information on the location of the lens. Monitoring of high-amplification events where the lens passes across the face of the source can be used as an effective high-angular-

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## Cycle 8

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## DIRECTOR'S PERSPECTIVE

Steven Beckwith

**Y**ou can buy a Sony Walkman for \$35. It cost more than \$100 fifteen years ago, when the dollar's worth was 50% greater. The cost of computers has come down drastically at the same time that computing power has increased exponentially. Long-distance telephone calls are much cheaper; so too are mobile phones. Many commodities have come down in price, with oil being the most remarkable. Gasoline costs less now in constant dollars than at any time since the 1920s. Across the wide spectrum of manufactured goods, services, and commodities, you pay less to get better quality today than you did only a decade ago. The business sector has enormously increased its productivity.

Telescopes are cheaper to build too, and the new ones are much better than those we built even 15 years ago. They have faster focal ratios, so they are shorter and lighter. We understand the importance of thermal control to reduce dome seeing. Computers allow us to use alt-az drives, reducing the cost of mountings, while simultaneously increasing their strength. Computer-controlled mirror support systems let us use segmented (Keck) or thin-meniscus (VLT, Gemini) primary mirrors; in principle, these systems are scalable to apertures of enormous size: MAXAT (50m) and OWL (100m). We expect to build the NGST for a phase C/D cost of \$500 million; a large part of the savings is that NGST will weigh 3700 kg, whereas *HST* weighs 11,000 kg, and cost tends to scale with weight for spacecraft. We have constructed more sophisticated instrumentation and automated systems to point, track, and record data without requiring heroics from the observers.

The big telescopes have become *more* expensive to operate. Keck has an on-site staff of more than 60 people. A similar number of people work on instrumentation for the telescope. The VLT will need to maintain four telescopes and will require an even larger staff. The Space Telescope Science Institute has a staff of 470 people, almost all of whom work full time to maintain the data flow from the Hubble Space Telescope. There are yet more people employed by Goddard Space Flight Center and in industry to service the telescope. Only 20% of the *HST* budget goes to STScI operations (~40 M\$/year). Grants and fellowships are another ~28 M\$/year. The rest, of order 180 M\$/year, is for new instrumentation, servicing, and flight operations. Gone are the days when a professor with a couple of ambitious graduate students and a technician could build state-of-the-art equipment to explore the heavens, at least not for the biggest telescopes.

There are gains, of course. The information content of a single observation is generally much higher than it used to be, in some cases by orders of magnitude, so the cost per bit of data has not risen as dramatically as operating expenses. Large CCD detectors deliver enormous amounts of high-quality data, although we should temper our enthusiasm by noting that photographic plates in the 1920s provided more raw bits of information than today's CCDs. The principle gain is high quantum efficiency needed for the faintest objects, that are naturally the most interesting. Similarly, *HST* delivers images with such superb resolution that it has changed the nature of what we expect. Quite a bit of modern astronomy now *requires* this resolution and its correspondingly high price. *HST* set the bar higher both in quality and cost of data.

I think it is a good time to examine these costs and see if we can reduce them without sacrificing those services necessary to do great science. We provide many services at STScI, some of which we can almost certainly do more cost effectively than anyone else; calibrating the standard instrument modes, for example, and archiving the data. Others may be less expensive and just as effective if done by the users. Novel uses of the telescope or observations with rarely-used configurations may be more successful if the expertise is vested in the community. Soon there will be redundant capability on *HST* whose incremental support cost will be high, but whose incremental scientific value is, at the very least, debatable.

Productivity gains in industry normally come at the cost of up-front capital investment for new equipment and training. When spread across millions of units, robotic welding equipment to manufacture automobiles or satellites to handle phone calls will greatly reduce costs in the long run, even if they are more expensive to implement at first. We can achieve similar productivity

*continued page 3**Editorial*

*Because of STScI's role in the Next Generation Space Telescope, this and future issues of the Newsletter are being sent to infrared astronomers as well as to the HST community. We hope you find the Newsletter useful and encourage your responses on its content (see the back page). You may, of course, ask to not receive this publication if you wish.*

## The *HST* Proposal Selection Process

Mike Shara, STScI [shara@stsci.edu](mailto:shara@stsci.edu)

Next month I'll step down as Head of the STScI Science Programs Selection Office (SPSO) after overseeing proposal Cycles 5, 6, and 8. The Panels and TACs I've had the privilege of working with have allocated about 10,000 *HST* orbits, equivalent to roughly a billion dollars (when you amortize the *HST* mission cost over 20 years). Their hard work, and that of the SPSO staff, is directed at selecting the very best proposals received each year.

The oversubscription rate is typically four- or five to one, with 1000+ proposals each year, so it's inevitable that some very good proposals are declined each cycle. I'd like to share with you some details of how the process works, what the Panels and TAC look for in supporting the truly outstanding proposals, and

some ideas that you might find useful when you write your next *HST* proposal.

### *How the Proposal Selection Process Works*

The proposal selection process has not changed drastically in recent years, though details have been different in different cycles. As an illustration I'll describe here the process as it was just applied to Cycle 8 proposals.

First, we asked STScI staff scientists to help by acting as Panel Support Scientists (PSSs). One senior and one junior STScI staffer were assigned to each panel. The PSSs acted solely to provide knowledgeable help for the work of the individual TAC panels, and were not voting members. Immediately after the proposal deadline the senior PSS read each

proposal for his or her panel and sent those with potential technical problems to an Instrument Scientist for a technical review. A "swap meet" was held by SPSO and the PSSs to make sure proposals ended up in the most appropriate panel. We worked hard to ensure that all proposals in a given area ended up in the same panel and that the assigned panel had the appropriate expertise to judge those proposals.

Proposals were assigned to Panelist reviewers on the basis of the proposal title and keywords, and the panelists' fields of expertise. Stringent conflict-of-interest rules were in place to prevent PIs, co-Is, same-institution colleagues, former supervisors and direct competitors from judging each other's proposals. We asked TAC

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### Cheap Ops *from page 2*

gains by investing in software to handle routine tasks now being done by people, and we do it all the time. The STScI staff has decreased by 14% since 1993, when it peaked. Our data rate has more than doubled, and a smaller staff provides more services for more complex instruments than in the past. We are implementing new software to automate the grant awards, handle our accounting systems, and translate scheduling information for the telescope from people-oriented language to machine code. All of these investments cost money, principally by using STScI software engineers to write and debug new code. It makes sense for some areas, but would be wasteful for others, where the number of "units," observation blocks, special instrument modes, or user inquiries is small. Our support of NGST will make possible more of these productivity gains by spreading the infrastructure costs over two projects.

NASA sets our budget assuming no change in the level of support for science instruments, and no change in the number of services we provide. The agency wants to do everything it can to insure the continued great flow of data from *HST*. But we will do ourselves a service by becoming more efficient before we face budget cutbacks: They are inevitable. And we are looking forward to the era of the NGST with the important assumption that we can operate it for about 30% of the cost of operating Hubble. We are working now to meet this goal; it will depend on some discipline in mission design, but it should be doable. In the meantime, it is useful to ask if we can reduce the costs of running *HST*. If we can make gains in our *HST* productivity, it bodes well for the future of space astronomy.

This effort will start at STScI and involve the users through community dialogue. The users committee, STUC, should play a major role in helping make the tradeoffs between essential and non-essential services. Some of the changes will be transparent to the user, resulting from internal improvements in the way we carry out tasks. Some will involve changes in the way the users work and what they expect from STScI. I do not see much waste in our current system. We scientists should demonstrate that we can increase productivity just as industry does. It may get the attention of our supporters if we who use astronomical facilities for research can increase our overall output without more input. Food for thought.

Steven Beckwith  
Baltimore, December 22, 1998

## Mike Shara to Leave STScI

As the accompanying article on proposal selection notes, Mike Shara will soon leave STScI to go to the American Museum of Natural History. The profiles of Institute scientists that have appeared in the *Newsletter* have mostly been of people recently promoted to tenure, which has meant I have missed more senior staff members. Mike has been at the Space Telescope Science Institute since its earliest days, and I wanted to make sure readers knew a little about him.

Mike is one of the Institute's many Canadians (you can still hear it a little in words like "about"). Despite the long and cold winters of Montreal, where he was born and raised, he took early to observing the heavens with



*Mike Shara*

a small refractor. He knew he wanted to be an astronomer when he was eight years old, and pursued that goal. His parents (an accountant and bookkeeper) encouraged his interest in science, as did an uncle who was involved with pharmaceutical research for a time. Some old books of a cousin, including some 1940s astronomy textbooks, also helped fuel his interest. He got his BSc in physics from the University of Toronto in 1971, then spent an additional year there to finish a Masters degree with Maurice Clement.

A desire to explore his Jewish background and a sense of adventure led Mike to go to graduate school at Tel Aviv University. He and his wife arrived in Israel just before the Yom Kippur war began, but stayed on to finish his degree in 1977. He worked with Giora Shaviv on hydrodynamic simulations of stellar collisions involving white dwarfs. Offshoots from this have been prominent in most of his subsequent research. For instance, the simulations showed that such collisions — which are likely to occur in globular cluster cores — lead to the white dwarf being coated with hydrogen after the collision event. This leads to a nova-like phenomenon after the main sequence star (the target of the collision) get destroyed.

Mike returned to Montreal after his PhD to take up a National Research Council (of Canada) post-doctoral fellowship at the University of Montreal. This led to collaborations with Rene Racine and Tony Moffat that also were critical in his career. Despite his youthful observational interest, Mike's professional background was entirely in theory, but Rene (re)introduced Mike to observational astronomy. Tony got Mike involved with Wolf-Rayet stars.

Mike spent 1980 to 1982 as a Visiting Assistant Professor at Arizona State University, then he came to STScI in 1982. His younger brother is also a scientist (a chemical engineer), and his wife, Honey, runs a small business supplying medical equipment. When he can, Mike gets away for scuba diving, and is well known here for his competitive squash racquet.

The Institute will miss Mike, but the move to New York works well for him. The position at AMNH offers more time for research, his wife markets equipment via the web, and their two children are in New York. We wish them all well.

— *The Editor*

## Proposal Selection Process

*from page 3*

panelists to provide preliminary grades and comments before the panels met.

Panelists came to STScI for intense two-day meetings. The panels reviewed and graded proposals on the first day, with a more reflective overview the second day. This overview was aimed at achieving scientific balance and breadth, consistent with panel orbit allocations. Snap and AR proposals were judged after GO orbits were assigned.

Each panel was allocated a number of *HST* orbits that was based mostly on proposal pressure. The total number of orbits assigned by the panels was about two-thirds of the available spacecraft orbits, with TAC assigning the rest. A significant pool of "matching incentive" orbits for larger proposals was made available to the panels this year for the first time.

This helped panels with modest initial orbit allocations award time to one or more larger proposals. Further details on this will be available in the Cycle 9 Call for Proposals.

The final product of each panel was a rank-ordered list of proposals. After each panel exhausted its available orbits it assembled a list of the best remaining proposals which were forwarded to the TAC for consideration. The TAC was charged with addressing the overall scientific quality and interdisciplinary balance of the Cycle 8 program. This was done by having the 20 TAC members consider and vote on the Large proposals, the scientifically risky proposals, and the best proposals not assigned time by the panels.

The 16 Panel chairs and 4 TAC members-at-large were asked to be advocates for the entire field of astronomy. In their initial presentations, each panel chair's goal was to educate the TAC on the key scientific themes in the sub-field, on the special role of *HST*, and on the overall quality level of proposals in the panel. For that reason, panel chairs limited their sub-area advocacy to their initial presenta-

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## Proposal Selection Process *from page 4*

tions. Chairs were asked to respond honestly to questions about strengths and weaknesses of proposals.

The TAC then proceeded to "rounds" for proposals in various categories. A special round for the largest proposals was held, which carefully considered the recommendation from panels about these Large proposals. Rounds for all remaining competing proposals (including the "risky" class) followed. In these rounds, each panel chair presented one proposal, and the TAC then voted. Typically 4 to 6 proposals were accepted per round. At appropriate moments, TAC discussed and compared the general quality of the remaining proposals, and then proceeded to further rounds until all available time was allocated. Both TAC and the panelists have supplied STScI with detailed critiques of our procedures so that we can further improve our selection process in future cycles.

### *Observations and Suggestions*

At least half of all proposals that are rejected have violated one or more of the following simple rules:

First, the best proposals can be understood in their entirety by a first-year graduate student. In other words, a clear and succinct statement of the broad science background is essential. Convincing the Panel that the proposed observations will significantly advance our understanding of a class of objects or physical process is no less crucial. Narrowly-focused proposals or those proposing only modest increments of knowledge rarely succeed.

Second, tell the panel why *HST* is essential to the success of your proposal. If it can be done from the ground, even with difficulty, your proposal will not receive time.

Third, signal-to-noise calculations must be thoroughly documented. Vague descriptions force STScI technical personnel to do Exposure Time Calculations in support of panels, and they may have to guess at proposers' intentions. Significant doubt

about the technical feasibility of a proposal is usually fatal to that proposal; the onus is on the proposer!

Fourth, panels look very hard at what you've done with your past allocations of *HST* time. Requesting more time when you haven't published observations from two or more cycles ago regularly leads to rebukes and proposal downgrading by panels. Timely publication in refereed journals is regarded by panels as a strong plus.

Fifth, proposers who request exactly the number of orbits that they really need, regardless of the "Small," "Medium," or "Large" orbit boundaries, tend to do best. Panels and TAC have an uncanny sense of orbit inflation and punish it. They also recognize a truly great, exciting proposal right away and support it with little regard for orbit cost.

Finally, edit your proposals carefully and have a colleague read them for clarity. Missing references, mislabelled figures, garbled sentences and proposals exceeding the page limit rapidly sour panelists trying to absorb up to 100 competing proposals.

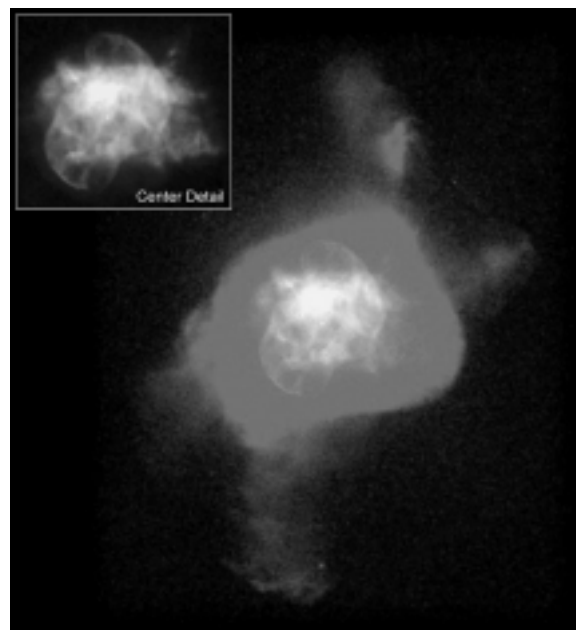
### *Final Thoughts*

If your proposal was turned down, should you reapply? Panelists rarely serve more than once every three or four years. Because successive panels are composed of completely different members, it's probably worth resubmitting a proposal which ranked in the top half but failed to get time (but heed the referees' advice first!). On the other hand, proposals in the bottom half usually had flaws serious enough that the proposer will have to strengthen them significantly to have any realistic chance of success in the next round.

Finally, consider submitting your proposal a few days ahead of the deadline. Please. The internet didn't melt down on September 11, as your proposals came flooding in, despite the fact that Ken Starr's report was competing for bandwidth. But did you really need the adrenaline rush of watching your proposal vanish into the

ether with less than 100% probability of receipt before the deadline?

On a personal note, it's been a genuine privilege and pleasure to do this job. The technical and scientific support I've consistently received from the SPSO staff, PRESTO division office and STScI colleagues has been outstanding. The encouragement and moral support from the Director's Office has been equally invaluable. I'll be moving permanently to the American Museum of Natural History and Hayden Planetarium in Manhattan next summer, leaving SPSO in Meg Urry's experienced hands. Cycle 9 will bring on the Advanced Camera, a resurrected NICMOS and, I'm certain, well over 1000 strong proposals for an extraordinary telescope.



### *HST Recent Release: Turtle In Space*

NASA's Hubble Space Telescope has shown us that the shrouds of gas surrounding planetary nebulae come in a variety of strange shapes, from an "hourglass" to a "butterfly" to a "stingray." With this image of NGC 6210, the Hubble telescope has added another bizarre form to the rogues' gallery of planetary nebulae: a turtle swallowing a seashell.

