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[S0002-7537(93)03951-4]

The period covered by this report is from October 2000 through September 2002.

1. INTRODUCTION

A major highlight during 2002 was the early success of the Advanced Camera for Surveys (ACS) on the *Hubble Space Telescope*. ACS Principal Investigator, Professor Holland Ford, and a team from JHU including many scientists at the Space Telescope Science Institute, provided scientific guidance for this project. The creativity and hard work of the *Far Ultraviolet Spectroscopic Explorer* (*FUSE*) team centered at JHU has enabled *FUSE* to maintain a very high level of scientific productivity in the face of daunting technical challenges. The Sloan Digital Sky Survey (SDSS) is a collaborative effort with a major JHU role. It has now imaged about 20 million galaxies and stars and obtained spectra for nearly 200,000 galaxies and quasars. The SDSS will provide the ‘‘backbone’’ for the National Virtual Observatory, with a team at JHU leading the way. We continue to grow in the field of high-energy astrophysics, with the highlight being the characterization of the sources that make up the cosmic X-ray background using ultra-deep images of the *Chandra* Deep Field South. Finally, we continue to pursue a broad range of research in theoretical astrophysics and ground-based observational astronomy.

2. PERSONNEL

Permanent Staff are Professors S. Beckwith (Director, Space Telescope Science Institute), P.D. Feldman, H.C. Ford, K. Glazebrook, T.M. Heckman (Director, CAS), R.C. Henry (Director, Maryland Space Grant Consortium), B.R. Judd, C.W. Kim, J.H. Krolick, H.W. Moos, D. Neufeld, C.A. Norman, D.F. Stobel, A. Szalay, E.T. Vishniac and R.F.G. Wyse, Research Professors W. P. Blair, R. Giacconi, Associate Research Professor Z. Tsvetanov, Visiting Professor M. Finkenthal, Adjunct Associate Professor G. Kriss, and Adjunct Assistant Professors D. Figer (STScI) and K. Weaver (GSFC).

Principal Research Scientist is L. Bianchi.

Research Scientists are S. Friedman, D. Golimowski, M.E. Kaiser, J. Kruk, S. McCandliss, G. Meurer, D. Sahnow, D. Stutman, A. Uomoto, T. Yaqoob and W. Zheng

Associate Research Scientists are B.G. Andersson, N. Benitez, J. Blakeslee, D. Christian, E. Colbert, W.V. Dixon, J. Dupuis, G. Fekete, N. Grogin, C. Gronwall, C. Holmes, C. Hoopes, M. Houdashelt, C. Howk, P. Kunst, N. Lehner, A. Martel, F. Menanteau, A. Ptak, S. Ridgway, R. Sankrit, S. Savaglio, R. Shelton, M. Sirianni, A. Thakar, H. Tran and G. Williger.

Visiting Scientists are P. Chayer, A. Fullerton, D. Pacella, E. Perlman, P. Rosati and J. Wiseman.

Postdoctoral Fellows are A. Aloisi, D. Ardila, I. Baldry, B. Blagojevic, T. Budavari, N. Cross, R. Gal, J. Herald, D. Knauth, B. McKernan, M. Ninomiya, B. Otte, P. Sonnentrucker, D. Strickland, R. Swaters, J. Wang and J. Zsargó.

3. PROJECTS

3.1 Advanced Camera for Surveys

After seven long years of development, the Advanced Camera for Surveys (ACS) was launched aboard the space shuttle *Columbia* 1 March 2002, 6:22 a.m. EST and six days later installed in the *Hubble Space Telescope* (*HST*) by space-walking astronauts during Servicing Mission 3B (STS-109). Only hours after installation, ACS principal investigator and scientific lead Professor Holland Ford and team members M. Clampin (STScI), G. Hartig (STScI), A. Martel, Wm.J. McCann (JHU), M. Sirianni, and P. Sullivan (GSFC) watched as the camera passed first its aliveness test and then its functional test. Subsequent tests have shown that the ACS meets (and exceeds in some areas) its technical specifications for the Wide Field and High Resolution Cameras; ACS increases the discovery efficiency of the *HST* by a factor of ten or more in the blue and the near infrared at 800 nm. ACS consists of three electronic cameras and a complement of filters and dispersers that detect light from the ultraviolet to the near infrared (1200–10,000 Å).