Credits: Robert Rubin and Christopher Ortiz (NASA Ames Research Center), Patrick Harrington and Nancy Jo Lame (University of Maryland), Reginald Dufour (Rice University), and NASA

<http://oposite.stsci.edu/pubinfo/pr/1998/36/index.html>





Panels

**TAC Chair**

*Steve Strom, University Of Massachusetts*

**TAC At-Large Members**

*Joe Burns, Cornell University*

*Ray Carlberg, University Of Toronto*

*Francoise Combes, Observatoire De Paris-Meudon*

*Dave Meyer, Northwestern University*

*Jim Pringle, University Of Cambridge Institute Of Astronomy*

**AGN Hosts And Environment**

*Patrick J. McCarthy, Carnegie Observatories  
(Panel Chair)*

*Joanne Baker, U. Of California Berkeley*

*Kenneth C. Chambers, U. Of Hawaii, Institute For Astronomy*

*David De Young, KPNO/NOAO*

*Richard W. Pogge, Ohio State University*

*Susan M. Simkin, Michigan State University*

*S. Adam, University Of California*

*Catherine Boisson, (ESA), Observatoire De Paris-Meudon*

**AGN Physics**

*P. D. Barthel, Kapteyn Astronomical Institute  
(Panel Chair)*

*Gerald N. Cecil, KPNO/NOAO*

*Martin C. Gaskell, University Of Nebraska*

*Hagai Netzer, Tel Aviv University*

*Christopher Reynolds, University Of Colorado, JILA*

*Paul S. Smith, KPNO/NOAO*

*Thomas Boller, (ESA), MPI Für Extraterrestrische Physik*

**Binary Stars**

*Edward M. Sion, Villanova University  
(Panel Chair)*

*Douglas R. Gies, Georgia State University*

*Carole Haswell, University Of Sussex*

*Coel Hellier, Keele University*

*David W. Latham, Center For Astrophysics*

*Ronald Webbink, University Of Illinois*

*Hilmar W. Duerbeck, (ESA), Westfälische Wilhelms-Universität*

**Cool Stars**

*Douglas K. Duncan, University Of Chicago  
(Panel Chair)*

*George F. Benedict, U. Of Texas-Austin, McDonald Observatory*

*Nancy S. Brickhouse, Center For Astrophysics*

*Alexander Brown, University Of Colorado CASA*

*Geoffrey C. Clayton, Louisiana State University*

*Constantine P. Deliyannis, Indiana University*

*Iain Neil Reid, Caltech*

*Raffaele Gratton, (ESA), Osservatorio Astronomico Di Padova*

**Clusters, Lensing, and Cosmology**

*Wendy L. Freedman, Carnegie Observatories  
(Panel Chair)*

*Warrick Couch, University Of New South Wales*

*Philippe Fischer, University Of Michigan*

*Lori M. Lubin, Caltech*

*Hans Boehringer, (ESA), MPI Für Extraterrestrische Physik*

*Edward A. Ajhar, KPNO/NOAO*

*Ronald O. Marzke, Carnegie Observatories*

*Brian P. Schmidt, Mount Stromlo & Siding Spring Obs.*

*The Australian National University*

*David N. Spergel, Princeton University*

*Yannick Mellier, (ESA), Observatoire Midi Pyrenees*

**Distant Galaxies**

*David C. Koo, University Of California, Lick Observatory  
(Panel Chair)*

*Stephane Courteau, Dominion Astrophysical Observatory*

*Erica Ellingson, University Of Colorado, CASA*

*Michael A. Pahre, Center For Astrophysics*

*David Schade, Dominion Astrophysical Observatory*

*Jeffrey A. Willick, Stanford University*

*Emanuele Giallongo, (ESA), Osservatorio Astronomico Di Roma*

**Field Stellar Populations**

*Donna Weistrop, University Of Nevada, Las Vegas  
(Panel Chair)*

*Timothy C. Beers, Michigan State University*

*Eva Grebel, University Of California Lick Observatory*

*Kem Cook, Lawrence Livermore National Lab., U. Of California*

*Andrew C. Layden, Bowling Green State University*

*Michael Rich, Columbia University*

*Bengt Edvardsson, (ESA), Uppsala Astronomical Observatory*

## Panels

**Galaxy Populations And Interactions**

Robert W. O'Connell, University Of Virginia  
(Panel Chair)

Darren L. Depoy, Ohio State University  
Michael Gregg, Lawrence Livermore National Lab.  
Carl J. Grillmair, SIRTf Science Center  
Inger Jorgensen, Gemini 8-M Telescopes Project  
Chris Mihos, Case Western Reserve Univ.  
Curtis Struck, Iowa State University  
Brigitte Rocca-Volmerange, (ESA), Institut D'astrophysique  
De Paris CNRS

**Galaxy Structure And Dynamics**

Debra M. Elmegreen, Vassar College  
(Panel Chair)

Gregory D. Bothun, University Of Oregon  
Marcella Carollo, The Johns Hopkins University  
John J. Dubinski, University Of Toronto, CITA  
Karl Gebhardt, University Of California Lick Observatory  
Michael Loewenstein, NASA/GSFC, University of Maryland  
K. H. Kuijken, (ESA), Kapteyn Astronomical Institute  
Mark Whittle, Univ. Of Virginia

**Hot Stars**

James W. Liebert, University Of Arizona, Steward  
(Panel Chair)

Laurent Drissen, Université Laval  
Jean Dupuis, University Of California At Berkeley  
Andrew King, University Of Leicester  
Mordecai-Mark Mac Low, Max Planck Institute For Astronomy  
Linda Smith, University College London  
Kim Venn, Macalester College  
Saeqa Dil Vrtilek, Center For Astrophysics  
Joachim Puls, (ESA), Universitaetssternwarte Muenchen

**Interstellar and Intergalactic Matter**

Michael J. Barlow, (ESA), University College London  
(Panel Chair)

Steven R. Federman, University Of Toledo  
Donald R. Garnett, University Of Arizona Steward Observatory  
Katherine Roth, University Of Hawaii Institute For Astronomy  
Robert H. Rubin, NASA/Ames Research Center  
Blair D. Savage, University Of Wisconsin  
Giovanno Vladilo, (ESA), Osservatorio Astronomico Di Trieste

**Quasar Absorption Lines**

Chris David Impey, University Of Arizona, Steward Observatory  
(Panel Chair)

Neal Katz, University Of Massachusetts  
Kirk T. Korista, Western Michigan University  
Howard Yee, University Of Toronto  
Sandra Savaglio, Space Telescope Science Institute  
Patrick Boisse, (ESA), Departement De Physique De Lens  
David Bowen, (ESA), Royal Observatory Edinburgh

**Solar System**

Paul D. Feldman, The Johns Hopkins University  
(Panel Chair)

Jane Fox, Wright State University, SUNY At Stony Brook  
Richard G. French, Wellesley College  
Will Grundy, Lowell Observatory  
Erich Karkoschka, University Of Arizona  
Steven W. Lee, University Of Colorado, LASP  
Harold F. Levison, Southwest Research Institute  
Pierre Drossart, (ESA), Observatoire De Meudon

**Stellar Ejecta**

Bo Reipurth, University Of Colorado  
(Panel Chair)

Michael F. Bode, Liverpool John Mores University  
You-Hua Chu, University Of Illinois  
Sun Kwok, University Of Calgary  
John C. Raymond, Center For Astrophysics  
Raghvendra Sahai, Jet Propulsion Lab.  
Lifan Wang, University Of Texas At Austin  
Peter Lundqvist, (ESA), Stockholm Observatory

**Stellar Populations In Clusters**

William E. Harris, McMaster University  
(Panel Chair)

Brian C. Chaboyer, U. Of Arizona, Steward Observatory  
Adrienne Cool, San Francisco State Univ.  
Randy L. Phelps, California State University  
Carlton Pryor, Rutgers University  
F.W.M. Verbunt, University Of Utrecht, Sterrekundig Instituut  
Peter Linde (ESA), Lund Observatory

**Young Stars and Circumstellar Material**

Michal Simon, SUNY At Stony Brook  
(Panel Chair)

Mary A. Barsony, University Of California, Riverside,  
Harvey Mudd College  
Adam Frank, University Of Rochester  
Carol Anne Grady, STIS Group, NOAO/GSFC  
Lynne Hillenbrand, Caltech  
Mark J. McCaughrean, (ESA), Astrophysikalisches  
Institut Potsdam  
T. P. Ray, (ESA), Dublin Institute For Advanced Studies





**Proposals by Country:**

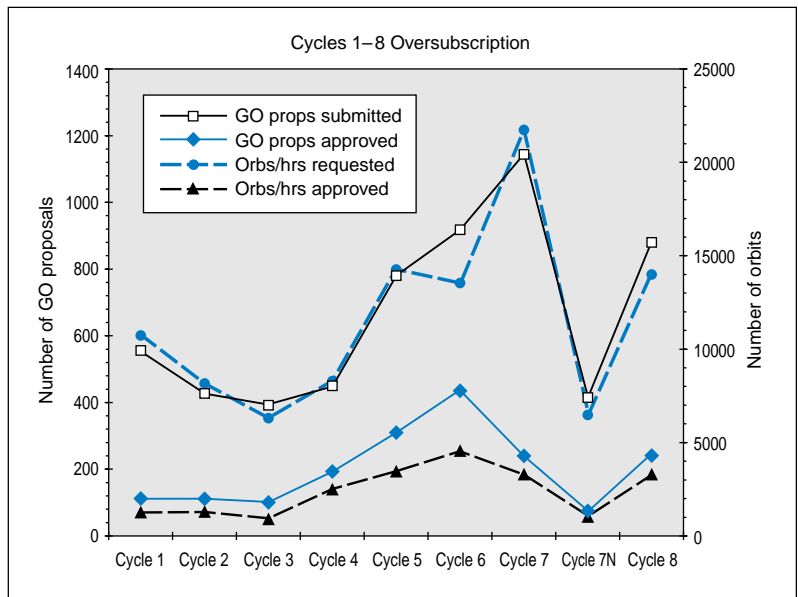
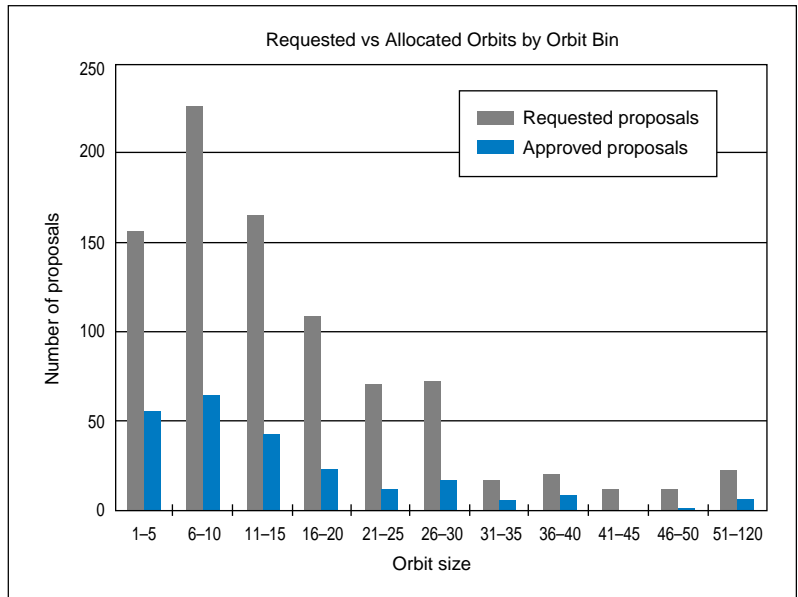
Country	Submitted	Approved
Australia	12	1
Austria	1	0
Belgium	1	0
Brazil	4	0
Canada	19	7
Chile	4	1
China	2	0
Denmark	4	0
France	37	14
Germany	52	10
Greece	1	0
India	2	0
Israel	8	1
Italy	25	4
Japan	3	0
Korea	3	0
Netherlands	18	8
Norway	1	0
South Africa	1	0
Spain	8	2
Sweden	14	1
Switzerland	3	0
United Kingdom	70	28
United States	760	218

**US PIs by State:**

Country	Submitted	Approved
AL -----	8	2
AZ -----	56	18
CA -----	128	33
CO -----	45	15
CT -----	11	2
DC -----	9	2
DE -----	4	0
FL -----	2	1
GA -----	2	1
HI -----	8	2
IA -----	4	0
IL -----	17	6
IN -----	7	1
KY -----	4	2
LA -----	7	1
MA -----	49	13
MD -----	190	61
MI -----	16	5
MN -----	7	5
NC -----	3	0
NE -----	2	0
NH -----	4	2
NJ -----	10	1
NM -----	7	2
NV -----	4	0
NY -----	31	6
OH -----	10	4
OK -----	2	1
OR -----	3	1
PA -----	34	6
SC -----	1	0
TN -----	1	0
TX -----	27	6
VA -----	10	4
VT -----	1	1
WA -----	17	5
WI -----	19	9

**Cycle 8 Panels**

Abbreviation	Panel
AGHN	AGN Host
AGHP	AGN Physics
BIN	Binary Stars
CLUS	Clusters, Lensing and Cosmology
CS	Cool Stars
DG	Distant Galaxies
FSP	Field Stellar Populations
GPI	Galaxy Populations and Interactions
GSD	Galaxy Structure and Dynamics
HS	Hot Stars
ISM	ISM
QAL	QAL
SS	Solar System
SE	Stellar Ejecta
SPC	Stellar Populations in Clusters
YS	Young Stars





Summary of Cycle 8 Results



	Requested	Accepted	% Accepted	ESA Accepted	ESA % Total
<i>Proposals</i>					
<i>GO</i>	880	231	26%	62	27%
<i>SNAP</i>	64	23	36%	9	39%
<i>AR</i>	109	41	38%	—	—
<b>Total</b>	<b>1,053</b>	<b>295</b>	<b>28%</b>	<b>71</b>	<b>27%</b>
<i>Primary Orbits</i>	14,005	3,314	24%	814	25%
<i>AR Funding</i>	\$6,457,494	\$2,232,523	35%	—	—

	Accepted	% Total	Oribits	% Total
<i>GO Proposals by SI*</i>				
<i>FGS</i>	9	4%	86	3%
<i>STIS / CCD</i>	53	21%	570	17%
<i>STIS / MAMA</i>	99	40%	1,349	41%**
<i>WFPC2</i>	86	35%	1,309	39%

\* The proposal numbers presented in the Science Instrument chart reflect multiple SI usage (either for coordinated parallels or Multi-SI Prime).  
 \*\* ~ Maximum supportable value

Proposal Statistics by Panel

	AGNH	AGNP	BIN	CLUS	CS	DG	FSP	GPI	GSD	HS	ISM	QAL	SE	SPC	SS	YS	TOTAL
<i>Proposals Received</i>																	
<i>GO</i>	39	63	47	63	73	25	55	62	38	85	61	44	86	42	51	46	880
<i>SNAP</i>	5	6	5	6	1	4	5	6	8	2	1	4	6	3	0	2	64
<i>AR</i>	7	4	4	10	6	28	7	5	7	1	4	4	5	3	12	2	109
<i>Proposals Accepted</i>																	
<i>GO</i>	11	17	16	16	15	8	9	16	13	18	17	12	22	14	15	12	231
<i>SNAP</i>	1	2	2	2	1	2	1	1	2	1	1	0	4	2	0	1	23
<i>AR</i>	3	2	2	2	3	8	2	2	3	0	3	0	2	2	6	1	41
<i>Primary Orbits Requested</i>																	
	606	874	567	1401	1450	755	1104	925	630	1000	926	970	1061	489	619	628	14005
<i>Panel Fraction of Total Accepted</i>																	
	5%	7%	5%	9%	13%	7%	5%	5%	6%	7%	5%	6%	8%	4%	4%	4%	—
<i>Primary Orbits Accepted</i>																	
	163	219	173	306	429	232	170	151	183	228	152	211	278	136	136	147	3314
<i>Fraction of Orbits Accepted/Requested</i>																	
	27%	25%	31%	22%	30%	31%	15%	16%	29%	23%	16%	22%	26%	28%	22%	23%	24%
<i>ESA Pls Accepted</i>																	
	6	4	6	5	3	2	2	3	4	7	4	6	8	3	4	4	71
<i>ESA Primary Orbits Accepted</i>																	
	107	24	42	95	42	12	54	22	63	50	33	127	57	22	29	35	814
<i>Fraction of ESA Orbits Accepted</i>																	
	66%	11%	24%	31%	10%	5%	32%	15%	34%	22%	22%	60%	21%	16%	21%	24%	25%

Approved Observing Programs for Cycle 8

*AGN Hosts And Environment*

Antonucci	University Of California — Santa Barbara	United States	Optical Nuclear Hotspot In NGC 1068
Best	Sterrewacht Leiden	Netherlands	Alignment And Evolution Of Redshift One Radio Galaxies
Filippenko	University Of California — Berkeley	United States	The Bulge Properties And Fueling Mechanisms Of Nearby AGNs
Haasinger	Astrophysikalisches Institut Potsdam	Germany	Evolution Of High-Redshift Seyfert Galaxies
Heckman	The Johns Hopkins University	United States	Comparing The Hosts Of High-z Radio-Quiet Quasars To Lyman Break Galaxies
Impey	University Of Arizona	United States	Lensed Quasar Hosts At High Redshift
Jaffe	Leiden Observatory	Netherlands	Mapping The Dynamics Of The Quasar 3C 48
Kinney	Space Telescope Science Institute	United States	Accretion Disks And Dust Disks In Active Elliptical Galaxies
Lacy	University Of Oxford	United Kingdom	The Nature Of Radio-Optical Alignments In Faint Radio Sources
Lehnert	Sterrewacht Leiden	Netherlands	The Evolution Of The Host Galaxies Of Powerful Radio Sources
Miley	Sterrewacht Leiden	Netherlands	Morphology Of The Most Massive Galaxies In The Early Universe
Sanders	University Of Hawaii	United States	The Nuclei Of Warm Ultraluminous Infrared Galaxies - Superstarbursts Or AGN
Sparks	Space Telescope Science Institute	United States	Ultraviolet Snapshots Of 3CR Radio Source Counterparts At Low z
Stockton	Institute For Astronomy	United States	The Location Of The Active Nucleus In The Radio Galaxy 3C 294
White	Space Telescope Science Institute	United States	HST Observations Of Millijansky Radio Sources From The First Survey

*AGN Physics*

Arav	Institute Of Geophysics And Planetary Physics	United States	Deep STIS Observations Of BALQSO PG 0946+301
Baker	University Of California Berkeley	United States	Absorption And Obscuration In Radio-Loud Quasars
Baldwin	Cerro Tololo Interamerican Observatory	Chile	High Abundances In Luminous Quasars: A Test Case
Baum	Space Telescope Science Institute	United States	UV Imaging Of Optical Jets: A New Window On The Physics Of Jets
Baum	Space Telescope Science Institute	United States	Jets Winds And Bubbles In Hercules A?
Biretta	Space Telescope Science Institute	United States	Far-UV STIS Imaging Of The M87 Jet
Brandt	The Pennsylvania State University	United States	Coordinated STIS/XAF Spectroscopy Of UV/X-Ray Absorption In The Seyfert 1 Galaxy NGC 4051
Charles	Oxford University	United Kingdom	UV Spectroscopy Of M33-X8: Mini-AGN Or Black-Hole Binary?
Crenshaw	Catholic University Of America	United States	Probing The Kinematics Of The Narrow-Line Region In Seyfert Galaxies With Slitless Spectroscopy
Falcke	Max-Planck-Institut Fuer Radioastronomie	Germany	Imaging The NLR In A Complete Sample Of z<0.5 Radio-Quiet PG Quasars
Junkkarinen	University Of California — San Diego	United States	Chemical Abundances And Geometry In QSO Broad Absorption Line Regions
Keenan	Queen's University Of Belfast	United Kingdom	Fe II Emission Lines As A Chronometer For High-Redshift Quasars
Kinney	Space Telescope Science Institute	United States	Survey Of Extended OI 5007 A Emission In Seyfert Galaxies
Kris	Space Telescope Science Institute	United States	UV Spectroscopic Snapshots Of FUSE AGN Targets
Mundell	University Of Maryland	United States	Powering The Narrow Line Regions In Seyfert Galaxies - Are Radio Jets The Key?
O'Brien	University Of Leicester	United Kingdom	PDS 456: A Radio-Quiet Analogue Of 3C 273
O'Dea	Space Telescope Science Institute	United States	Constraints On The Evolution Of Powerful Radio Galaxies
Peterson	Ohio State University	United States	Reverberation Mapping Of A Narrow-Line Seyfert 1 Galaxy
Turner	Goddard Space Flight Center	United States	Determination Of The SED For TON S180: A Direct Probe Of The Big Blue Bump
Whittle	University Of Virginia	United States	Jet Acceleration Of Narrow Line Region Gas
Whittle	University Of Virginia	United States	The Origin Of Blue Wings On NLR Line Profiles

*Binary Stars*

Bond	Space Telescope Science Institute	United States	Two Post-Common-Envelope Binaries In The Hyades Cluster
Burleigh	University Of Leicester	United Kingdom	Double Degenerates Among DAO White Dwarfs
Chaboyer	Dartmouth College	United States	Anomalously Blue Giants: Possible Precursors To Subdwarf B Stars
Charles	University Of Oxford	United Kingdom	Structure And Evolution Of The Globular Cluster Low Mass X-Ray Binary AC211 In M15
Drew	Imperial College	United Kingdom	High Resolution UV Imaging Of The Binary Nucleus Of Abell 35

Approved Observing Programs for Cycle 8

Gehrz	University Of Minnesota	United States	The Complex Circumstellar Environment Of The Massive Contact Binary RY Scuti
Gies	Georgia State University	United States	The FUV Spectrum Of SS 433
Haswell	University Of Sussex	United Kingdom	Black Hole Accretion Outbursts In Soft X-Ray Transients
Hellier	Keele University	United Kingdom	The Accretion Geometry In The Soft Double-Pulsing Intermediate Polar V405 Aur
Karovska	Smithsonian Astrophysical Observatory	United States	Binary Interaction In The Mira AB Accreting System
Kenyon	Smithsonian Astrophysical Observatory	United States	Evolution Of The Symbiotic Nova AG Pegasi
Knigge	Space Telescope Science Institute	United States	A Definitive Census Of The Cataclysmic Variable Population In 47 Tuc
Margon	University Of Washington	United States	An Ultraviolet Census Of Counterparts To Highly Luminous X-Ray Sources In M31 Globular Clusters
Naylor	Keele University	United Kingdom	Solving The Iron Curtain Conundrum
Robinson	University Of Texas — Austin	United States	Ultraviolet Spectroscopy Of The X-Ray Transient CI Cam
Schneider	University Of Arizona	United States	Duplicity And Variability In HST Guide Stars - An FGS Serendipitous Survey
Shara	Space Telescope Science Institute	United States	The Shock Cones And Underlying Stars In Interacting Wolf-Rayet Binaries
Sion	Villanova University	United States	Probing An Ancient Thermonuclear Runaway On A White Dwarf In A Dwarf Nova
Szkody	University Of Washington	United States	A Global Picture Of White Dwarfs In Cataclysmic Variables
Wade	The Pennsylvania State University	United States	The UV Spectrum Of An Elliptical Accretion Disk Devoid Of Hydrogen

Clusters, Lensing And Cosmology

Ajhar	National Optical Astronomy Observatories	United States	Reconciling The SBF And SN Ia Distance Scales
Bohun	University Of Oregon	United States	The Distance To NGC 2841: Improving The TF Calibration And Definitively Testing MOND
Davies	University Of Durham	United Kingdom	Galaxy Evolution In Low-Density Environments: WFPC2 Imaging Of Poor X-Ray Clusters At $Z=0.2-0.3$
Davis	University Of California	United States	Local Cosmology: The Nearby Flow Field And Its Structure
Ellis	Institute Of Astronomy	United Kingdom	Imaging The Host Galaxies Of High Redshift Type Ia Supernovae
Falco	Smithsonian Astrophysical Observatory	United States	A Survey Of Gravitational Lenses As Cosmological Tools III
Franx	Leiden Observatory	Netherlands	Galaxy ML Ratios: The Morphology-Density Relation And Weak Lensing In The $Z=1$ Cluster Of 3C184
Gregg	University Of California — Davis	United States	Bright Quasar Close Lensing Search
Hajian	United States Naval Observatory	United States	The Gravitational Lens Candidate PKS 1445-161
Kneib	Observatoire Midi-Pyrenees	France	A Strong Lensing Survey Of The Mass Distribution In X-Ray Luminous Clusters
Mulchaey	The Observatories Of The Carnegie Institution Of Washington	United States	HST Imaging Of Moderate Redshift X-Ray Emitting Groups Of Galaxies
O'Dea	Space Telescope Science Institute	United States	What Is The Nature Of The Cold Medium In Cooling Flow Clusters?
Perlmutter	Lawrence Berkeley Laboratory	United States	Cosmological Parameters From Type Ia Supernovae At High Redshift
Saha	National Optical Astronomy Observatories	United States	Calibration Of Nearby Type Ia Supernovae As Standard Candles: The Next Step
Sasselov	Harvard-Center For Astrophysics	United States	Direct Distances To M31 And M33 Using Detached Eclipsing Binaries And Cepheids
Scarpa	Space Telescope Science Institute	United States	Spectroscopy Of Gravitational Lens Candidates From The HST Survey Of BL Lac Objects
Schmidt	Mt. Stromlo & Siding Spring Observatories	Australia	Investigating Type Ia Supernovae And An Accelerating Universe
Whitmore	Space Telescope Science Institute	United States	The Globular Cluster Luminosity Function As A Distance Indicator
Wilkinson	NRAL University Of Manchester	United Kingdom	WFPC2 Observations Of Potential JVAS/GLASS Gravitational Lenses
Windhorst	Arizona State University	United States	Searching For The Hydrogen Reionization Edge Of The Universe At $5 < z < 7.5$ With Deep STIS/CCD Parallels

Cool Stars

Ayres	University Of Colorado	United States	Origins Structure And Evolution Of Magnetic Activity In The Cool Half Of The H-R Diagram: A STIS Survey
Bennett	University Of Colorado	United States	A Semi-Empirical Model Of The Structured Wind Of $\zeta$ Cygni
Bennett	University Of Colorado	United States	VV Cephei: The Egress From Chromospheric Eclipse
Burrows	Space Telescope Science Institute	United States	Weather Moons And Orbit Of The Brown Dwarf Gl 229B
Cowan	University Of Oklahoma	United States	Abundances In Halo Stars And Galactic Element Formation
Duncan	University Of Chicago	United States	Detection Of $^{11}\text{B}/^{10}\text{B}$ : Part II
Fornville	Observatoire De Grenoble	France	FGS Astrometry Of The Extrasolar Planet Of Gl 876
Gilliland	Space Telescope Science Institute	United States	Taking The Measure Of Planets In The Globular Cluster 47 Tucanae

Approved Observing Programs for Cycle 8

Henry	Harvard-Smithsonian Center For Astrophysics	United States	Calibrating The Mass-Luminosity Relation At The End Of The Main Sequence
Jordan	University Of Oxford	United Kingdom	Is SIO Observed In The UV Spectrum Of Beta Gem?
Kulkarni	California Institute Of Technology	United States	Search For Brown Dwarfs Around Nearby Stars
Reid	California Institute Of Technology	United States	A Search For Binary L-Dwarfs
Robinson	Catholic University Of America	United States	Rapid UV Spectroscopy Of Stellar Flares
Saar	Smithsonian Astrophysical Observatory	United States	A Search For Acoustic Heating In The Chromospheres Of Low Activity Dwarfs
Schneider	University Of Arizona	United States	Confirmation And Characterization Of Brown Dwarfs And Giant Planets From NICMOS 7228/7227
Snedden	University Of Texas	United States	CS 22892-052: A Roseita Star For The Age And Early History Of The Galaxy
Soderblom	Space Telescope Science Institute	United States	Calibrating Stellar Models With The Pleiades: Resolving The Distance Discrepancy
Valenti	National Optical Astronomy Observatories	United States	Stellar Seismology From Space: From The Sun To The Stars
Walter	State University Of New York	United States	The Spatial Location Of The Flaring Regions On AB Doradus

*Distant Galaxies*

Clements	Institut d'Astrophysique Spatiale & Cardiff University	France	Probing The Dark Side Of Galaxy Formation: HST Imaging Of The ISO Ultradeep Survey
Dickinson	Space Telescope Science Institute	United States	The Five Deep Fields: Lyman Break Galaxies From Multi-Color WFPC2 Images
Elston	University Of Florida	United States	The Morphological Evolution Of Field Galaxies At $1 < z < 2$
Ferguson	Space Telescope Science Institute	United States	Constraints On The Evolution Of Dwarf Elliptical Galaxies From Deep HST Images
Fruchter	Space Telescope Science Institute	United States	The Source Of Gamma Ray Bursts And The Nature Of Their Hosts
Gardner	NASA - Goddard Space Flight Center	United States	Star Formation In Galaxies At $0 < z < 1.6$
Koo	Lick Observatory University Of California	United States	Quantitative NICMOS Structural Parameters Of Galaxies In The Hubble Deep Field - North
Lilly	Department Of Astronomy University Of Toronto	Canada	Identifying The Hidden Phases Of Galaxy Evolution
Lowenthal	University Of Massachusetts	United States	The Faintest Radio Galaxies: Interacting Starbursts At $z < 1$
Martin	California Institute Of Technology	United States	Moderate Redshift Analogs To Lyman Break Galaxies?
McCarthy	Observatories Of The Carnegie Institution Of Washington	United States	STIS Imaging Of The Deep NICMOS Parallel Fields: Building On The NICMOS Legacy
Patton	University Of Victoria	Canada	Snapshot Survey Of Dynamically Close Galaxy Pairs From $z=0.1$ To $z=0.5$
Ramaiaunga	Carnegie Mellon University	United States	The Morphology Of Faint WFPC2 Galaxies
Seijeant	Imperial College London	United Kingdom	Snapshots Of Sub-Mjy Starburst Galaxies
Stern	University Of California Berkeley	United States	WFPC2 Imaging Of A Galaxy At $z = 5.34$ And Its Field
Waddington	Arizona State University	United States	Rest-Frame Galaxy Morphology At Intermediate To High Redshifts Using Archival NICMOS Images
Windhorst	Arizona State University	United States	Locating Compact Ly-Alpha Emitting Galaxies At $z=2.3-2.8$ : Analysis Of Archival WFPC2 Medium-Band Images
Yan	Carnegie Observatories	United States	Search For Emission Line Galaxies In The Near Infrared Using The NICMOS Grism Data

*Field Stellar Populations*

Armandroff	Kit Peak National Observatory	United States	The Horizontal Branches Of The M81 Dwarf Spheroidal Companions And V & VI
Bruhweiler	Institute For Astrophysics & Computational Sciences	United States	UV Spectral Properties Of O And B Stars Versus Metallicity
Harris	University Of Waterloo	Canada	The Stellar Halo And The Metallicity Distribution Function In The Giant Elliptical NGC 5128
Ibata	European Southern Observatory	Germany	Illuminating The Galactic Dark Matter
Knezek	The Johns Hopkins University	Germany	Accurate Proper Motions Of Galactic Halo Populations
Leitherer	Space Telescope Science Institute	United States	Stellar Populations In The Closest Large Low Surface Brightness Galaxy
Mateo	University Of Michigan	United States	The Alpha-Element/Iron Ratio In Starburst Populations
Schulze-Ladbeck	University Of Pittsburgh	United States	Intermediate-Age Dwarf Spheroidal Galaxies In The M81 Group
Seitzer	University Of Michigan	United States	The Evolution Of Galaxies — Mining The Stellar Content Of The Two Most Local Blue Compact Dwarf Galaxies
Wakker	University Of Wisconsin-Madison	United States	A Snapshot Survey Of Probable Nearby Galaxies
Walterbos	New Mexico State University	United States	A Search For Intergalactic Stars In The Local Group
			Massive Emission-Line Stars In Nearby Galaxies

## Approved Observing Programs for Cycle 8

*Galaxy Populations And Interactions*

Calzetti	Space Telescope Science Institute	United States	The Youngest Super-Star-Cluster
Calzetti	Space Telescope Science Institute	United States	Calibrating Star Formation With The Metal-Rich Starburst Galaxy M83 (NGC5236)
Ciardiullo	The Pennsylvania State University	United States	Red Giants Planetary Nebulae And The Properties Of Virgo's Intracluster Stars
Corbin	Steward Observatory	United States	Pox 186: A Nearby Protogalaxy?
Driver	University Of St Andrews	Scotland	Dwarf Busting In Abell 868
Gregg	University Of California — Davis	United States	Galaxy Interactions Tidal Debris And The Origin Of Intracluster Light In The Coma Cluster
Griffithair	SIRTf Science Center	United States	The Evolution Of Globular Cluster Systems In Early Type Galaxies
Harris	Memaster University	Canada	Globular Cluster Systems In Three Giant Coma Ellipticals
Keel	University Of Alabama	United States	Ongoing Mass Transfer In The Galaxy Pair NGC 1409/10
Leitherer	Space Telescope Science Institute	United States	Ultraviolet Spectra Of Galaxies With Active Star Formation
Majewski	University Of Virginia Dept. Of Astronomy	United States	What Is 52W036?
Maaz	Tel-Aviv University	Israel	Spatial Structure Of Super Star Clusters In NGC 1569
Meurer	The Johns Hopkins University	United States	The Ultraviolet Properties Of Ultra-Luminous Infrared Galaxies
Miller	Leiden Observatory	Netherlands	Globular Clusters Of Low Surface Brightness Galaxies
Peterson	Astrophysical Advances	United States	Near-UV Spectra Of Andromeda Globular Clusters Compared To Spectral Calculations
Treyer	Astrophysikalisches Institut Potsdam	Germany	Dust And Ultraviolet Light In The Local Universe
Van Der Marel	Space Telescope Science Institute	United States	Nuclear Structure & Merger—Starburst Relation In The Ultraluminous IR Galaxy NGC 6240: II. Kinematics
West	Saint Mary's University	Canada	A Search For Intergalactic Globular Clusters In A1185
Whitmore	Space Telescope Science Institute	United States	Kinematics Of The Young Star Clusters And The Gas In The Antennae Galaxies

*Galaxy Structure And Dynamics*

Axon	University Of Manchester	United Kingdom	The Black Hole Versus Bulge Mass Relationship In Spiral Galaxies
Baum	Space Telescope Science Institute	United States	Black Holes And Gas Disks In A Complete Sample Of Radio-Loud Ellipticals - II: Kinematics
Bregman	University Of Michigan	United States	The Properties Of Gaseous Halos Around Disk Galaxies
Buita	University Of Alabama	United States	High Resolution Imaging Of The Core Of Maffei 1 The Nearest Normal Massive Elliptical Galaxy
Cote	California Institute Of Technology	United States	The Origin Of cd Envelopes
Edge	University Of Durham	United Kingdom	A Snapshot Survey Of X-Ray Selected Central Cluster Galaxies
Ford	The Johns Hopkins University	United States	The Nature Of Dusty Nuclear Disks In Early Type Galaxies
Giovanelli	Cornell University	United States	The Evolution Of The Mass-To-Light Ratio Of Spiral Galaxies
Kuijken	Kapteyn Institute	Netherlands	Proper Motions Of Bulge Stars
Olsewski	Steward Observatory U. Of Arizona	United States	Absolute Proper Motions Of Nearby Dwarf Spheroidal Galaxies
Savage	University Of Wisconsin-Madison	United States	WFPC2 Imaging Of Dust Structures And Star Formation In The Disk-Halo Interface Of Spiral Galaxies
Scheier	Space Telescope Science Institute	United States	Measuring The Black Hole Mass In Centaurus A The Nearest Active Galaxy
Shlosman	University Of Kentucky	United States	Testing The Stellar Dynamics Of Nested Bars In NGC 5728
Siegel	University Of Virginia	United States	Proper Motion Of The Leo II Dwarf Spheroidal
Smith	University Of Colorado	United States	The Morphology Of Dust Lanes In Barred Spirals
Tadunter	University Of Sheffield	United Kingdom	The Mass Of The Black Hole In Cygnus A
Wang	Northwestern University	United States	WFPC2 Narrow-Band Halpaha Imaging Of The Edge-On Galaxy NGC4631
Wilson	University Of Maryland	United States	Masses And Spins Of Black Holes In Seyfert Galaxies

*Hot Stars*

Barstow	University Of Leicester	United Kingdom	The Composition And Evolution Of Extremely Hot DA White Dwarfs
Barstow	University Of Leicester	United Kingdom	Resolving Sirius-Like Binaries
Bianchi	The Johns Hopkins University	United States	The Open/WN Stars In M33: Understanding Wolf-Rayet Star Formation In Different Environments
Caraveo	Istituto Di Fisica Cosmica Del CNR	Italy	HST Astronomy To Gauge The Distance Of PSR0833-45 (VELA) And PSR 0656+14



Approved Observing Programs for Cycle 8

Davidson	University Of Minnesota	United States	STIS Observations Of Eta Carinae: The Central Star
Herrero	Instituto De Astrofísica De Canarias	Spain	Calibration Of The Wind Momentum-Luminosity Relationship In Cyg OB2
Heydari-Malayeri	Observatoire De Paris	France	The Youngest Massive Star Clusters In The SMC As Clues To Star Formation In The Early Universe
Kulkarni	California Institute Of Technology	United States	The Optical Counterpart Of The Soft Gamma-Ray Repeater 1900+14
Kwok	University Of Calgary	Canada	Stellar Winds From Central Stars Of Young Planetary Nebulae
Landsman	Raytheon STX	United States	Deep Helium-Mixing And The Ultraviolet Spectra Of Hot Horizontal Branch Stars
Massey	National Optical Astronomy Observatories	United States	Tests Of Stellar Models Using Four Extremely Massive Spectroscopic Binaries In The R136 Cluster
Shara	Space Telescope Science Institute	United States	Discerning The Origins Of Blue Stragglers: Masses And Rotation Rates
Smith	University College London	United Kingdom	Probing The Evolution Of Massive Stars: Ejecta Ring Nebulae Abundances And Dynamics
Van Kerkwijk	University Of Utrecht	Netherlands	The Massive Binary Pulsar Z303+46: An Unexpected Companion
Venn	Macalester College	United States	Boron In The Magellanic Clouds: A Novel Test Of Light Element Formation
Walborn	Space Telescope Science Institute	United States	Trapezium Systems And Stellar Jets In 30 Doradus
Wallace	The Johns Hopkins University	United States	A Link Between Massive Binary Stars And Non-Thermal Radio Emission
Walter	State University Of New York At Stony Brook	United States	The Spectral Energy Distribution Of A Neutron Star Photosphere
Winget	University Of Texas — Austin	United States	A Unique Calibration Of Asteroseismology: The DBV GD358

*Interstellar And Intergalactic Matter*

Allen	Space Telescope Science Institute	United States	How Opaque Are Spiral Galaxies?
Bornans	Astronomisches Institut Universitaet Bochum	Germany	The H <sub>2</sub> /CO Ratio In The Large Magellanic Cloud
Deharveng	Laboratoire d'Astronomie Spatiale	France	The Lyman Continuum Radiation From Galaxies
Federman	University Of Toledo	United States	Physical Conditions In Predominantly Atomic Interstellar Clouds
Garnett	University Of Arizona	United States	High Spatial Resolution UV/Optical Spectroscopy Of H II Regions In The Magellanic Clouds
Gordon	Louisiana State University	United States	Understanding The Starburst-Like Dust In The Small Magellanic Cloud
Keenan	Queen's University Of Belfast	United Kingdom	The Interstellar Medium Near To And Beyond The Galactic Center
Kochanek	Harvard-Center For Astrophysics	United States	Extinction Curves Of Distant Galaxies
Kunth	Institut d'Astrophysique De Paris	France	Lyman Alpha Emission In Starburst Galaxies
Lauressch	Northwestern University	United States	A SNAAPHOT Survey Of Interstellar Absorption Lines
Leiferer	Space Telescope Science Institute	United States	The Physical State Of The Starburst Outflow In NGC1705
Meyer	Northwestern University	United States	The Oxygen Abundance In Translucent Interstellar Clouds
Rubin	NASA Ames Research Center	United States	Fundamental Problems In Plasma Astrophysics: The Thermal Equilibrium Of NGC 7009
Sembach	The Johns Hopkins University	United States	C IV High Velocity Clouds: Remnants Of The Local Group?
Shoppell	University Of Maryland	United States	The Starburst-ISM Interaction In NGC 1569
Sonneborn	NASA/Goddard Space Flight Center	United States	Probing The Galactic Halo And Beyond With Young Supernovae
Stoeck	University Of Colorado — Boulder	United States	The Extent Of Metal Transport In The Low Redshift Intergalactic Medium
Wakker	University Of Wisconsin-Madison	United States	The Metallicity And Dust Content Of HVC Complex C
Welty	University Of Chicago	United States	Abundances And Physical Conditions In The ISM Of The Magellanic Clouds
Wolff	Space Science Institute	United States	Further Insights Into Interstellar Dust Grains Using Ultraviolet Polarimetry And Spectroscopy
Wood	Smithsonian Astrophysical Observatory	United States	Detecting Circumstellar Hydrogen Wall Emission Around A Nearby Sun-Like Star

*Quasar Absorption Lines*

Bowen	Royal Observatory Edinburgh	United Kingdom	The Ly-alpha Absorption Cross-Section Of Nearby Galaxies
Cohen	University Of California — San Diego	United States	A Unique Measurement Of The Dust-To-Gas Ratio In An Absorption Line System
Impey	University Of Arizona	United States	The Coherence Length Of Lyman-Alpha Absorbers At z ~ 1
Jannuzi	National Optical Astronomy Observatories	United States	Low Column Density Ly-Alpha Absorbers At z=1.2: High SNR Echelle Spectroscopy Of PG 1634+706
Jenkins	Princeton University Observatory	United States	Pervasive Hot Gas Hidden In Galaxy Groups: A Substantial Baryon Reservoir?
Lemoine	Departement d'Astrophysique Relativiste Et De Cosmologie	France	Lyman Alpha Clouds Toward PKS1302-102.
Moller	European Southern Observatory Garching	Germany	STIS Deep DLA Imaging Survey II

Approved Observing Programs for Cycle 8

Monier	The Ohio State University	United States	The Homogeneity Of Damped Lyalpha Systems (And Variability In BAL Systems)
Petitjean	Institut d'Astrophysique De Paris	France	STIS Observations Of QSO Pairs
Reimers	Hamburger Sternwarte	Germany	A Search For Transparent Lines Of Sight With Intergalactic He II Absorption Towards 26 Bright $z > 2.9$ Quasars
Reimers	Hamburger Sternwarte	Germany	UV Brightest Known Intermediate Redshift QSO: A $z = 1.15$ DLA And Metals In The Ly Alpha Forest
Shull	University Of Colorado — Boulder	United States	Primordial Low-z Lyalpha Clouds Towards PKS 2155-304?