On April 30, 2002, the first spectacular photos from ACS were released. Throughout the summer of 2002, the ACS science team of more than 30 scientists, postdocs and graduate students from Johns Hopkins, the Space Telescope Science Institute, the University of California, Santa Cruz and various institutions in Europe have been analyzing the data. Members of the ACS team presented their first round of post-launch instrument description and early science results papers at the SPIE meeting in August. In mid-October, Tran *et al.* submitted to ApJL the first science results on the young star clusters in the tidal tail of the interacting galaxy UGC 10214. The team is presently working on a wide range of ACS projects, including coronagraphic images of debris disks around nearby stars, the host galaxy of the quasar 3C273, strongly lensing clusters, clusters of galaxies at redshifts $z\sim1$, and proto-clusters at $z>4$. For more information about this project, please visit http://acs.pha.jhu.edu.

The ACS owes its high quality to the hard work of a large number of talented and dedicated people at Ball Aerospace, the Goddard Space Flight Center, the Space Telescope Science Institute, and the members of the ACS Science and Engineering Team.

3.2 Far Ultraviolet Spectroscopic Explorer

The Far Ultraviolet Spectroscopic Explorer (*FUSE*) is an orbiting astronomical observatory designed to obtain high-resolution spectra of faint sources in the wavelength region between 905 and 1187 Å . *FUSE* is part of NASA's Origins program: it was developed by NASA in collaboration with the space agencies of Canada and France, under the leadership of JHU and with the participation of the University of Colorado, UC Berkeley, and several commercial companies. It was launched into low-Earth orbit on June 24, 1999, and is operated from the Bloomberg Center on JHU's Homewood campus under the direction of Professor H. Warren Moos (Principal Investigator) and Research Professor William P. Blair (Chief of Observatory Operations). Comprehensive information about all aspects of the *FUSE* mission may be found at `http://fuse.pha.jhu.edu/`.

FUSE began the final year of its three-year prime mission on December 1, 2001. Cycle 3 marks a new phase of the mission, in which the largest fraction of observing time is earmarked for programs from Guest Investigators rather than those developed by the Principal Investigator Team. Unfortunately, Cycle 3 was delayed by the failure of a second (of 4) reaction wheel on December 10, 2001. Through the efforts of the *FUSE* operations staff and attitude control specialists at Orbital Sciences Corporation and NASA's Goddard Space Flight Center, an entirely new attitude-control system was developed and tested in six weeks. Active control of the satellite was regained on January 27, 2002, with a system based on the two functioning reaction wheels and the spacecraft's magnetic torquer bars, which provide stabilization about a third axis through controlled interactions with Earth's magnetic field. After a month of intensive observations to characterize operations with the new attitude control system, observations for Cycle 3 resumed on March 1, 2002. Although the scheduling and implementation of science observations is more complex and there are additional sky coverage constraints, there has been negligible impact on the quality of *FUSE* spectra.

At the mid-point of Cycle 3, *FUSE* has obtained far-ultraviolet spectra of more than 1,650 different objects for a total integration time of nearly 24.8 Ms. More than 100 papers based on *FUSE* spectra have been published in the refereed literature. Particular highlights include eight papers published back-to-back in the May 2002 edition of the *Astrophysical Journal Supplement Series* that describes the first results of the comprehensive *FUSE* program to determine the ratio of deuterium to hydrogen in the local interstellar medium; detailed studies of molecular hydrogen in the Magellanic Clouds and along various Galactic lines of sight; the detection of the Gunn-Peterson effect in the intergalactic medium in singly ionized helium; and the production of far ultraviolet atlases of the spectra of early-type stars in the Galaxy and Magellanic Clouds. A list of *FUSE* publications is maintained at `http://fuse.pha.jhu.edu/papers/papers.html`.