Stellar Ejecta

Bally	CASA / University Of Colorado — Boulder	United States	Herbig-Haro Jets Irradiated By Massive OB Stars
Bode	Liverpool John Moores University	United Kingdom	High Resolution Imagery Of Selected Symbiotic Stars
Bode	Liverpool John Moores University	United Kingdom	A Snapshot Survey Of Symbiotic Stars
Bujarabul	Observatorio Astronomico Nacional	Spain	Colliding Stellar Winds And Proto-Planetary Dynamics: WFPC2 Imaging Of OH231.8+4.2
Chu	University Of Illinois	United States	Supernova Remnants In A Cloudy Interstellar Medium
Dougados	Laboratoire d'Astrophysique Observatoire De Grenoble	France	New Clues To The Ejection Process In Young Stars: Forbidden Line Imaging Of T Tauri Micro-jets
Drew	Imperial College Of Science Technology & Medicine	United Kingdom	Cataclysmic Variable Disk Winds: A High Time- And Spectral Resolution Study Of Flow Inhomogeneity
Fesen	Dartmouth College	United States	The Spatial And Ionization Structure Of Cas A's Metal-Rich Ejecta
Harrington	University Of Maryland	United States	Spectroscopy Of The Rapidly-Evolving Chemically Inhomogeneous Planetary Nebula BD+30 3639
Hester	Arizona State University	United States	An Emission Line Survey Of The Crab Nebula
Hrivnak	Valparaiso University	United States	HST Imaging Of Bipolar Proto-Planetary Nebulae And Circumstellar Arcs
Humphreys	University Of Minnesota	United States	Imaging The Circumstellar Environments Of The Cool Hypergiants
Keyes	Space Telescope Science Institute	United States	Snapshot Spectroscopic Diagnostic Survey Of The Symbiotic Stars
Kirshner	Harvard College Observatory	United States	SINS: The Supernova Intensive Study - Cycle 8
Kwok	University Of Calgary	Canada	Morphology Of High Radio Surface Brightness Planetary Nebulae
Latter	SIRTF Science Center/Catech	United States	Using STIS To Unravel Planetary Nebulae
Morse	University Of Colorado	United States	Tracking The Evolution Of The Homunculus And Outer Debris In Eta Carinae
Nordsieck	University Of Wisconsin-Madison	United States	Orientation And Extent Of The Bipolar Outflow In Beta Lyrae
O'Dell	Rice University	United States	Proper Motions And Variability Of HH Objects Near The Orion Nebula
Perinotto	Dipartimento Astronomia	Italy	Stalking FLIERS In Planetary Nebulae: A STIS Study
Reipurth	University Of Colorado Boulder	United States	The Kinematics Of Knots Along Herbig-Haro Jets At High Spatial Resolution
Sahai	Jet Propulsion Laboratory California Institute Of Technology	United States	Multipolar Bubbles And Jets In Very Low Excitation Planetary Nebulae - A WFPC2 Halpha Imaging Survey
Shara	Space Telescope Science Institute	United States	The Next Bright Galactic Nova: High Resolution Imaging
Shanghellini	Space Telescope Science Institute	United States	A SNAPSHOTS Survey Of LMC Planetary Nebulae: A Study Of Nebular And Late Stellar Evolution
Verner	University Of Kentucky	United States	The Fe II Spectra Of Eta Carinae: Implications For Atomic And Plasma Astrophysics
Weis	Universitaet Heidelberg Institut Fuer Theoretische Astrophysik	Germany	Highly Collimated Strings In The Nebula Around Eta Carinae - A New Phenomenon
Whitney	Prism Computational Sciences Inc.	United States	Measuring Eta Car's Giant Eruption By Modeling Dust Scattering And Emission In The Homunculus
Winkler	Middlebury College	United States	Probing Stellar Ejecta In SN 1006 Through UV Absorption Spectroscopy

Stellar Populations In Clusters

Bailyn	Yale University	United States	High Precision Photometry Of The Core Of M13
Briley	University Of Wisconsin-Madison	United States	Light Element Abundance Variations In The Core Of 47 Tucanae
Heydari-Malayeri	Observatoire De Paris	France	Hidden New-Born Massive Stars In Compact H2 Blobs Of The Large Magellanic Cloud
Hodge	University Of Washington	United States	Massive Blue Clusters In M31
Hodge	University Of Washington	United States	The Cluster Formation Rate In Nearby Galaxies
Hodge	University Of Washington	United States	Star Clusters Of NGC 6822
King	University Of California — Berkeley	United States	Exploring The Luminosity Function Near The Limit Of Hydrogen Burning In Globular Clusters
King	University Of California — Berkeley	United States	A Proper-Motion Study Of Two Fields In The Globular Cluster 47 Tucanae
Landsman	Raytheon STX	United States	A Complete Census Of Hot Stars In Globular Clusters
Layden	Bowling Green State University	United States	White Dwarf Distances To Globular Clusters And The RR Lyrae Luminosity Calibration - M5 And NGC 3201

Approved Observing Programs for Cycle 8

Nota	Space Telescope Science Institute	United States	Is The IMF Universal At Low Stellar Masses?
Piotta	Universita Di Padova	Italy	A Snapshot Survey Of Galactic Globular Clusters
Piotta	Universita Di Padova	Italy	The Stellar Initial Mass Function Of Globular Clusters
Rich	University Of California At Los Angeles	United States	High Quality WFFPC2 Photometry For 3 Intermediate Age LMC Clusters With Multiple (?) Turnoffs
Smith	Michigan State University	United States	The Second-Parameter Effect In Metal-Rich Globular Clusters: A Snapshot Study Of NGC 6441
Van Altena	Yale University	United States	Internal Velocity Distribution In Globular Clusters II
van der Marel	Space Telescope Science Institute	United States	Nuclear Kinematics Of The Dense Globular Cluster M15
Walker	National Optical Astronomy Observatories	United States	NGC 1866: A Critical Test Of Stellar Evolution For Intermediate Mass Stars

Solar System

Bagenal	University Of Colorado	United States	HST-Galileo Io Campaign
Bell	Cornell University	United States	Mineralogy And Weathering History Of Mars
Brown	Caltech	United States	A Search For Kuiper Belt Object Satellites
Chanover	New Mexico State University	United States	An Archival Study Of The Quiescent And Disturbed Atmosphere Of Saturn
Clarke	University Of Michigan	United States	HST Far-UV Imaging And Spectra Of Jupiter's Aurora During The Galileo Extended Mission
Elliot	Massachusetts Institute Of Technology	United States	Global Change On Pluto?
Emerich	CNRS-Institut d'Astrophysique Spatiale	France	Search For Origin Of Supersonic Turbulence Observed In The Upper Equatorial Atmosphere Of Jupiter
Festou	Southwest Research Institute	United States	Determination Of The Radius Of Comet 19P/Borrelly In Support Of The NMP DS1 Flyby
Griffith	Northern Arizona University	United States	Spatially Resolved Spectroscopy Of Titan's Atmosphere And Surface
Lamy	Laboratoire d'Astronomie Spatiale	France	A Size Survey Of Cometary Nuclei
McGrath	Space Telescope Science Institute	United States	UV Imaging Of Europa & Ganymede: Unveiling Satellite Aurora & Electrodynamical Interactions
Orton	Jet Propulsion Laboratory California Institute Of Technology	United States	Discrete Photometry Of Galileo Mission Atmospheric Targets In Jupiter
Piange	Institut d'Astrophysique Spatiale	France	FUV Diagnostic Of Saturn's Stratosphere With STIS: Water Influx From The Ring And Polar Haze
Rages	NASA Ames Research Center (Space Physics Research Inst.)	United States	Changes In Uranus' Atmosphere Since The Voyager Encounter
Richardson	Massachusetts Institute Of Technology	United States	Constructing A 2-D Picture Of Saturn's OH Cloud
Sromovsky	University Of Wisconsin-Madison	United States	Multispectral Investigation Of Jovian Cloud Structure
Stern	Southwest Research Institute	United States	Mapping Triton
Stern	Southwest Research Institute	United States	Exploring Triton In The Act Of Global Change
Trauger	Jet Propulsion Laboratory	United States	Saturn's Far-UV Aurora And Polar Hazes
Weaver	The Johns Hopkins University	United States	UV Spectroscopic Investigation Of Any Bright Newly Discovered Comet
Whitney	Prism Computational Sciences Inc.	United States	A Critical Extension To Martian Ozone Abundances Using WFFPC2

Young Stars And Circumstellar Material

Bally	University Of Colorado Boulder	United States	The Structure And Kinematics Of Irradiated Disks And Associated High Velocity Features In Orion
Burrows	Space Telescope Science Institute	United States	Development And Evolution Of YSO Outflows And Jets
Calvet	Smithsonian Astrophysical Observatory	United States	Mass Accretion Rates For Pre-Main Sequence Intermediate Mass Stars
Grady	National Optical Astronomy Observatories STIS Group	United States	UV Spectroscopy Of Infalling Cometary Material In Solar-Type Pre-Main Sequence Stars
Gullbring	Stockholm Observatory	Sweden	The Structure Of The Accretion Flow On Pre-Main-Sequence Stars
Hartigan	Rice University	United States	Collimated Jets And Low Velocity Forbidden Emission From T Tauri Stars
Lagrange	Observatoire De Grenoble	France	Testing The Falling Evaporating Bodies Hypothesis On The Herbig Star HD100546
O'Dell	Rice University	United States	Determination Of Circumstellar Cloud Mass Loss Rates With STIS Spectra
Ray	Dublin Institute For Advanced Studies	United Kingdom	The Nature Of T Tauri And Herbig Ae/Be Star Winds
Simon	SUNY	United States	Masses And Distances Of Pre-Main Sequence Binaries
Soderblom	Space Telescope Science Institute	United States	HD 98800: An Opportunity To Measure True Masses For Low-Mass PMS Stars
Stapelfeldt	Jet Propulsion Laboratory	United States	T Tauri Star Snapshot Survey II. Completing The CTTs Sample
Walter	State University Of New York	United States	Molecular Hydrogen In The Circumstellar Environments Of T Tauri Stars
Whitney	Prism Computational Sciences Inc.	United States	Testing Protostellar Collapse And Outflow Models

## A New Phase II in Cycle 8

David Soderblom, STScI [soderblom@stsci.edu](mailto:soderblom@stsci.edu)

If you are among the successful *HST* proposers for Cycle 8 congratulations! You now have to submit the complete details of how your program is to be executed, meaning the Phase II program. There are some important differences in the Phase II process from previous cycles that you need to be aware of:

1. We will be strict about the deadlines for submission. Having accurate Phase II submissions right at the beginning goes a long way toward effective and efficient use of *HST* by making it possible for us to make a long-range observing plan.

*Phase II programs will be due February 18. In exceptional cases we can grant a short extension of the deadline if you inform us before February 18. In any case, if no Phase II program has been submitted by March 18, the orbits allocated to the program will be lost.*

2. We will also be strict about the quality of what is submitted, meaning that we expect PIs to provide us with complete and accurate information right at the beginning. To make this clearer, we draw a distinction between “submission” and “acceptance” of your Phase II program. “Acceptance” means either that what is submitted is error-free (according to RPS2) or that the errors that remain cannot be remedied by the PI. The latter case means that your Program Coordinator (PC) overrides RPS2 and officially accepts the program anyway.

*The Phase II program that is submitted by February 18 must also be **accepted** by that date.*

3. Phase II programs must include all targets to be observed in that program, and the orbits required must be at or below your allocation.

4. In Cycle 8 we have reduced the scope of duplication checking done at STScI. We will check for near-to-exact matches with GTO observations and with programs that still have data within the proprietary period. However, we recognize that the PI has the best sense of when another program may encroach on their valid data rights. Therefore we will expect PIs to check for possible data conflicts once all the Phase II submissions are in. A web-based duplication checking tool will be available.

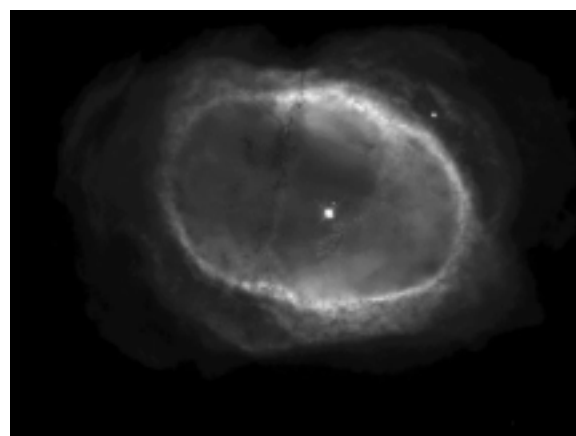
5. Once a program has been submitted and accepted, changes are possible, but only when documented and justified. Minor changes can be approved by your PC or Contact Scientist (CS), but you must file a Change Request form to accompany the RPS2 resubmission. Major changes (see the policies on the Observer’s web page at <http://www.stsci.edu/observing/observing.html>) require a formal Program Change Request, which is done via the web.

If you experience problems or have questions, get in touch with your PC or CS; they were identified in your notification letter.

Your Phase II program is essentially written in a high-level programming language. The commands available to you and the syntax to be used are described in the Phase II Proposal Instructions. These have been completely reedited for Cycle 8. There are substantial changes to RPS2 — new capabilities, obsolete functions removed — that the Phase II Proposal Instructions describe.

The new Phase II Proposal Instructions are available exclusively on-line in PDF format. No paper version will be supplied, but it is easy to print from the PDF. PDF offers all the useful capabilities of HTML with many additional features, and navigation within PDF is much, much faster than within HTML. The PDF version of the

Phase II Proposal Instructions has many added features to make it easy to find the information you need, including a fully-linked and extensive table of contents, and index, and navigation buttons on each page. You should be able to read the PDF by clicking in your web browser. You can also obtain Acrobat for free from [www.adobe.com](http://www.adobe.com). Your comments on this document are welcome and can be sent to [help@stsci.edu](mailto:help@stsci.edu).



*HST Recent Release: A Glowing Pool of Light*

*NGC 3132 is a striking example of a planetary nebula. This expanding cloud of gas, surrounding a dying star, is known to amateur astronomers in the southern hemisphere as the “Eight-Burst” or the “Southern Ring” Nebula.*

*NGC 3132 is nearly half a light year in diameter, and at a distance of about 2000 light years is one of the nearer known planetary nebulae. The gases are expanding away from the central star at a speed of 9 miles per second.*

*This image, captured by NASA’s Hubble Space Telescope, clearly shows two stars near the center of the nebula, a bright white one, and an adjacent, fainter companion to its upper right. (A third, unrelated star lies near the edge of the nebula.) The faint partner is actually the star that has ejected the nebula. This star is now smaller than our own Sun, but extremely hot. The flood of ultraviolet radiation from its surface makes the surrounding gases glow through fluorescence. The brighter star is in an earlier stage of stellar evolution, but in the future it will probably eject its own planetary nebula.*

*Credit: Hubble Heritage Team (STScI/AURA/NASA)*

<http://opposite.stsci.edu/pubinfo/pr/1998/39/index.html>

## The New, Improved, RPS2

*Andy Gerb, STScI gerb@stsci.edu*

With the aim of better support for Hubble's observers, STScI has been looking at ways to improve our Remote Proposal Submission (RPS2) software. Efforts are currently underway to improve the speed and robustness of the tool and to seek ways of making it more useful.

### *Speed*

In order for RPS2 to accurately advise users on the feasibility of their programs, it needs to build up a detailed model of how the observations will execute on *HST*. To do this, RPS2 relies on a tool embedded within it called Transformation (Trans). The complicated buffer management requirements of the newer instruments have made Trans' job more difficult, resulting in a noticeable slowdown of RPS2.

To alleviate this, we are embarking on the TransVERSE project to reengineer the Trans system. In addition to simplifying the Trans system and thereby allowing faster execution, this project will also provide greater control over how Trans

does its job, allowing better trade-offs between speed and precision. Although TransVERSE is a two-year project, so its benefits will not be fully realized until Cycle 10, it is being added to the system incrementally so there is a good chance that improvements to Cycle 9 RPS2 will also be evident.

### *Robustness*

Although RPS2 is installed and runs without difficulty on the majority of sites that use it, some users have reported problems with "hangs" during execution and unexpected results from RPS2's user interface. To eliminate these, we are working to upgrade the controller within RPS2 to use tools which conform to the Common Object Request Broker Architecture (CORBA). We are also reimplementing portions of the graphical user interfaces to use the Java programming language. CORBA and Java have become widely used standards that did not exist five years ago when RPS2 was designed.

The look and feel of RPS2 will change little as a result of this upgrade, but we expect that the use of new standards will make the software more

robust to minor differences in platform and environment. It will also enable us to incorporate state-of-the-art process control tools into RPS2 to ensure that it runs reliably. In order to give us adequate time to test these changes, we have opted not to release them with the Cycle 8 version of RPS2, but we are confident they will be available by Cycle 9.

### *Usability*

We are actively seeking ways to improve the user-friendliness of RPS2 and to ensure that the information that it gives observers is as useful and applicable as possible. Anuradha Koratkar, STScI's Presto Project Scientist, is chairing a focus group of *HST* proposers and STScI personnel tasked with improving the Phase II proposal preparation process. Improving RPS2 figures prominently within their charter.

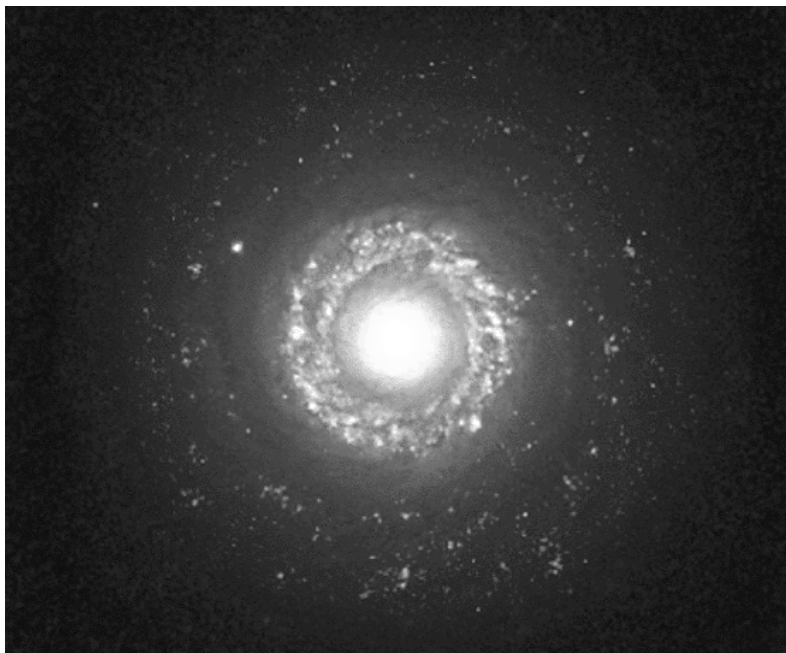
We are open to additional suggestions on how to make RPS2 a better tool. If you have ideas, we'd like to hear them. Email any comments, suggestions or ideas you have to [gerb@stsci.edu](mailto:gerb@stsci.edu).

### *HST Recent Release: Astronomers Unveil Colorful Hubble Photo Gallery*

*What may first appear as a sunny side up egg is actually NASA Hubble Space Telescope's face-on snapshot of the small spiral galaxy NGC 7742. But NGC 7742 is not a run-of-the-mill spiral galaxy. In fact, this spiral is known to be a Seyfert 2 active galaxy, a type of galaxy that is probably powered by a black hole residing in its core.*

*Credit: Hubble Heritage Team (STScI/AURA/NASA)*

<http://oposite.stsci.edu/pubinfo/pr/1998/28/index.html>





## The Hubble Heritage Project

Keith Noll noll@stsci.edu

An STScI/NASA press release in October 1998 announced the kickoff of a new outreach program, the Hubble Heritage Project. After more than a year of preparation, the Heritage Project went public with the release of four color images produced from non-proprietary data in the *HST* archive. The Heritage team also announced their plans to release one new image each month at their web site and have done so in November and December. These are to be followed by a new three-color image of the Ring Nebula made by the team that will be released at the AAS in Austin on January 6.

The Hubble Heritage project was conceived by STScI Astronomers Keith Noll, Anne Kinney, Howard Bond, and Carol Christian. The team also includes Jayanne English, Lisa Frattare, Forrest Hamilton, and Zolt Levay, all at STScI.

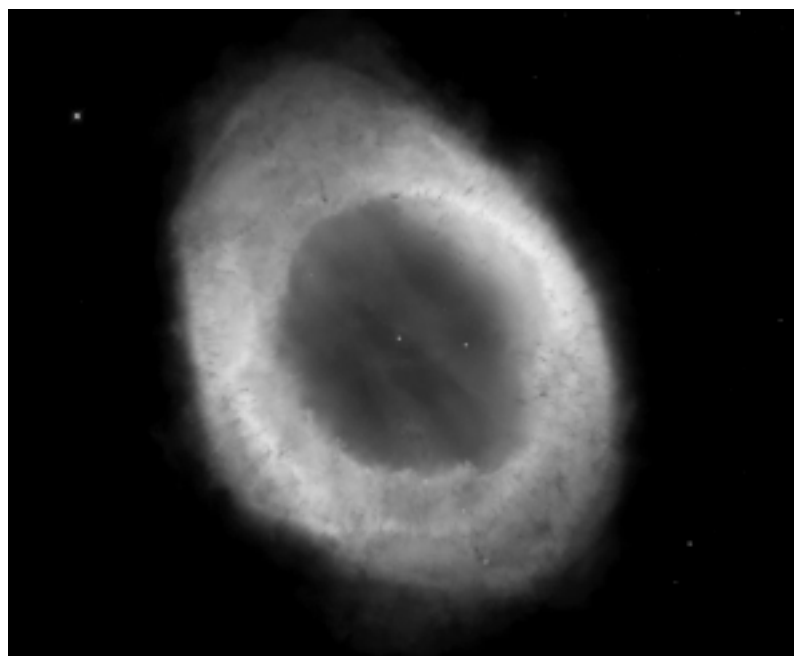
The mission of the Heritage team is to produce a steady stream of esthetically impressive images using data obtained with *HST*. The majority of the releases will come from the *HST* archive. Many potentially excellent

images reside in there but have never been released, either because the results from the project do not meet the relatively high criteria of newsworthiness applied to normal press releases, or because the astronomers involved simply do not have the considerable amount of time needed to produce a very high quality color image. The Heritage project provides both a separate channel to the public where the main criterion is the quality of the image itself and the resources needed to produce esthetically optimized images.

In addition to archival images, the Heritage team has a small budget of Director's Discretionary time with which to make new observations. The Ring Nebula color image is the first example of such an observation. Future observations will be decided, in part, by public voting at the Heritage web site, where visitors will be asked to choose between a small sample of preselected targets. Of course, all data obtained by the Heritage Project will be non-proprietary and it is our expectation that these data will be of value scientifically as well as for public outreach.

The Heritage web site has been enormously popular with 17 million hits in the first seven weeks of operation. Public comments have been almost unanimously favorable. And, of course, we are continually upgrading the site in response to external suggestions. The Heritage web site can be found at <http://heritage.stsci.edu/> and we invite you to visit. You will find a site that is somewhat different in flavor from a traditional astronomical web page with a mix of design elements intended to convey both the seriousness of the scientific enterprise as well as the sheer beauty of the images.

The ultimate success of the Heritage project depends on the support of the *HST* user community. We have enjoyed excellent cooperation with PIs of the programs whose archival images we have used. Their insight and feedback has enriched the releases and is a service to the entire community. We invite suggestions for improving the Heritage project and look forward to working with many more *HST* users in the months to come.



*HST Recent Release: Looking Down a Barrel of Gas at a Doomed Star*

*The NASA Hubble Space Telescope has captured the sharpest view yet of the most famous of all planetary nebulae: the Ring Nebula (M57). In this October 1998 image, the telescope has looked down a barrel of gas cast off by a dying star thousands of years ago. This photo reveals elongated dark clumps of material embedded in the gas at the edge of the nebula; the dying central star floating in a blue haze of hot gas. The nebula is about a light-year in diameter and is located some 2,000 light-years from Earth in the direction of the constellation Lyra.*

*Credit: Hubble Heritage Team (STScI/AURA/NASA)*

<http://opposite.stsci.edu/pubinfo/pr/1999/01/index.html>

## A Workshop on Observing Tools

Anuradha Koratkar and Jeremy Jones [koratkar@stsci.edu](mailto:koratkar@stsci.edu)

A Workshop on Observing Tools was held recently to explore where collaborative effort could benefit both observers and observatories. The workshop was held on October 28 and 29, 1998 at the University of Maryland Inn and Conference Center in College Park, Maryland. Over fifty representatives — a mixture of astronomers and software developers representing a variety of observatories (ground- and space-based, optical, x-ray, infrared) — discussed the role of collaboration in the development of future observing tools.

The primary goal of the workshop was to encourage discussion between groups. Formal presentations were kept to a minimum, and consisted of four talks: a short introduction by Keith Kalinowski, an overview by Anuradha Koratkar and Sandy Grosvenor, a presentation on the

results of the NOAO meeting by Jeannette Barnes (see below), and a presentation on the Future of User Support Tools by Tom Brooks. Most of the time was spent on focused panel discussions and breakout sessions. At the end of the workshop we formed six working groups:

### Target Visualization Tools:

- Exposure Time Calculators
- Defining an Observation
- Optimizing Calibration Observations for Ground Based Observatories
- Common Observatory Definition
- Data Services

These working groups will start with simple goals and explore collaboration on their own terms. The short-term goals of these groups will be to develop a common definition of what each tool should contain. The long-

term goals are to define interfaces that make tools interoperable, share code and pool efforts in the development of next-generation capabilities.

The emphasis on discussion over presentation was clearly appreciated. The group seemed to feel that it was a great first step in what we hope to be a much longer collaborative effort. The true measure of success, however, will be if efforts put forth by the working groups actually produce tangible results. Still, it was an exciting two days, and we were glad we had the opportunity to facilitate such interesting discussion. We look forward to hearing from the working groups in the near future. For more information on this meeting report, slides and information on next generation observing tools see the web site <http://aaaproduct.gsfc.nasa.gov/workshop> and <http://aaaproduct.gsfc.nasa.gov/SEA>.

## NOAO Workshop on Telescope Proposals of the Future

Caty Pilachowski and Jeannette Barnes

As new and more complex telescopes come on line, telescope time applications are becoming more complex too, with requirements for machine-readable target lists, guide star selections, detailed exposure estimates, and specifications on sky conditions. Learning to use new tools for each observatory just to submit proposals may well become a daunting and time-consuming task for all of us.

To try to prevent this situation from arising, representatives of several observatories, including NOAO, Gemini, STScI, McDonald Observatory and the HET, the MMT Observatory, the CFHT, the National Research Council of Canada, the AAO, and JACH, met together in Tucson in August. The goal of the Proposal Process Workshop, hosted by NOAO, was to develop a shared understanding

among observatories, including the National Gemini Offices and the Gemini Project, of the requirements and procedures for telescope proposals, and to encourage cooperation among the national observatories of the partner countries, STScI, and other institutions faced with similar issues and concerns related to the telescope proposal process.

Through discussions at the Workshop, a broad consensus emerged. First, the proposal process should include an option for web-based proposal preparation and submission that does not require the distribution of software. For now this was the best option for the US community, but we will need to continually re-evaluate the situation as new tools and methods become available.

Second, the proposal process should be as simple as possible for users, with required information kept to a

minimum, while allowing investigators to present their case in a suitable manner. Wherever possible, observatories should share common and familiar tools for developing proposals.

Finally, the process should also minimize the effort required at each observatory to support TAC evaluation and observing. The process should allow integration of proposals for the variety of telescope time available through each observatory.

Actions resulting from the Workshop include the distribution of the NOAO Web proposal system to several observatories, and the formation of two working sub-groups to develop a set of LaTeX/XML tags to be shared among observatories and to develop guidelines for layout and organization of Web-based tools for proposal submission that will allow the sharing of tools among observatories.

## Starburst99: Synthesis Models for Galaxies with Active Star Formation

Claus Leitherer (STScI), Daniel Schaerer (Obs. Midi-Pyrenees), Jeffrey D. Goldader (Univ. of Pennsylvania), Rosa M. González Delgado (Inst. Astrof. de Andalucía), Carmelle Robert (Laval University), Denis Foo Kune (Macalester College), Duília F. de Mello (STScI), Daniel Devost (STScI), and Timothy M. Heckman (JHU)

Those of you who frequently surf the internet may already have discovered it: a new webpage entitled “Starburst99” has been added to the STScI website. In case you have not yet visited this site, give it a try at <http://www.stsci.edu/science/starburst99/>. The welcome page is shown in Figure 1. This project is a collaborative effort of the STScI Starburst Group to provide the community with a convenient tool for the interpretation of galaxies with ongoing star formation.

What is it? Starburst99 is a comprehensive set of model predictions for spectrophotometric and related properties of galaxies with active star formation. The models are an improved and extended version of the data set previously published by Leitherer & Heckman (1995). We have upgraded our code by implementing the latest set of stellar evolution models of the Geneva group and the model atmosphere grid compiled by Lejeune et al. (1997). Several predictions which were not included in

the previous publication are now shown for the first time. The models are presented in a homogeneous way for five metallicities between  $Z = 0.040$  and  $0.001$  and three choices of the initial mass function. The age coverage is  $10^6$  to  $10^9$  yr. Also shown are the spectral energy distributions which are used to compute colors and other quantities.

Examples of sets of spectral energy distributions are shown in Figure 2. These spectra have a wavelength-dependent resolution of typically 10 to 20 Å. Apart from being able to view more than 500 figures, the user can download the files that were used to produce the plots. The files are simple ascii tables which can easily be manipulated, for instance, for applying reddening or K corrections to the spectra.

Most users may find the information in these figures sufficient for their needs. If the figure and table set does not cover the required parameter space, you can run your own models. A typical example would be a case with a

non-standard IMF. The input parameters can be entered via a web interface (Figure 3). After submission of the job, the computations are done remotely at Space Telescope Science Institute. Once the job is complete, the users are notified by e-mail and can retrieve the output files by ftp. If the cpu load is low, a typical run should last less than an hour. However, we anticipate that it may take a bit longer during the first weeks after the STScI *Newsletter* has been published... Be patient!

Finally, if all else fails, the Starburst99 user has the option to download the code and all auxiliary files. We distribute the source code freely to the community and the users may modify the code to suit their needs.

More details on the code and the models are on our website and in a paper we have submitted to *ApJS* (Leitherer et al. 1999; a copy may be downloaded from the Starburst99 webpage). Feel free to browse and create your own starburst model. Comments and questions are welcome.



Figure 1. The default webpage of the Starburst99 project at <http://www.stsci.edu/science/starburst99/>. The user can view and download the figures, tables and the source code, and can submit her/his own tailored models for computation.



Figure 2. Set of spectral energy distributions for single stellar populations at  $1/20$  solar metallicity. The data can be downloaded by simply clicking on the figure.



Figure 3. Interface for running tailored starburst models. The webpage allows users to enter their desired parameters and submit the job for execution at STScI.

## Microlensing follow-up *from page 1*

resolution telescope to resolve the source and get limb-darkening parameters. And if the lens has a planetary system, the planet can cause an extra-short-duration spike on the

light curve, which can be used to detect planets around the lensing stars.

However, the microlensing survey programs, which monitor the events nightly, would mostly miss such fine structures in the light curve. Looking for such fine structures in the light curve would require dedicated telescopes specially suited for this purpose, capable of monitoring the events 24-hours a day and frequently, with good photometric accuracy in the monitoring program. This requires dedicated access to telescopes around the globe, the best time for monitoring being the ‘Bulge-season’ when there are more than 10 events at any given time.

### *The PLANET collaboration*

Conceived in the early winter of 1995 to meet this challenge, PLANET (Probing Lensing Anomalies NETWORK) was born soon after as a worldwide collaboration of astronomers with access to a set of 3 telescopes situated in Chile, South Africa,

and Australia. In the 1996 Bulge season, two additional telescopes - the CTIO 1m telescope in Chile and the Hobart 1m telescope in Australia - joined PLANET, which improved the longitude and time coverage. This brings the total to (at least) five participating sites: CTIO, Dutch/ESO 0.9m, SAAO 1m, Perth 0.6m and Hobart 1m (Fig. 1). Some of the science high-lights of the PLANET collaboration follow.

### *Where are the lenses? Monitoring a caustic crossing to find the answer*

Four years of monitoring of millions of stars towards the Magellanic Clouds has resulted in the detection of more than a dozen microlensing events towards the LMC, and 2 events towards the SMC. However, the simple microlensing light curve is insufficient to provide information on the exact location of the lens due to a degeneracy between the mass, distance, and the perpendicular velocity of the lens.

*continued page 23*

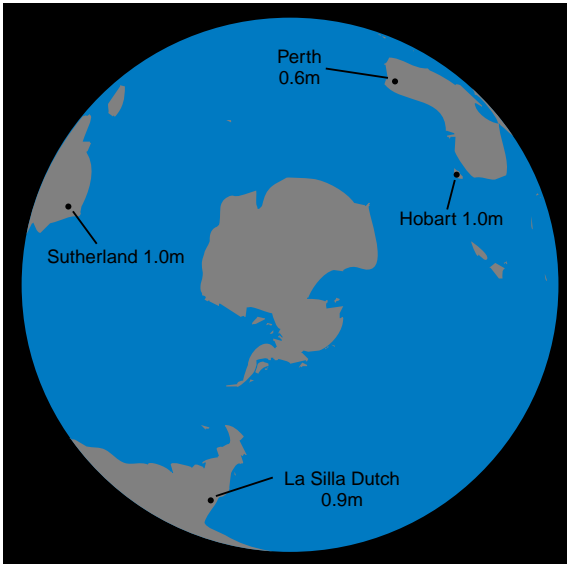


Fig. 1. A south-pole centered view of the location of the PLANET telescopes.

### *HST Recent Release: Combined Deep View of Infrared and Visible Light Galaxies*

*This narrow, deep view of the universe reveals a plethora of galaxies (reaching fainter than 28th magnitude), as seen in visible and infrared light by NASA's Hubble Space Telescope. Several distinctive types of galaxies can be seen in these views: blue dwarf galaxies, disk galaxies, and very red elliptical galaxies. A bright, nearby face-on spiral galaxy appears at upper right. Some of the brightest objects in the field are foreground stars in the halo of our own Milky Way galaxy. By combining views in infrared light and visible light astronomers have a better idea of the shapes of galaxies in the remote universe, and of the fraction which are old or dust-obscured at early epochs.*

*Credit: R. Williams (STScI), the HDF-South team, and NASA*

<http://oposite.stsci.edu/pubinfo/pr/1999/02/index.html>





## Microensing follow-up *from page 22*

As a result, there is much controversy on the exact location of the lenses and there is, as yet, no consensus on whether the lenses are located in the Galactic halo, the local Galactic disk, or within the Magellanic Clouds. Direct determination of the location of the lens in a few cases can potentially put this long-standing controversy to rest.

Frequent monitoring of a caustic-crossing event caused by a binary lens provides one such means of determining the lens location. The caustic is essentially a straight line in space, so the time taken by the caustic to cross the source provides a direct measure of the proper motion of the lens projected onto the source plane. If the lens is in the halo at a distance of 15 kpc, then, since the expected proper motion of the lens is about 200 km/s, the time to cross the caustic would be of the order of half an hour. If, on the other hand, the lens is within the SMC, the caustic crossing time is expected to be of the order of 10 hours. Thus monitoring a caustic crossing provides a neat method to determine the location of the lens. Such an opportunity occurred last June when a binary lens event was discovered towards the SMC.