Despite ongoing operational challenges, the outlook for *FUSE* toward the end of its prime mission is very positive. The NASA Senior Review of 2002 funded the extension of the *FUSE* mission for an additional two years, through Cycle 5, and recommended a further extension through Cycle 7. Cycle 4 is scheduled to begin on April 1, 2003. All observing time during the extended mission will be devoted to programs proposed by the international Guest Investigator community and selected by NASA. After a six-month proprietary period, *FUSE* data are publically available through the Multimission Archive at Space Telescope (MAST; see `http://archive.stsci.edu/fuse/`). This treasure-trove of spectra will keep investigators busy for years, and represents the true legacy of *FUSE*.

3.3 The National Virtual Observatory (NVO)

The National Virtual Observatory (NVO), led by Principal Investigator Professor Alex Szalay will unite the astronomical databases of many earthbound and orbital observatories. In conjunction with computer scientist R. Williams (Caltech), this project will take advantage of the latest computer technology, data storage and analysis techniques to build the framework for the Virtual Observatory, a facility that will organize all available astronomy data and literature into a coherent whole, regardless of differences in data formats. The NVO will be accessible by anyone, from anywhere on the Internet. The National Science Foundation, which has started this project with a five-year, $10 million Information Technology Research grant titled "Building the Framework of the National Virtual Observatory," announces that this will "put the universe on line." The system will provide an efficient synthesis of data over a wide range of wavelengths and time intervals, from many different observatories and instruments. It will open up new areas of research that are currently impractical or impossible. The Virtual Observatory will provide a unique and powerful base for teaching astronomy, for demonstrating the process of scientific discovery to students and the public, and for sharing the benefits of new developments in information technology.

4. RESEARCH AND ACTIVITIES

Alessandra Aloisi worked with Tim Heckman (PI, JHU) and several collaborators on the characterization of the properties of a sample of starburst galaxies observed with *FUSE*. The analysis is still in progress. One goal of the project is the derivation of an extinction law in the FUV from the spectra of the sample. They are also performing a detailed analysis of the stellar population content in each starburst. This study is performed with the help of the stellar evolutionary synthesis code Starburst99, very recently implemented by Aloisi and collaborators (Robert *et al.* 2002, ApJ, in press) with a FUSE library of O & B star spectra.

Aloisi and collaborators finished a pilot study on the determination of the heavy element abundances in the neutral gas of IZw18 (Aloisi *et al.* 2002, ApJ to be submitted). The *FUSE* spectrum has been retrieved from the archive, and a line-profile fitting technique has been applied to derive the column densities from the absorption lines. The results imply that the neutral interstellar medium of IZw18 is not primordial: a certain amount of heavy elements is already present, requiring the enrichment from a star-formation episode at least 1 Gyr old. The relative abundances of alpha-elements and iron are different in the neutral and ionized gas, implying self-enrichment of the H II regions by the very recent ongoing burst.

Aloisi, M. Tosi (Bologna Obs.) and collaborators studied the stellar population of a sample of starbursts (NGC 1569, and NGC 1705) resolved with *HST* in the optical and near-IR (Aloisi *et al.* 2001, AJ, 121, 1425; Origlia *et al.* 2001, AJ, 122, 815; Tosi *et al.* 2001, AJ, 122, 1271; Annibali *et al.* 2002, AJ submitted). The technique of the synthetic color-magnitude diagrams was applied to infer the star-formation history of these starbursting systems. Both galaxies resulted to have a stellar population which is at least 1 Gyr old. In the case of NGC 1705, a gasping star-formation activity was characterized, and a quite intense burst in the last 15–10 Myr was registered. This burst is comparable to the high star-formation rates inferred for the Lyman break galaxies at high redshifts. A certain metallicity gradient was discovered for NGC 1705, with the most metal-rich old stars in the outskirts, and the most metal-poor old stars around the central super-star cluster. This could imply induced star-formation through the propagation of the ejecta from massive stars.

Bengt-Goran Andersson is an associate research scientist and head of the *FUSE* User Support Group. His main research is focused on the transition regions from molecular to atomic medium in interstellar clouds. He specializes in multi-wavelength observations, including mm-wave, optical and UV spectroscopy and optical polarimetry.

David R. Ardila joined the ACS Science team in September 2002. He has been collaborating in the analysis of the coronagraphic observations of circumstellar disks. As part of this collaboration, an *Astrophysical Journal Letters* about HD141569A was submitted for publication in mid-October 2002. This is an AOV with a debris disk around it. Ardila's ultimate goal in this work is to advance our physical understanding of these systems, through modeling or additional observations.

Professor **Steven Beckwith**'s main research interests are the formation and early evolution of planets including those outside the Solar System and the birth of galaxies in the early universe. Through his responsibility for the *Hubble Space Telescope* science program, he has the opportunity to delve into some of the most interesting questions of modern astrophysics. He has published many research articles and lectures extensively to both the general public and professional audiences. He also contributes his time to advisory committees on research policy that help shape the landscape of funding for major astronomy projects throughout the world.

Narciso Beni´tez is an associate research scientist on the ACS team. In preparation for ACS data, Benitez has been involved in the development of the ACS science pipeline, focusing on the analysis of faint galaxy populations. He is also working on a new method and code for strong lensing modeling. With JHU graduate student D. Coe, Benitez is researching weak lensing on Abell 1689 using ACS and Keck observations. In February 2002, Benitez *et al.* published a widely publicized paper, ‘‘Evidence for Nearby Supernova Explosions’’ that posits that a global extinction of some marine life could be linked to a supernova explosion that occured two million years ago. Benitez' main areas of research are gravitational lensing and galaxy evolution.

Luciana Bianchi is a principal research scientist and continues to lead a study of hot massive stars in Local Group galaxies with *HST*, *FUSE* and ground-based data. Recent results and preprints can be found on the web site `http://dolomiti.pha.jhu.edu`. Detailed modeling of hot massive stars spectra from the far-UV (*FUSE*) to the optical wavelength range, using NLTE, line-blanketed, hydrodynamic models, indicate that these stars are significantly cooler (15–20 percent) than previously thought. Their luminosities are consequently lower. The results have important implications for understanding evolution of massive stars and energy balance of H II regions (e.g., Bianchi & Garcia, ApJ, Dec. 2002, and Bianchi *et al.* 2002 RMxAA, in press).

Bianchi's programs for characterization of young stellar populations in nearby galaxies are continuing using data from *HST* and VLT (e.g., Bianchi *et al.* 2001, PASP, 113, 697; Bianchi *et al.* 2001, AJ, 121, 2020). Additionally, Bianchi carried out a number of *FUSE* observing programs on Central Stars of Planetary Nebulae in the Galaxy and Magellanic Clouds. The *FUSE* data (complemented with *HST*, *IUE* and ground-based data), provided improved determinations of the central star's parameters, and a measure of the circumstellar molecular and neutral hydrogen. The mass of the central star, plus the ionized shell and the molecular hydrogen shell give an observational test to the initial-final mass relation for intermediate-mass stars (e.g., Herald & Bianchi, ApJ, Dec. 2002, and Herald & Bianchi, 2002, RMxAA, in press). Collaborators at JHU to Bianchi's research programs are associate research scientist David Thilker, postdoctoral associate James Herald, and graduate students Miriam Garcia and Alin Tolea.

Bianchi is also co-investigator of the NASA SMEX mission GALEX (The Galaxy Evolution Explorer). GALEX will be launched in early 2003 to perform Ultraviolet imaging and spectroscopic surveys of the sky during a 28-month mission. Bianchi is currently serving on the Organization Committee of IAU Comm. 42, and on the NASA MUG group.

Since the last report, **William P. Blair** was promoted to Research Professor. Also, in December 2000, he became the Chief of Observatory Operations for the *FUSE* project. In September 2002, he was appointed to *FUSE* Co-Investigator status by NASA. While these duties have taken the bulk of his time, Blair has continued his independent research projects on supernova remnants and the interstellar medium using *FUSE*, *HST*, the *Chandra X-ray Observatory*, and other space and ground-based observatories.