The binary lens event, MACHO 98-SMC-1, was discovered by the MACHO collaboration. After the first caustic crossing event was reported, PLANET, with its 24-hour access to telescopes around the world, began monitoring this event, with a particular interest in fully sampling the second caustic crossing. The peak of the second caustic crossing occurred when it was night in South Africa, and the whole caustic crossing was covered with great frequency by PLANET. The time for the caustic to cross was found to be 8.5 hours, which suggested that the lens is within the SMC (Fig. 2). A more detailed model, taking all the data into account, confirmed this early suggestion that the lens is most likely within the SMC proper (Ref. 1). The result was further confirmed by the EROS, OGLE, MACHO and MPS

collaborations, who also concluded that the lens is most likely within the SMC.

A few more such determinations of the lens locations will potentially provide conclusive tests on the lens locations.

### *Microensing as a high angular resolution telescope*

The event MACHO 97-BLG-28 is a very unique event among all the events monitored by PLANET. This is a binary lens event where the source star directly passed behind the cusp — the region where the caustics meet — thereby highly magnifying the portion of source star lying directly behind the cusp during the caustic transit and allowing a rare opportunity to study in detail the structure of the stellar surface. PLANET monitored this event with very high accuracy and frequency, and the results are spectacular (Fig. 3).

From a spectrum of the source we know that it is a K-giant. Analysis of the PLANET dataset not only shows that the observations are inconsistent with a uniformly bright disk model, but allows the measurement of limb-darkening parameters in two filters from the light curve data alone. The resulting stellar profiles are in excellent agreement with those predicted by stellar atmospheric models for K giants. The limb-darkening coefficients measured here are among the first derived from microlensing. They are also among the first for normal giants by any technique, and any star as distant as the Galactic Bulge (Ref. 2).

### *Search for extra-solar planets*

If the lensing star has a planetary system, the effect of the planet can be seen, in most cases, as sharp extra peaks in the microlensing light curve (Fig. 4). The probability of detection of such extra peaks by a planetary system has been investigated by several authors. It is found that for a solar-like system half way between us and the Galactic Bulge, Jupiter's orbital radius

coincides with the Einstein ring radius of a solar-mass lensing star. Such a case is termed 'resonant lensing,' which increases the probability of detecting the planetary signal. Detailed models show that if every star has a Jupiter, then in 20% of the cases there would be a planetary signature with magnification larger than 5%. It is worth adding here that among the

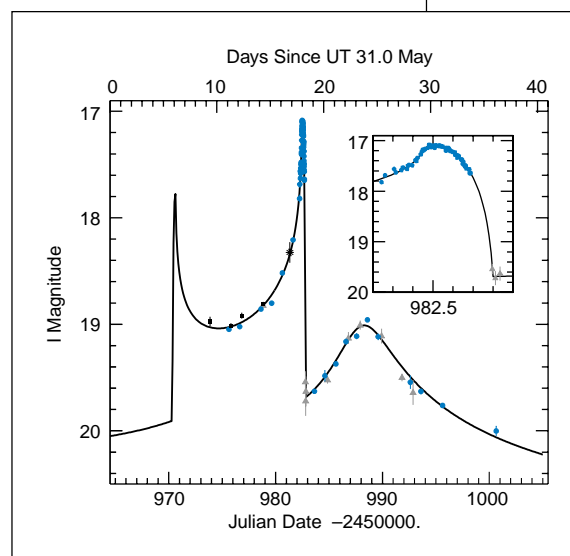


Fig. 2. Light curve of the PLANET data for MACHO-98-SMC-1. Shown are the data from the SAO 1 m (circles), the CTIO 0.9 m (squares), the CTIO-Yale 1 m (triangles), and the Canopus 1 m (asterisks). The inset covers about 0.6 days, corresponding to less than one tick mark on the main figure.

currently-available methods, microlensing is probably the only method which is sensitive to detection of Earth-mass planets.

The minimum duration of the extra feature due to the planet, to a first approximation, is the time taken by the source to cross the caustic, which can be about 1.5 to 5 hrs. The maximum duration of the spike is roughly the time taken by the planet to cross its own Einstein ring. Using a reasonable set of parameters (the lower mass of the planet is taken as that of the Earth, the higher mass is assumed to be that of Jupiter), this can be a few hours to about 3 days. Thus one of the

*continued page 24*



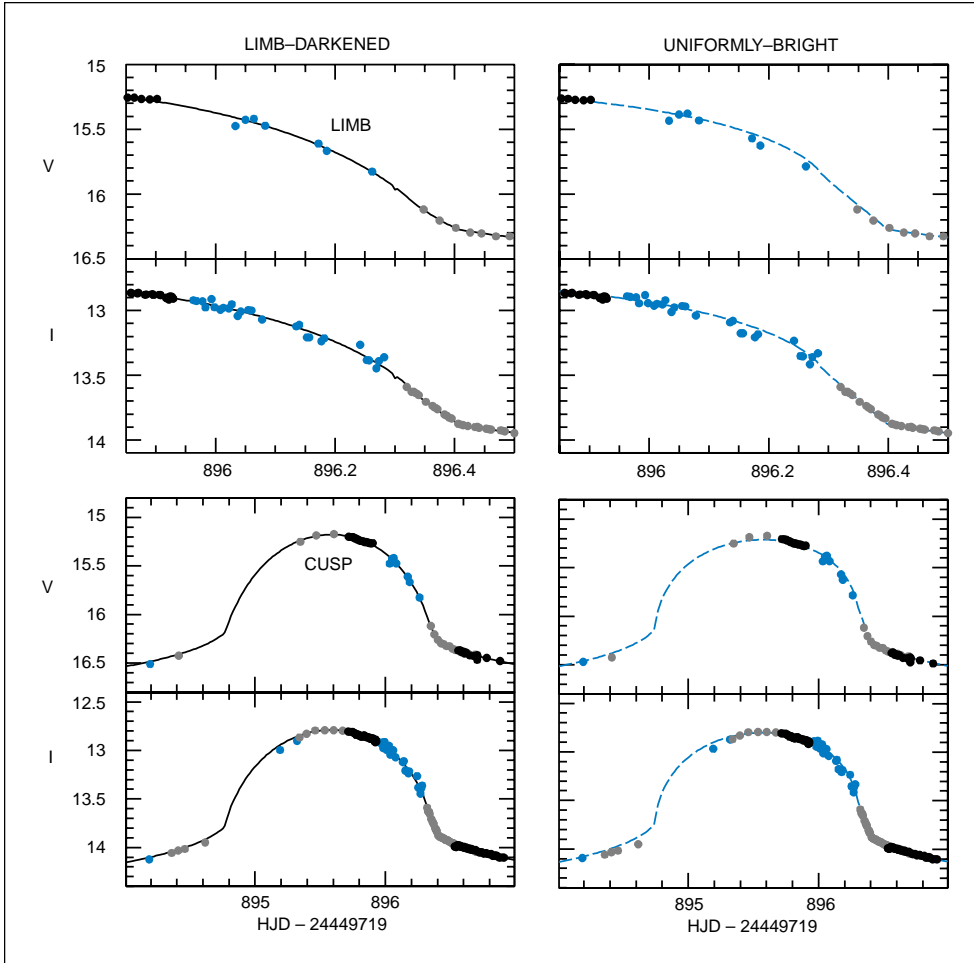


Fig. 3. Left: Light curves for the best fitting 2-parameter limb-darkening model superimposed on PLANET data sets for a 3-day period centered on the cusp-crossing (bottom) and a 16-hour period during which the stellar limb swept over the cusp (top). Right: Same for the best uniform bright source model (UB) shown as a dashed line. The limb-darkening model is clearly superior.

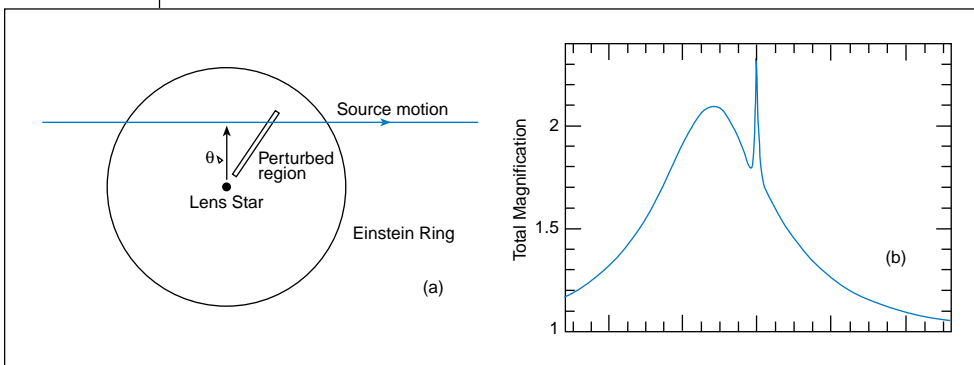


Fig.4. (a) The geometry of the star-plus-planet lensing event and fig. (b) the resulting light curve.

### Microensing follow-up *from page 24*

requirements for a monitoring program is the ability to monitor hourly so that the extra feature due to the planet is well-sampled. Other requirements include the capability of 24-hour coverage in the monitoring program, and high photometric accuracy.

PLANET is thus ideally suited for such a monitoring program (Ref. 3). The present capability of the PLANET collaboration is the following:

- Access to four 1-meter size telescopes at appropriately spaced longitudes throughout the Bulge season.
- Photometric accuracy of better than 5%.
- Hourly monitoring and (weather permitting) close to 24-hour coverage in the monitoring program
- Online reduction facilities
- Capability of providing 'secondary alerts.'

In addition, a near-IR capability is being added in the 1999 observing season. PLANET has now completed 4 years of observing campaigns and has intensely monitored more than 2 dozen microlensing events, during which several binary events have been discovered and monitored. At the time of writing this article, the full datasets are still being analyzed, and intensive efforts are under way in modeling and better understanding of the many 'anomalous' events detected by PLANET.

More Information on the PLANET project can be found at <http://www.astro.rug.nl/~planet>

#### References:

1. Albrow, M. et al. (PLANET Collaboration), 1998, ApJ, in press (astro-ph/9807086)
2. Albrow, M. et al. (PLANET Collaboration), 1998, Submitted to ApJ. (astro-ph/9811479)
3. Albrow, M. et al. (PLANET Collaboration), 1998, ApJ, in press (astro-ph/9807299)

## NGST Ad Hoc Science Working Group Prioritizes Science Capabilities

Peter Stockman and John Mather  
stockman@stsci.edu

On October 15 and 16, the NGST Ad Hoc Science Working Group (ASWG) met in Baltimore to review preparations for the upcoming external review (see neighboring article on the NESR) and to decide on priorities for key NGST science capabilities. Science leads for the five NGST science themes presented highlights and required capabilities for each field. These capabilities included wavelength regions, spectral and angular resolution, and any special requirements for the spacecraft (e.g., tracking moving targets). Pierre Bely described relevant technical studies of NGST designs in regard to visual imaging and realistic mid-IR backgrounds (see adjoining article).

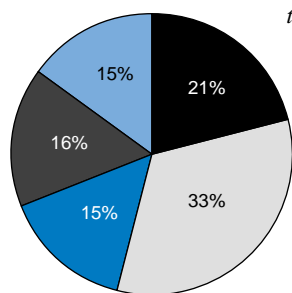
At the July ASWG meeting in Belmont, we had experimented with a voting system in which each ASWG member could allocate up to 100 priority points (in units of 5 points) to a large list of elements. At that meeting, the ASWG “voted” on the relative amount of observing time in the Design Reference Mission (DRM) to be devoted to the five science themes. The results are shown in Fig. 1. We found that the dispersion among the votes was very tight indicating a strong consensus within the group. In October, the ASWG was requested by NASA HQ to prioritize the scientific capabilities of NGST in preparation for entering the next development phase (Phase A). After much discussion, we voted in a

similar fashion on a selected list of 8 science capabilities. The results of this vote are shown in Fig. 2. Imaging and spectroscopy in the near infrared (1 to 5 microns) obtained half the votes, with imaging and spectroscopy in the mid-IR (MIR, 6 to 28 microns) getting 28% of the votes and visible and high contrast imaging garnering about 22%. This vote showed a larger dispersion in votes, probably because each science theme stresses different parts of the Observatory. As a result, we estimate that these priorities are uncertain by 5% even within the ASWG. Nevertheless, we were pleased to see that the results were remarkably similar to what was obtained from the DRM program itself (e.g. the percentage time spent using different instruments in different wavebands).

The recommendations of the ASWG, together with technical and budgetary information, were presented to Dr. Edward Weiler, then Acting Associate Administrator for the Office of Space Science, on November 2. Dr. Weiler approved the recommendation of the NGST Project to proceed into Phase A with a nominal wavelength range of 0.6 to 10 microns. The short wavelength corresponds to a possible cutoff due to gold coatings and was influenced by data showing that near-infrared (NIR) detectors can have excellent performance at visible wavelengths. The long wavelength extension to 10 microns corresponds to the shortest wavelength at which scattered and emitted thermal background from a MIR-compatible NGST equals the natural zodiacal background toward the ecliptic poles. A detailed engineering study has shown that a MIR-friendly design is actually less expensive and less risky to develop and

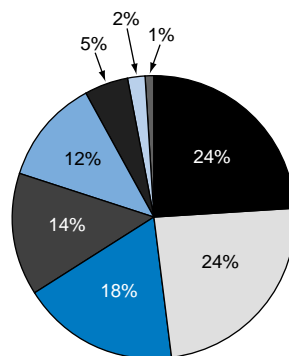
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Figure 1: The percentage of the 2.5 year DRM for the five scientific themes.



- Cosmology and the Structure of the Universe: 21%
- The Origin and Evolution of Galaxies: 33%
- The History of the Milky Way and its Neighbors: 15%
- The Birth and Evolution of Stars: 16%
- The Origins and Evolution of Planetary Systems: 15%

Figure 2: The relative priorities of scientific capabilities for NGST



- NIR Imaging: 24%
- NIR Spectroscopy: 24%
- MIR Imaging: 18%
- MIR Spectroscopy: 12%
- Improved Optics: 5%
- VIS Imaging: 14%
- VIS Spectroscopy: 1%
- Coronagraphy: 2%



## Ad Hoc Science Working Group *from page 25*

test than a warmer, temperature-controlled NGST for the NIR only. This wavelength range is intended to be a guideline to the Phase A observatory studies to be undertaken by two or more aerospace contractors beginning in the spring of 1999. (Note that these studies will inform the solicitation for science instruments in 2001.)

The ASWG will continue to advise the NGST Project during the Phase A study on a wide variety of scientific and technical areas, including the general capabilities of

### Editor's Note:

*This membership list appeared in the previous Newsletter but with a number of errors, which we regret.*

### The current ASWG membership is:

*Jill Bechtold, Steward Obs.<sup>1</sup>*  
*Mike Fall, STScI*  
*Robert Fosbury, ESO/STECF*  
*Jon Gardner, GSFC*  
*James Graham, UC Berkeley*  
*Tom Greene, ARC<sup>1</sup>*  
*Matt Greenhouse, GSFC<sup>1</sup>*  
*Don Hall, Univ. Hawaii*  
*Avi Loeb, Harvard*  
*Peter Jakobsen, ESTEC<sup>2</sup>*  
*Bob Kirshner, Harvard*  
*Simon Lilly, Univ. Toronto<sup>3</sup>*  
*Bruce Margon, Univ. Washington*  
*John Mather, GSFC (Co-Chair)*  
*John MacKenty, STScI*  
*Michael Meyer, Steward Obs.*  
*Harvey Mosely, GSFC<sup>1</sup>*  
*Phil Nicholson, Cornell Univ.*  
*Takashi Onaka, U. Tokyo<sup>4</sup>*  
*Marcia Rieke, Steward Obs.*  
*Mike Rich, UC Los Angeles*  
*Peter Schneider, Max Planck Inst.<sup>2</sup>*  
*Gene Serabyn, JPL<sup>1</sup>*  
*Massimo Stiavelli, STScI*  
*Peter Stockman, STScI (Co-Chair)*  
*John Trauger, JPL<sup>1</sup>*  
*Ewine van Dishoeck, Leiden<sup>2</sup>*

<sup>1</sup> ISIM Science Lead

<sup>2</sup> ESA Science Representative

<sup>3</sup> CSA Science Representative

<sup>4</sup> ASAS Science Representative

the scientific instruments. We encourage the astronomy community to send their comments and concerns to members of the ASWG or to us ([stockman@stsci.edu](mailto:stockman@stsci.edu), [john.c.mather@gssc.nasa.gov](mailto:john.c.mather@gssc.nasa.gov)). We include a list of the ASWG members and their national or study team allegiances.

## Implications of the Mid-Infrared capability for NGST

*Pierre Bely*

*on behalf of a team composed of L. Petro (STScI), R. Burg (JHU), S. Castles, M. Greenhouse, K. Parrish (GSFC), D. Jacobson, (MSFC), C. Perrygo (Swales), D. Redding (JPL), and consultants at Ball Aerospace, Lockheed-Martin and TRW.*

The “HST and Beyond” (Dressler) report, which is at the origin of the current NGST program, calls for a near-infrared (NIR) zodiacal-light-limited observatory optimized for the 1 to 5 micron range. Additionally, the report also advocates extending NGST’s capability to the mid-infrared (MIR), from 5 to about 30 microns. Preliminary studies performed over the last three years followed these guidelines, with the MIR capability being considered as optional. For the “Formulation” phase of NGST (the old NASA Phase A), we need to better define the technical implications and cost of extending the wavelength coverage beyond 5 microns.

To that end, we compared the performance, cost, and risk of three candidate NGST architectures: NIR-optimized; MIR-compatible; and MIR-optimized. The NIR optimized architecture has the telescope operating at about 100 K, a temperature high enough to allow ground testing in readily-available liquid-nitrogen-cooled chambers. The thermal radiation from optics at about 100 K would limit the zodiacal-limited spectral range of NGST to about 7 microns. In such a “warm” environment the NIR detectors, which operate at ~30 K, must be actively cooled by a mechanical cryo-cooler.

The MIR-compatible architecture (Figure 1) eliminates the need for a mechanical cryo-cooler by the incorporation of more layers in the sunshield. This brings the telescope and instruments down to about 40 K and 30K respectively, allowing the NIR detectors to be cooled passively. In this case, the main source of infrared background at the focal plane is due not to direct emission from the optics but to the radiation emitted by the back of the sunshield scattering off the primary and secondary mirrors (Figure 2). With a

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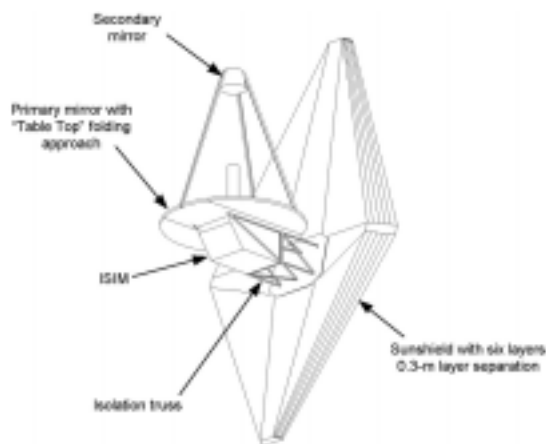


Figure 1. MIR-compatible architecture. The NIR-optimized architecture is similar, but with fewer sunshield layers and the telescope is thermally controlled at 100 K. The MIR-optimized architecture has a sunshield which is composed of two structures with a total of 8 layers.