With JHU graduate student C.W. Danforth, and J.C. Raymond (SAO), Blair published a detailed UV/ optical analysis of the shocked cloud known as the ‘‘XA region’’ in the Cygnus Loop. The UV data came from the Hopkins Ultraviolet Telescope and *IUE*. Combining these data with optical ground-based images and spectra of the same regions, they have characterized the spatial distributions of the various emissions and investigated the effects of resonance line scattering. They interpret the observed structure as the interaction of the blast wave with a possible protrusion from the cavity wall that bounds the perimeter of the Cygnus Loop. With T. A. Gaetz (SAO) and P. Plucinsky (SAO), Blair is collaborating on *Chandra* investigations of both the Cygnus Loop and Vela supernova remnants.

Work with data from *FUSE* has taken on several forms. With R. Sankrit (JHU) and collaborators, observations of the Vela SNR and the Cygnus Loop have been analyzed and published. With C. G. Hoopes (JHU) and collaborators, *FUSE* data intersecting a supernova remnant in the Small

Magellanic Cloud have been published. An atlas of *FUSE* sight lines toward stars in the Magellanic Clouds has been assembled by Danforth and collaborators (published in ApJS). Work with many collaborators on the *FUSE* team has resulted in initial measurements of the deuterium abundance in the local

ISM and faint O VI emission from diffuse gas in the ISM. Finally, work with French collaborators resulted in two publications involving *FUSE* observations of young star system β Pictoris.

Blair participates in various education and public outreach activities and maintains the public Web site for the *FUSE* project (see `http://fuse.pha.jhu.edu`).

John P. Blakeslee is an associate research scientist with the ACS Science team. He played a central role in the development and completion of the JHU ACS science data pipeline, which is used for processing all the ACS GTO observations. The ACS pipeline is described in a paper presented at the Astronomical Data Analysis Software & Systems XII meeting in October 2002 in Baltimore. Blakeslee worked to process the ACS early release observations (ERO) for delivery to the STScI public relations office and has continued to participate in the analysis of these observations and follow-up ground spectroscopy at Keck Observatory of the ERO "Tadpole" galaxy field. Blakeslee also is particularly involved in the planning and analysis of the ACS galaxy cluster observations. First results from the ACS cluster program will be presented in a paper currently in preparation.

One of the surprising discoveries in some of the first ACS GTO data was the presence of two distant supernovae in the Hubble Deep Field North. Blakeslee has worked extensively on the analysis of these data and the follow-up HST observations using ACS and NICMOS. The results demonstrate the enormous potential of ACS for discovering and confirming distant Type Ia supernovae, and therefore of testing and constraining the accelerating universe cosmology. A paper detailing this effort is expected to be in press by the end of 2002.

Along with G. Meurer (JHU), D. Lindler (Sigma Science & Eng. Res.) and C. Cox (STScI), Blakeslee contributed to the ACS optical distortion calibration effort of the ACS science mission orbital verification (SMOV) campaign. He collaborated with STScI staff members in producing the on-orbit flat fields for the ACS Wide Field Camera.

Blakeslee has continued his work on the extragalactic distance scale with collaborators J. Tonry (U. Hawaii), L. Ferrarese (Rutgers), and P. Stetson (DAO). They are completing the analysis of an *HST* Cycle 10 WFPC2 program to calibrate directly the early-type galaxy distance scale using Cepheid distances to late-type galaxies that are physically associated with early-type companions. With collaborators P. Côté and J. Cohen (Caltech), he also has continued to work on the globular cluster and galaxy population in the nearby Virgo cluster of galaxies.

Pierre Chayer is the *FUSE* support scientist for the Fine Error Sensor at JHU since 1998. His main astrophysical interest is the study of stellar atmospheres of white dwarf and subdwarf stars. Chayer provides the stellar expertise within the*FUSE* group that is surveying the line of sights of white dwarfs and subdwarfs in search of deuterium (Friedman *et al.* 2002). He is also pursuing work on the spectral evolution of white dwarfs. He demonstrated that the oxygen abundance in the atmospheres of relatively cool white dwarfs must be stratified to explain the O VI lines observed in the *FUSE* spectra of these stars (Chayer *et al.* 2002).

Damian Christian is a support astronomer for the Far Ultraviolet Spectroscopic Explorer. His recent research interests have involved active late-type stars selected from EUV surveys. He and collaborators have been looking for changes in the magnetic dynamo for the most active M-dwarfs. Christian has also recently published a catalog of new detections with the *Extreme Ultraviolet Spectroscopic Explorer* (*EUVE*) Right Angle Program. This latest catalog brings the total number of *EUVE* sources to nearly 1200.

Edward Colbert conducts research on black holes in external galaxies, with special emphasis on X-ray observations. His current main research projects include (1) studying the X-ray and optical phenomenology of Intermediate-luminosity X-ray Objects in nearby spiral and elliptical galaxies, and (2) analyzing the X-ray properties of large-scale galactic outflows in Seyfert galaxies.

Van Dixon is an associate research scientist. He serves the *FUSE* PI team as Acting Director of Science Data Processing. His research interests include observational studies of evolved stars in globular clusters, hot gas in the interstellar and intracluster media, and molecular hydrogen in the disk and halo of the Galaxy.

Jean Dupuis, an associate research scientist, works with the *FUSE* project. His current research interests are the spectral evolution of white dwarf stars, the origin of ultra-massive white dwarfs, and the modeling of hot white dwarf atmospheres with the goal of better understanding their EUV and FUV spectra.

Paul D. Feldman completed his term as Chair of the Department of Physics and Astronomy on June 30, 2002. He directs the NASA-supported sounding rocket program, collaborating with S.R. McCandliss in the development of new instrumentation for far- and extreme-ultraviolet astronomy. He continues his collaboration with H.A. Weaver (JHU/APL) in a program of *HST*/STIS and *FUSE* observations of comets, with H.W. Moos, D.F. Strobel, and M.A. McGrath (STScI) in *HST*/STIS observing programs on the Galilean satellites, with V. Krasnopolsky (Catholic U.) in *FUSE* observations of Mars, and with A. Vidal-Madjar, A. Lecavelier des Etangs (IAP), and A. Roberge (now at CIW) in *FUSE* studies of molecular and atomic species in the circumstellar disks surrounding β Pictoris, AB Aur, 51 Oph, and other similar systems. He is a member of the science teams for *FUSE*, *HST*'s Advanced Camera for Surveys, the Alice ultraviolet spectrometer experiment for Rosetta, and the Comet Nucleus Tour mission.

The majority of **Holland Ford**'s time during the past year was devoted to ACS pre-launch and post-launch activities. The early on-orbit performance of the ACS was described in a series of papers given at the August 2002 SPIE meeting in Hawaii (cf. Ford *et al.* 2002). Ford leads a team of 33 scientists that is beginning to analyze data from the ACS; the team at JHU consists of 13 scientists, and 8 technical, support staff, and graduate students. The team is analyzing excellent observations of clusters of galaxies ranging from the nearby strongly-lensing cluster Abell 1689 to an apparent protocluster of Lyman-α emitters and g-band dropouts clustered around a radio galaxy at $z=4.11$. The color-magnitude diagram of a cluster at $z=1.23$ shows a well defined "red sequence," suggesting that the elliptical galaxies in this cluster formed several billion years earlier. ACS coronagraphic images reveal spiral structure in the debris disks of several nearby stars. The first papers have been written, and many more will follow.

Alex Fullerton is funded by the Canadian Space Agency to serve as a support astronomer for the *FUSE* mission. He works with the *FUSE* Science Data Processing Group at JHU, as well as acting as a liaison with the Canadian astronomical community. His research emphasizes observational studies of the atmospheres and stellar winds of early-type stars, particularly the processes responsible for the rampant variability observed in hot-star winds. As a member of the *FUSE* hot-star team, Fullerton has been deeply involved with the production of far-ultraviolet spectral atlases of early-type stars in the Galaxy and Magellanic Clouds, photospheric analyses that point to the need to revise the temperature scale for O-type stars, and empirical studies of the ionization balance in the winds of hot stars in the Large Magellanic Cloud. Current work (with N. Lehner and J. Zsargó at JHU and Massa at NASA's GSFC) aims to use the O VI lines commonly observed in *FUSE* spectra of hot stars as probes of the distribution and origin of very hot gas in the winds of early-types stars.