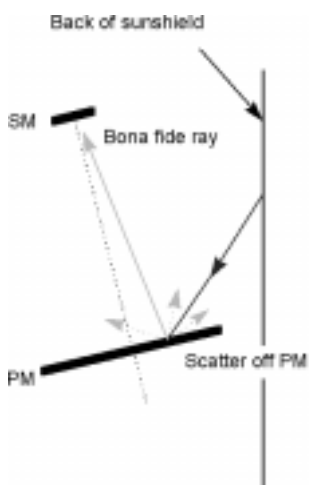


Figure 2. The thermal radiation from the back of the NGST sunshield can scatter off the primary and secondary mirrors and exceed the MIR background due to the radiation from the cooler optics.

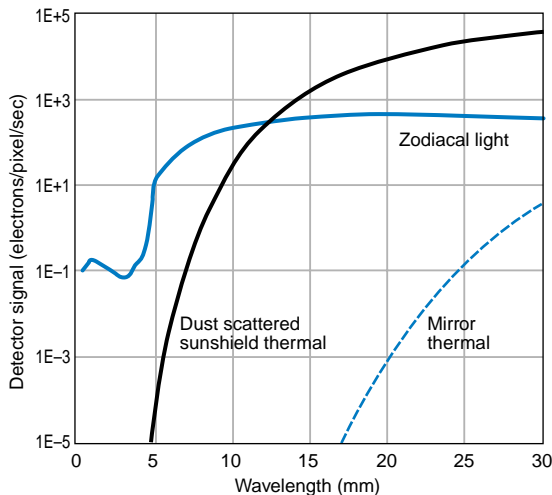


Figure 3. Focal plane backgrounds for the MIR-compatible case due to (i) the thermal emission of the NGST primary and secondary optics, (ii) radiation by the sunshield backlayer scattering off the optics, and (iii) detector noise compared to the zodiacal light level in the field of view.

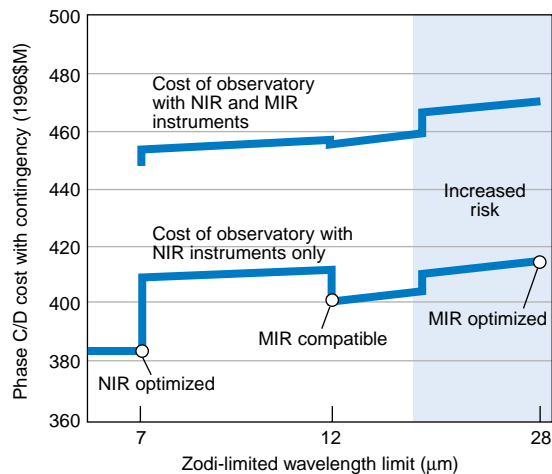


Figure 4 Cost of NGST as a function of infrared wavelength coverage. The recommended wavelength coverage (0.6 to 10 microns) corresponds to the local minimum in the lower line in the center of the diagram - the cost/contribution of a MIR instrument is included in the upper line.



## Mid Infrared *from page 26*

6-layer sunshield, the back layer is at about 100K and the scatter-induced background radiation at the focal plane is negligible compared to the zodiacal light for wavelengths shorter than 12 microns (Fig. 3). The drawback of this solution is that it requires testing many elements of the observatory at a temperature of 30 K which implies upgrading testing chambers by adding liquid helium shields.

The MIR-optimized architecture is similar to the MIR-compatible architecture, but with additional sunshield layers to further reduce the radiation from the sunshield back layer. Eight layers are needed for the observatory to be zodiacal-light-limited up to about 30 microns. Such a telescope+sunshield configuration is very difficult to validate, however, because of the very low operating temperatures involved and the difficulty of eliminating thermal leaks.

We estimated the cost and risk of these three schemes in detail using the model for the NASA “yardstick” architecture and estimates for the testing from aerospace consultants. We estimated that the cost of the NIR-optimized scheme is \$385M, the MIR-compatible and MIR-optimized being \$17M and \$25M higher respectively (Figure 4). These costs are in 1996 dollars and do not include a \$100M management reserve nor the MIR instrument cost estimated at \$50M. Our analysis showed that the savings offered by the easier testing on the ground of the NIR-optimized system is partially offset by the need for precise temperature control of the optics and the cost of the cryo-cooler for the NIR detectors. Cryo coolers can also be avoided for the MIR detectors, which operate at 8 K, since in such a 30 to 40 K environment a stored cryogen system would last 10 years. In the end, a passively-cooled observatory such as the MIR-compatible architecture appears a more natural technical solution and has the advantage of keeping the option of adding the MIR instrument open (e.g. for international collaborators). This approach enables MIR observations which are zodiacal-light-limited out to 10 microns, and vastly superior to other facilities at longer wavelengths, without increasing complexity, risk or cost of the observatory.

Based upon this study and the ability of NIR detectors to work at visible wavelengths (assuming that the optics remain diffraction-limited only at 2 microns) we recommended to the Project and to Dr. Weiler that a zodiacal-light-limited spectral range of 0.6 to 10 microns form the basis for the upcoming Phase A study of NGST.

## The NGST External Science Review: Is NGST Ready for Prime Time?

*Peter Stockman stockman@stsci.edu*

Summer breezes in December brought an air of unreality to Baltimore. But on December 1 and 2, the real heat was felt in the STSci Boardroom. The NGST External Science Review (NESR, a nasty nested acronym), led by Rob Kennicutt, grilled the NGST Ad Hoc Science Working Group and the NGST Project on everything from science to budgets. The NESR is the brain-child of Harley Thronson, Acting Director of the Origins Theme at NASA Headquarters. His motive was to make sure that the science program was sufficiently important and robust that the NGST would still be breaking new ground in 2007, after ten years of two Kecks, four VLTs, the Geminis, Subaru, Magellan, the LBT, etc. In addition, Harley asked the NESR to look at the entire Project, the technology plans, the telescope designs, and the overall budget with the viewpoint of the astronomy community. Is this Project ready to move into Phase A? An earlier independent review by engineers and managers, the Standing Review Board, had given a green light to the Project, but HQ wanted a representative group of scientists to check the health of the activity. Harley intends to have similar reviews of all the Origins missions periodically.

The NESR was briefed on the overall science goals by members of the ASWG representing the five science themes. Simon Lilly led off with a discussion of the original “Dressler core mission” for NGST, the origin and evolution of galaxies. He was followed by Bob Kirshner (cosmology), Mike Rich (history of the Milky Way and its neighbors), Mike Meyer (the birth and formation of stars), and Marcia Rieke (the origins and evolution of planetary systems). The review group also heard about plans for soliciting and constructing the NGST science instruments and the possible contributions from ESA and the Canadian Space Agency (CSA).

The preliminary verbal report of the NESR on December 2 was positive. Their final report, which is under preparation, will be sent directly to Dr. Thronson and the NGST Project. It is expected to raise significant issues for the Project to address during Phase A. The members of the NESR are: Rob Kennicutt, Chair, Len Cowie, Alan Dressler, Mark Dickinson, Harriet Dinerstein, Richard Ellis, John Hutchings, Anne Kinney, Jill Knapp, Richard Kron, Steve Shore, Charles Steidel, Alan Tokunaga, Mark Voit, Mike Werner, Ned Wright.





## The European Space Agency (ESA) and NASA agree on NGST Collaboration

Peter Jakobsen (ESTEC)

As a result of NASA's invitation to ESA to participate in its ongoing studies of NGST, a framework for future collaboration on the project has recently been reached by the two agencies. The draft agreement assumes that ESA will participate in the project at the level of a so-called "F" class mission (~200 M\$) — in the parlance of its Horizon 2000 long-term plan — in return for a guaranteed minimum of 15% of NGST observing time for ESA member state astronomers. The envisaged ESA/NASA NGST collaboration conforms closely to the successful *HST* model; i.e. it assumes that a key component of ESA's hardware contribution will be in the form of a scientific instrument, augmented by contributions to the spacecraft and operations.

ESA is presently sponsoring three studies by scientific consortia and aerospace industries of various potential instrument and telescope concepts for NGST. These studies are scheduled to be completed during 1999 and will form the basis for identifying ESA's potential hardware contributions to the mission. To aid in this process, an ESA NGST Study Science Team has been appointed (see box), and an exchange of members and information with the corresponding ASWG has been instituted.

Once ESA's contributions to NGST have been further defined and agreed upon, final approval of ESA's participation in NGST will be sought in 2001.

### ESA NGST Study Science Team:

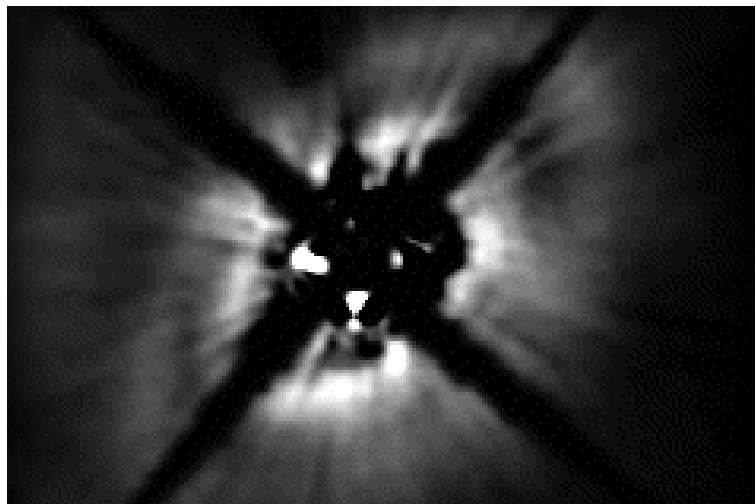
*S. Arribas (Tenerife)*  
*C. Burrows (ESA/STScI)*  
*R. Davies (Durham)*  
*E. van Dishoeck (Leiden)*  
*A. Ferrara (Arcetri)*  
*R. Fosbury (ESA/ST-ECF)*  
*J. Hjorth (Copenhagen)*  
*P. Jakobsen (ESA/ESTEC - Chair)*  
*O. Le Fèvre (LAS, Marseille)*  
*J. Mather (NASA/GSFC)*  
*M. McCaughrean (Potsdam)*  
*P. Schneider (MPE, Garching)*  
*P. Stockman (STScI)*

## HST Recent Release: Gap In Stellar Dust Disk May Be Swept Out By Planet

A striking *HST* near-infrared picture of a disk around the star HD 141569, located about 320 light-years away in the constellation Libra. Hubble shows that the 75 billion-mile wide disk seems to come in two parts: a dark band separates a bright inner region from a fainter outer region.

Credit: Alycia Weinberger, Eric Becklin (UCLA), Glenn Schneider (University of Arizona) and NASA

<http://opposite.stsci.edu/pubinfo/pr/1999/03/index.html>



## NGST Detector Workshop

April 20-21, 1999 at the Space Telescope Science Institute

NGST will be NASA's foremost infrared observatory beginning in 2007. To exploit the scientific capabilities of a cooled 8 meter-class telescope in space, close coordination between instrument designers and detector suppliers is required today. To facilitate this relationship, the STScI will host a detector technology workshop in Baltimore on April 20-21, 1999.

The main goals of the workshop are:

- To identify the requirements for and trade-offs involved in creating detectors for NGST science,
- To summarize current experience in the ground-based and space-based community with IR detectors,
- To educate instrument designers and the NGST science community on the detector technologies likely to be available for use for NGST, and
- To promote good working relationships between detector suppliers and the rest of the NGST community.

Interested astronomers, instrument developers, and detector suppliers are urged to obtain further information about planning and registration for the conference on its web page:

[http://www.stsci.edu/ngst/detector\\_conf.html](http://www.stsci.edu/ngst/detector_conf.html)

## Fine Guidance Sensors

Ed Nelan, STScI [nelan@stsci.edu](mailto:nelan@stsci.edu)

As reported in earlier *Newsletters*, FGS1r has demonstrated that it significantly outperforms FGS3 in its ability to detect and resolve close binary systems. As a result, it has been designated the astrometer for Cycle 8. To perform well as a science instrument, an FGS's interferometric response must have both optimal fringe visibility and long-term stability. During its first 9 months in orbit, FGS1r showed significant evolution of its interferograms, presumably due to out gassing of the instrument's graphite epoxy composites. But more recent data obtained from Transfer Mode observations of a standard star suggests that FGS1r's fringes have stabilized to within 2%. This implies that the instrument can be accurately calibrated and reliably used for scientific investigations. (For perspective, a binary system with a small magnitude difference and a separation of 10 mas results in an interferogram which differs by 10% relative to that from a point source.) By contrast, FGS3, after 8 years in orbit, never achieved long term stability below about 18% (for unknown reasons). This variability

contributed to FGS3's inability to reliably resolve binary systems with angular separations less than about 20 mas.

## Spectrographs Group

Melissa McGrath [mcgrath@stsci.edu](mailto:mcgrath@stsci.edu)

STIS continued to operate smoothly during the transition to a higher execution rate for STIS observations following completion of the NICMOS science program. A new version (v2.0) of calstis was installed in the pipeline on November 10, 1998, and was made available to the public for downloading in the interim until the next STSDAS release. For details on the improvements available with version 2.0, see the STIS WWW pages (<http://www.stsci.edu/instruments/stis>). Further releases are planned and will be posted to that location. We also plan an update to the STIS portion of the Data Handbook to be released in early 1999. This will incorporate numerous enhancements made since the last update of the Data Handbook roughly 9 months ago.

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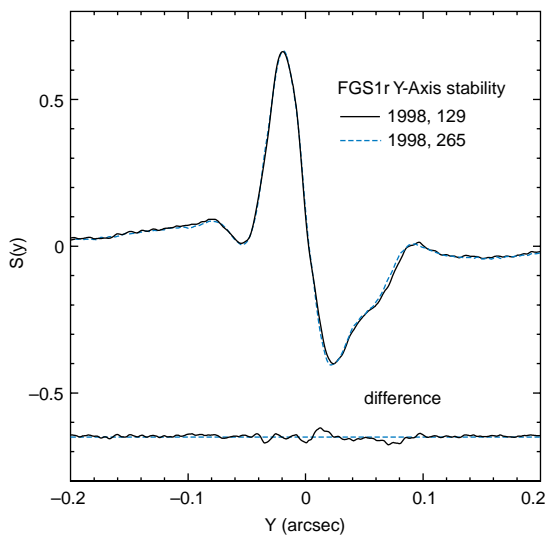
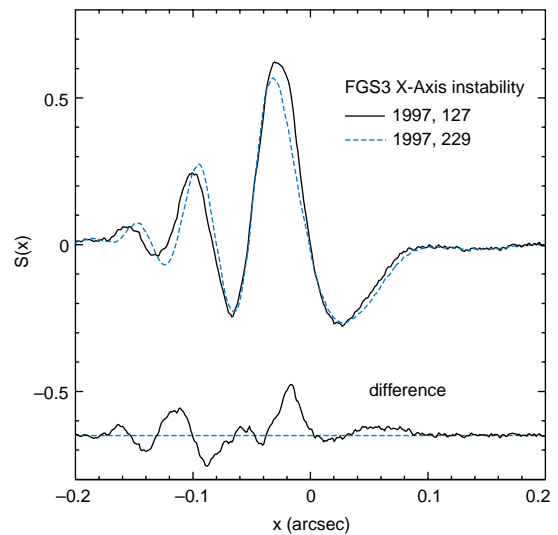


Figure 1 shows the remarkable stability of FGS1r's y-axis fringes over a 136 day interval (May 9 to September 22). For comparison, Figure 2 shows the persistent variability of FGS3's x-axis fringes over a similar time span. We will continue to monitor FGS1r's stability as Cycle 8 approaches.



FGS1r is equipped with the Articulated Mirror Assembly (AMA) which allows for in-flight alignment of the interferometer with HST's optical telescope assembly. The final AMA adjustment was made on October 12, resulting in near-ideal point-source fringes. A stable FGS1r with optimal fringes should be well suited for resolving structure down to 10 mas (or less) in objects as faint as  $V=15$ .

## Spectrographs *from page 30*

The HDF-South calibrated data were made available to the public on November 23. The data are beautiful, and completion of the very-detailed calibration work has resulted in numerous improvements to the pipeline calibration software, including better calibration reference files (e.g., both low-order and pixel-to-pixel flat fields for the MAMAs; low-order flat fields for the CCD clear and F28X50LP apertures), and some new data analysis tools (Spectrum Splicer and Optimal Extraction) that will be available soon.

We are beginning a transition to a new, more concise format for the *HST* Spectroscopy STAN (our electronic newsletter). At the beginning a high-level index of topics is given, accompanied by the web address where you can go to get all of the details. Below this, short summaries are provided for each topic. As before, the STAN will be posted on the STIS web site, where all of these topics will be hypertext links directing you to the full writeup.

Preparations are in progress for the development of the STIS Interface Kit (STIK) to the Aft Shroud Cooling System which will be installed in *HST* during the third servicing mission. The STIK will provide an added cooling capability for the STIS MAMA detectors. In addition to providing a thermal safety margin for the operation of the MAMA detectors, the added cooling capability has the potential to provide a reduced dark rate for NUV-MAMA and FUV-MAMA observations, and this would provide important science gains for UV observations of faint objects.

## WFPC2 Group

John Biretta [biretta@stsci.edu](mailto:biretta@stsci.edu)

**W**FP2 continues to perform flawlessly. In connection with the recent HDF-South campaign, we have examined many of the routine calibrations for low-level changes. In general, the news is good and the changes are very small. Both the number of permanent hotpixels and the low-level dark current continue to increase with time, presumably due to long-term radiation damage. The number of permanent hotpixels has increased by a factor ~2.5 since 1995 at all intensity levels, but these still represent a very small fraction of the total pixels (about 0.2%). In addition, the low-level dark current has approximately doubled in that time, and now ranges from ~7 to  $10 \times 10^{-4}$  DN/sec across the different CCDs. But again, this has little impact, and will only be an important noise source for long exposures in narrow band and

far-UV filters. Changes have also been seen in the flat fields, and are mostly due to small changes in the optical alignments inside the camera. These changes cause the positions of dust spots and other obscurations to shift, hence making bright/dark patterns in the flats. Most of the changes are about 0.5% or less, although there are ~100 spots across WFPC2, each a few pixels in size, where ~5% changes are seen. These are mostly associated with strong features in the existing flats. New super-darks have been generated, and work is underway to make new flats to calibrate-out these long-term changes.