Roy Gal works on optical surveys for galaxy clusters (the Northern Sky Optical Cluster Survey), galaxy evolution in clusters, and cosmology from clusters. Extensive spectroscopy of statistical samples of galaxies in clusters to derive cluster masses and study galaxy properties in dense environments. Comparison of X-ray and optically selected cluster catalogs. He also works on public data access and documentation for the Sloan Digital Sky Survey.

Carl Glazebrook's interest is in the properties and evolution of galaxies. In the local Universe he is working on galaxies in the SDSS survey, looking at morphology, color, luminosity and stellar populations. He is particularly interested in the connection between the local Universe and the distant Universe: e.g., cosmic star-formation history observed directly and inferred from "fossil cosmology." He is also interested in very deep, very high-redshift surveys and their connection to astronomical instrumentation. In particular he is using the "nod & shuffle" method of sky cancellation to do a new ultra-deep spectroscopic survey on Gemini trying to pull out faint red galaxies at high redshift and determine the evolution of the galaxy mass function and observe the origin of the Hubble Sequence.

David Golimowski is a research scientist on the ACS team. His scientific interests are very-low-mass stars and brown dwarfs, extrasolar planetary systems, circumstellar debris disks, and characterization of the solar neighborhood. Golimowski is the science lead of the ACS science data archive. He was involved in the SMOV testing and calibration of the HRC coronagraph.

Timothy M. Heckman conducts research on starburst and active galaxies. He is the Director of the Center for Astrophysical Sciences. He also serves on the Board of Governors of the Astrophysical Research Consortium, the Sloan Digital Sky Survey Advisory Council, AURA's Space Telescope Institute Council, and NASA's Structure & Evolution of the Universe Subcommittee. He is a member of the science team for the Galaxy Evolution Explorer (GALEX) NASA mission (PI, C.D. Martin, Caltech).

Heckman, with D. Strickland, K. Weaver (GSFC/ JHU), A. Aloisi, and C.L. Martin (Caltech), are continuing a long-term program to elucidate the physics of starburst-driven galactic winds ("superwinds") and thereby ascertain their role in the evolution of galaxies and the inter-galactic medium. Recent work has focussed on the analysis of new *Chandra* X-ray data for a sample of a dozen starbursts ranging from dwarf galaxies to ultra-luminous merging systems, and on spectroscopy of the interstellar absorption-lines using ground-based telescopes, *FUSE*, and *HST*. The two approaches are complementary: the X-ray data probe the hot gas that may contain the majority of the energy in the superwind, while the absorption-lines yield unique diagnostics of the dynamics and energetics of cooler material entrained into the hot outflow. The data show that superwinds are ubiquitous in local starbursts, and that starbursts are ejecting metal-enriched material at a rate similar to the star-formation rate and at a velocity sufficient in principle to leave low-mass (but not high-mass) galaxies. The absorption-line data strongly suggest that dust is also being carried out in the flow. These results quantitatively support models in which powerful galactic winds driven by the starbursts associated with the formation of bulges and elliptical galaxies have chemically-enriched and heated the intra-cluster and inter-galactic media.

Heckman, with JHU graduate student C. Tremonti, G. Kauffmann (MPIA), S. Charlot (MPIA), S. White (MPIA) and the SDSS collaboration are exploring the properties of the the roughly 105 SDSS galaxies for which spectra have been obtained so far. The properties of galaxies show an abrupt transition at a stellar mass of 3×10^{10} $M_{\odot}$ and a stellar surface mass density of 3×10^{8} $M_{\odot}/kpc^2$: the low mass/low density galaxies are young disk-dominated systems while the high mass/high density galaxies are old bulge-dominated systems. Below the critical mass, the gas-phase metallicity, surface mass density, and ratio of stellar to halo mass all decline with decreasing mass, while the frequency of major recent starbursts increases. Above the critical mass, galaxies are remarkably uniform in their properties. The transition from galaxies whose global emission -line spectra are dominated by star-forming regions to those dominated by AGN also occurs at the same critical mass. The most powerful AGN reside in those rare galaxies with high mass but a young stellar population (large black hole and ample ISM?). Feedback from star-formation is clearly playing a major role in galaxy evolution, and early feedback from AGN may be crucial for the massive bulge-domnated systems.