Our group has recently completed a detail, hands-on guide to the drizzling software package, called the "Drizzling Cookbook." Most long-imaging observations made with *HST* now use position dithers to aid in removal of detector artifacts, as well as for enhancement of the spatial resolution. After the data are obtained, the images are aligned and combined using the Drizzle software package written by Andy Fruchter and Richard Hook. The new Cookbook gives detailed examples of the drizzling procedures for WFPC2, STIS, and NICMOS data for a wide range of targets. Input images, command scripts, and final images are also available on our WWW site, so that users can first practice on our examples before Drizzling their own data. The current cookbook illustrates the drizzling tasks in STSDAS as well as the "ditherII" update, which allows cosmic ray removal when there are only single images at each pointing. Work is underway to add additional capabilities to the drizzling software, including the ability to mosaic the 4 WFPC2 CCDs onto a single drizzled image. An update to both STSDAS and the Cookbook for these added capabilities is planned for next Spring.

A recent study of the *HST* long-range plan shows that opportunities for long, contiguous observations (more than 5 orbits) are over-subscribed. This is due to a number of factors, including a trend towards longer observations of fewer targets, and the recent suspension of NICMOS observing. We have taken a number of steps to alleviate this situation for WFPC2 observers. We have already asked a number of WFPC2 PIs to split their long visits into pairs of shorter ones wherever possible. This will avoid further scheduling delays and help observers obtain the same data sooner than otherwise. We also made the South Atlantic Anomaly avoidance region smaller for WFPC2. Approximately 0.1% of WFPC2 images will see some increase in cosmic rays as a result, but ~10% more time becomes available for scheduling long visits. Finally, for programs with short exposures, more effort will be

*continued page 32*

**WFPC2** *from page 31*

made to utilize short visibility periods which are often available in the schedule, rather than requiring the usual ~56 minutes of visibility per orbit. We believe these changes will be transparent to most observers and will mitigate the over-subscription.

For the latest WFPC2 news, and the Drizzling Cookbook, please see our WWW site at [http://www.stsci.edu/ftp/instrument\\_news/WFPC2/wfpc2\\_top.html](http://www.stsci.edu/ftp/instrument_news/WFPC2/wfpc2_top.html)

**Near Infrared Camera and Multiobject Spectrometer**

*Alex Storrs, STScI storrs@stsci.edu*

The Near-Infrared Camera and MultiObject Spectrometer (NICMOS) has entered its warmup stage. The solid nitrogen used to cool the detectors to 61.5 K (-349 F) is entirely gone, after almost two years of operation. The first evidence of this depletion came in late August, when the temperature at the back of the dewar (the container of solid nitrogen) and the temperature of the nitrogen ice were observed to differ. This deviation indicated that the nitrogen had sublimated away from the end of the dewar farthest from the detectors.

A second indicator of the impending depletion of cryogen was when the temperature at the detector mounting cup started to rise. Although the detector temperature has been increasing steadily throughout the

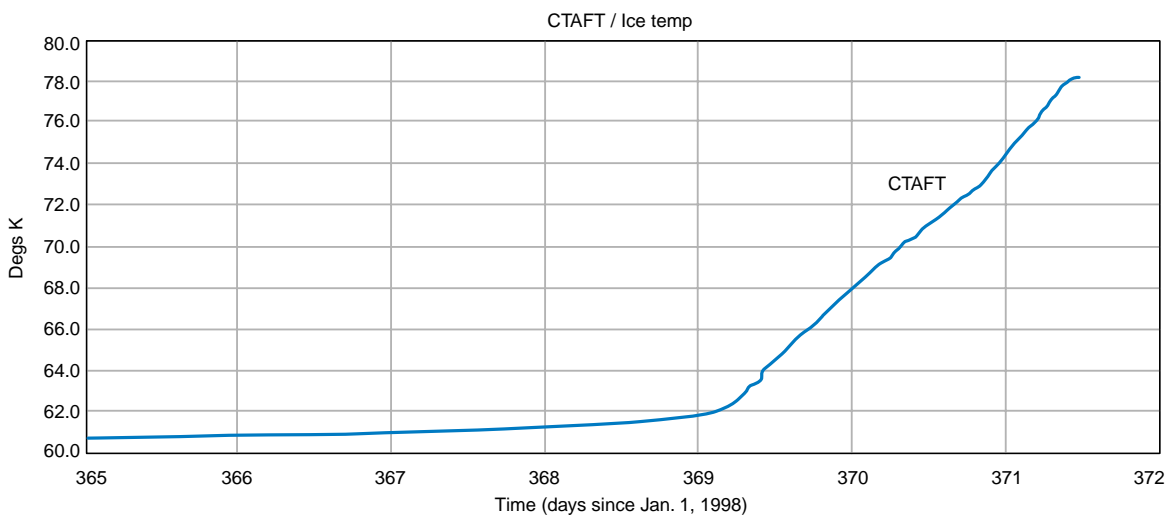
instrument's lifetime, the rate of increase jumped sharply in the early days of December.

The final indicator of cryogen depletion was a marked increase in the rate of temperature change. The official end of cryogen life was on Sunday January 3rd, when all the temperature sensors indicated a surge of 0.5 K in eight hours. This rate of increase was 19 times that seen previously. At this time the detectors were at about 64 K and the aft end of the dewar was at about 62 K. The temperature soared through 78 K, the highest temperature for which the thermometers are calibrated. This change is illustrated in Figure 1.

NICMOS was prohibited from moving its filter wheels on January 6th (at 1435 UT) by ground commanding. Monitoring observations (see below) continued through the end of the week, but with the BLANK filter in place. All NICMOS observations were pulled out of succeeding weeks' schedules, and the instrument put in a hibernating state.

The NICMOS group has constructed an addition to our web site ([http://www.stsci.edu/ftp/instrument\\_news/NICMOS/topnicmos.html](http://www.stsci.edu/ftp/instrument_news/NICMOS/topnicmos.html)) that contains up-to-date information on the depletion of the cryogen. We have observed the behavior of the detectors as they pass through the circa 77 K region where the NICMOS Cooling System (NCS, or "cryocooler") will operate. This data will give us a head start at determining the performance of NICMOS in Cycle 9, and allow potential observers a chance to predict how well NICMOS can perform their observations. The detectors

*continued page 33*



*The temperature of the aft end of the NICMOS dewar in late 1998. Note the inflection in the trend on January 4, 1999 (day 369), indicating the depletion of the cryogen. (courtesy John Bacinski, STScI)*

*NICMOS from page 32*

warmed up through the NCS operational temperature range quite quickly (see Fig. 1), and the effects of this passage are not well known yet.

The NICMOS group has monitored the focus, flat field, and dark current behavior on a regular basis. Program 7961 took lamp flats four times a day in a number of filters in all three cameras. Its goal is to follow the QE variations as a function of temperature and wavelength to provide sensitivity estimates for NCS operation. Program 7962 observed a star cluster twice a week in order to monitor possible focus variations due to varying mechanical stresses in the dewar. Program 7963 took darks in all three cameras once every orbit that was not affected by the South Atlantic Anomaly (SAA), or used for one of the other two monitoring proposals. These data will allow us to check for any temperature-induced electronic effects.

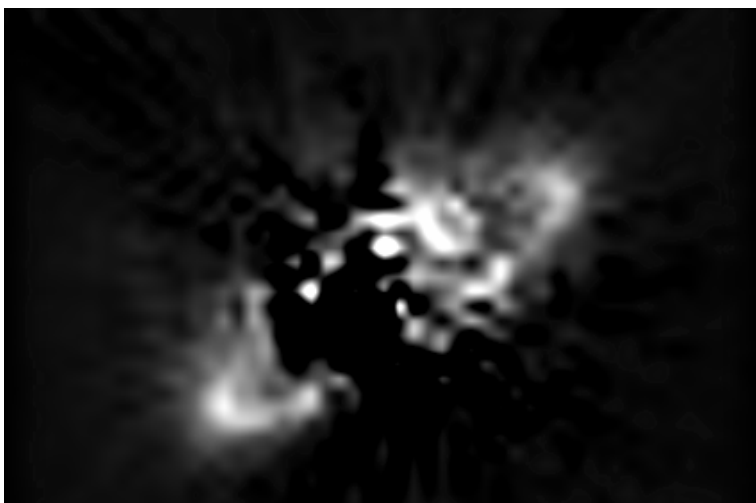
The detector temperature change has caused only a few percent variations in the flat field response of the detectors, an expected development as their sensitivity increases with temperature. There has been only small changes in dark current as well, although individual pixels have been observed to suddenly start emitting much more dark current as the temperature increases. A change of 1 K or more will require a new set of calibration files, however, the temperature variation

should not effect observations taken in December. The focus has been steady. NIC1 and NIC2 remain near their nominal focus values, and NIC3 has if anything gotten closer to being in focus. It has been hovering around -12 mm in PAM units. Note that the PAM can only be adjusted to about -9.5 mm, so observers at short wavelengths with NIC3 will continue to see some degradation in their ability to detect faint point sources.

One major observing benchmark was passed on November 15, the "end of science" (EOS) date for NICMOS in the long range plan. At that time, 97% of NICMOS science had been scheduled. The remainder was either constrained to be schedule beyond EOS, or were repeats of failed observations. The latest of these observations successfully executed on December 18th. Thus no science observations should be affected by the temperature changes discussed above.

There were many intriguing abstracts based on NICMOS data at the January AAS meeting in Austin, TX. See the AAS website (<http://www.aas.org/meetings/aas193/program/index.html>) for details. Press releases and images can be found at the STScI Office of Public Outreach web site (<http://opposite.stsci.edu/pubinfo/pr.html>) as usual.

*We are pleased to note that NICMOS Instrument Scientist Al Schultz received an Honorable Mention in the sciences category from Computer Sciences Corporation for his work "First Results from the Space Telescope Imaging Spectrograph: Optical Spectra of Gliese 229B." He received his award in a ceremony at CSC December 15, 1998.*



### *HST Recent Release: Dust Ring Around Star Offers New Clues Into Planet Formation*

*A NASA Hubble Space Telescope false-color near infrared image of a novel type of structure seen in space — a dust ring around a star. Superficially resembling Saturn's rings — but on a vastly larger scale — the "hula-hoop" around the star called HR 4796A offers new clues into the possible presence of young planets.*

*Credit: Brad Smith (University of Hawaii), Glenn Schneider (University of Arizona), and NASA*

<http://opposite.stsci.edu/pubinfo/pr/1999/03/index.html>



## Multi-Mission Archive at the Space Telescope Science Institute (MAST) News

Paolo Padovani, [padovani@stsci.edu](mailto:padovani@stsci.edu)

### Hubble Data Archive

Archive ingest reached a record value of 174 Gbytes (5.8 Gbytes/day) in November. The average monthly ingest rate for the past year has been around 5 Gbytes/day. Retrieval rates have been about 4 times larger, with a record high of 22 Gbytes/day in June. On October 22, at 23:10 GMT, STScI began processing the 250,000th *HST* observation since launch in May, 1990.

### Guest Account Discontinued

The guest account on the Archive host machine ([archive.stsci.edu](http://archive.stsci.edu), also known as [stdatu.stsci.edu](http://stdatu.stsci.edu)) has been discontinued. This account was used by some users to run StarView from our machine and display the screens back to theirs. It had originally been planned that the guest account would be closed by the end of the year. For security reasons, however, we have been forced to move up the date. Our apologies for any inconvenience this will cause. Users using SunOS 4.1.3, Solaris 2.4, Digital Unix on Alpha, and OpenVMS on both VAX and Alpha can install StarView on their machine. This will be much faster than running it remotely and displaying the windows locally. The Hubble Data Archive can also be searched on the World Wide Web (WWW) at <http://archive.stsci.edu/cgi-bin/nph-hst>. Users having problems with both these options should contact us at [archive@stsci.edu](mailto:archive@stsci.edu).

### StarView Release 5.4

StarView 5.4 was released in November. To avoid problems with both searches and retrievals, we recommend that users update any locally-installed StarView software. Installation instructions are available at [http://archive.stsci.edu/hst/distributed\\_starview.html](http://archive.stsci.edu/hst/distributed_starview.html). The main new features of this release include changes in preparation for the On-The-Fly Calibration, the possibility of perform-

ing cross-correlations from custom queries, and updates to reflect database structure changes.

### Hubble Deep Field Data Available

As most of our readers should know by now, a second Hubble Deep Field (HDF) campaign was carried out with *HST* in October 1998. The selected field is located in the southern Continuous Viewing Zone (J2000 coordinates 22:32:56.2 -60:33:02.7). All HDF-South data, including derived object catalogs prepared by the STScI HDF-South team, were made available on November 23 1998 at 20:00 GMT. The data can be retrieved via anonymous ftp at <ftp://archive.stsci.edu/pub/hdf-south/version1>. Further details about the HDF-South, including flux limits and flanking field observations, can be found on the WWW at <http://www.stsci.edu/ftp/science/hdf/hdfsouth/hdfs.html>.

### New Digitized Sky Survey Jukebox

The WWW page of the Digitized Sky Survey (DSS), at <http://archive.stsci.edu/dss/>, is one of the most popular pages of our WWW server. Since this service was opened in May 1995, usage has steadily increased up to one to two thousand accesses per day. This has strained the original jukebox to its limits, forcing us to replace it. The new jukebox is much faster than the old one and is providing easier access to the DSS images.

### New MAST Page

A new main entry page for the Multi-Mission Archive at the Space Telescope Science Institute (MAST) WWW site has been implemented at <http://archive.stsci.edu/mast.html>. A new form allows the user to locate available data sets according to wavelength range and data type. This is another step to make the MAST site relevant

for those users not familiar with the individual missions and instruments and to focus on the scientific content of the archives. The page continues to provide links to the WWW pages of the various archives, the cross correlation search, and other general information.

## 1999 STScI May Symposium

As announced in the last *Newsletter*, the 1999 May Workshop is titled "The Largest Explosions since the Big Bang: Supernovae and Gamma-Ray Bursts" and will be held from from May 3 to 6, 1999. A complete program is not yet available, but the speakers will include:

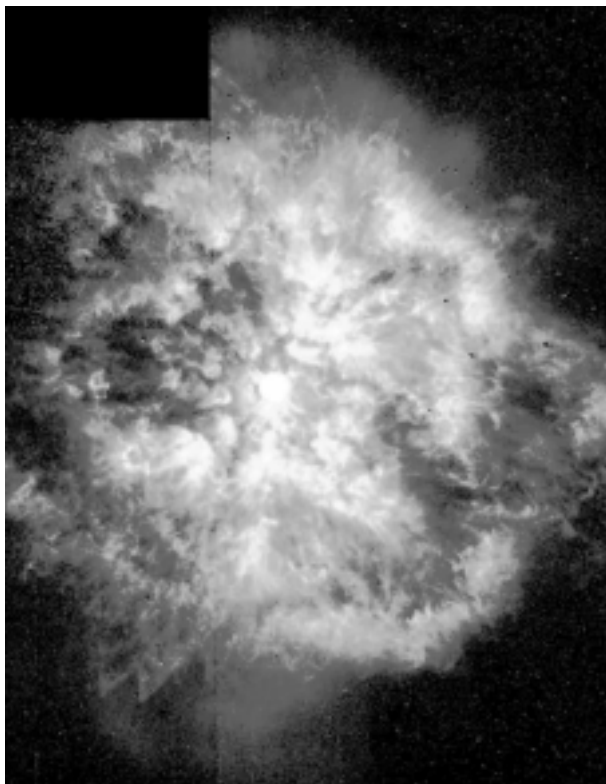
D. Arnett  
 D. Branch  
 R. Chevalier  
 Y.-H. Chu  
 D. Frail  
 A. Fruchter  
 A. Khokhlov  
 R. Kirshner  
 C. Kouveliotou  
 S. Kulkarni  
 M. Livio  
 K. Nomoto  
 B. Paczynski  
 S. Perlmutter  
 E. Pian  
 T. Piran  
 L. Piro  
 M. Rees  
 A. Sandage  
 B. Schmidt  
 J. van Paradijs  
 E. Waxman  
 K. Weiler  
 J. C. Wheeler  
 S. Woosley.

## A 1999 Summer Student Program at STSci

The Space Telescope Science Institute will again host a dozen or more undergraduate research interns in the summer of 1999. We encourage you to let students know about this opportunity. Complete information may be found at our web page: <http://www.stsci.edu/stsci/summer.html>

Applications will be due February 15, 1999.

Specific inquiries may be made to David Soderblom ([soderblom@stsci.edu](mailto:soderblom@stsci.edu)), but please read the web page first.



### HST Recent Release: Great Balls of Fire

Resembling an aerial fireworks explosion, this dramatic HST picture of the energetic star WR124 reveals it is surrounded by hot clumps of gas being ejected into space at speeds of over 100,000 miles per hour. Also remarkable are vast arcs of glowing gas around the star, which are resolved into filamentary, chaotic substructures, yet with no overall global shell structure.

Credit: Yves Grosdidier (University of Montreal and Observatoire de Strasbourg), Anthony Moffat (Universit  de Montreal), Gilles Joncas (Universit  Laval), Agnes Acker (Observatoire de Strasbourg), and NASA

<http://opposite.stsci.edu/pubinfo/pr/1998/38/index.html>

## Calendar

### Cycle 8

Phase II Proposals Due February 18, 1999 (firm)

### Cycle 9

Call for Proposals issued June, 1999 (tentative)  
Phase I proposals due September, 1999 (tentative)  
Proposers notified December, 1999 (tentative)  
Phase II Proposals Due February, 2000 (tentative)  
Routine Observing Begins June, 2000 (tentative)

### Meetings and Symposia

May Symposium May 3-6, 1999

## ST-ECF Newsletter

The Space Telescope — European Coordinating Facility publishes a quarterly newsletter which, although aimed principally at European Space Telescope users, contains articles of general interest to the HST community. If you wish to be included in the mailing list, please contact the editor and state your affiliation and specific involvement in the Space Telescope Project.

### Robert Fosbury (Editor)

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How to contact us:

First, we recommend trying our Web site: <http://www.stsci.edu>  
 You will find there further information on many of the topics mentioned in this issue.

**Second, if you need assistance on any matter send e-mail to [help@stsci.edu](mailto:help@stsci.edu) or call 800-544-8125. International callers may use 1-410-338-1082.**

Third, the following address is for the *HST* Data Archive:  
[archive@stsci.edu](mailto:archive@stsci.edu)

Fourth, if you are a current *HST* user you may wish to address questions to your Program Coordinator or Contact Scientist; their names are given in the letter of notification you received from the Director, or they may be found on the Presto Web page <http://presto.stsci.edu/public/propinfo.html>.

Finally, you may wish to communicate with members of the Space Telescope Users Committee (STUC). They are:

Fred Walter (chair), SUNY Stony Brook,  
[fwalter@sbast1.ess.sunysb.edu](mailto:fwalter@sbast1.ess.sunysb.edu)

Bruce Balick, U. Washington

John Bally, U. Colorado

John Clarke, U. Michigan

Bob Fosbury, ESO

Jay Frogel, Ohio State University

Laura Kay, Barnard College

Pat McCarthy, O.C.I.W.

Felix Mirabel, CEA-CEN Saclay

Sergio Ortolani, Padova

Regina Schulte-Ladbeck, U. Pittsburgh

Sue Tereby, Extrasolar Research Corp.

Rodger Thompson, U. Arizona

Harold Weaver, JHU

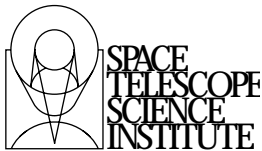
Bruce Woodgate, GSFC

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