Richard C. Henry conducts research on the interstellar medium, cosmology, and ultraviolet background radiation. The highlight of the last two years was the outstandingly positive peer review of the (sad to say, unsuccessful) BEST ("Baryonic Extragalactic Structure Tracer") MIDEX proposal that we submitted, with Wilton Sanders as Principal Investigator, to carry out a systematic X-ray and ultraviolet background radiation sky survey.

Charles Hoopes is an associate research scientist with the *FUSE* team. Most recently he has been investigating the deuterium abundance along extended sight lines in the Milky Way disk. He has also used FUSE to map the hot gas in the Small Magellanic Cloud, and to study a supernova remnant in that galaxy. Charles also has been studying the molecular gas in a sample of starburst galaxies with *FUSE* , and searching for hot has in starburst superwinds. He has continued his work on diffuse ionized gas (DIG) by analyzing *Ultraviolet Imaging Telescope* and optical images of nearby spirals, as well as deep optical spectroscopy of DIG in nearby spirals from the Apache Point Observatory 3.5 meter telescope.

Mark Houdashelt, an associate research scientist who specializes in the study of stellar populations, is working with R. Bell (U. Maryland) and A. Sweigart (GSFC) to construct evolutionary population synthesis models of early-type galaxies. The main objective of this work is to calculate integrated synthetic spectra of simple stellar populations (coeval stars of the same chemical composition) that have non-solar abundance ratios, incorporating the appropriate chemical mixture in all stages of the modelling process: the calculations of stellar opacties, interiors and atmospheres; the construction of isochrones; and the calculation of synthetic stellar spectra. Of particular interest are models having enhanced abundances of the alpha elements (O, Ne, Mg, Si, S, Ar, Ca, Ti), since current observational evidence seems to suggest that massive elliptical galaxies have supersolar $[\alpha/\mathrm{Fe}]$ ratios.

As a prelude to this larger project, Houdashelt is collaborating with S. Trager (Kapteyn Inst.) and G. Worthey (Wash. State U.) to examine the effects of abundance variations on the strengths of spectral features measured by the optical Lick indices. By calculating synthetic spectra of stars of known effective temperature, surface gravity and [Fe/H], but with varying abundances of specific elements, it is possible to estimate the effects of non-solar abundance ratios and tweak the results of models that incorporate solar abundance ratios to see if the agreement with observational data is truly improved by such abundance ratio changes.

In collaboration with R. Wyse, G. Gilmore (IoA, Cambridge), S. Feltzing (Lund Obs.), JHU graduate student L. Hebb, J. Gallagher (U. Wisc.) and T. Smecker-Hane (UC Irvine), Houdashelt also participated in a study of the low-mass initial mass function of the Ursa Minor dwarf spheroidal galaxy. The UMi dSph galaxy has evidently experienced only a single burst of star formation, as all of its stars appear to be old and metal-poor, and the dynamics of its stars indicate that the galaxy is dark-matter-dominated. The most metal-poor Galactic globular clusters have stellar populations similar to those of UMi, but these stellar systems are free of dark matter. Luminosity functions of the UMi dSph galaxy and of two Galactic globular clusters with ages and metallicities similar to it, constructed from *Hubble Space Telescope* WFPC2 and STIS photometry, were found to be indistinguishable to masses as low as 0.3 solar masses, virtually ruling out the possibility that the dark matter in the UMi dSph could be due to low-mass stars.

David C. Knauth joined the *FUSE* team as a postdoctoral fellow in late 2001 after completing his Ph.D. at the University of Toledo. His research interests include studying the abundance of Li and its isotopic ratio in the interstellar medium (ISM). He recently submitted the results of his dissertation on the lithium isotope ratio to the *Astrophysical Journal*. He will continue pursuing his interests by using *FUSE* data to study the elemental abundance of interstellar deuterium and nitrogen. He is also interested in studying the physical conditions of the ISM near regions of active star formation and the interaction of stars with their environments.

Collaborating with J.C. Howk (JHU and UCSD) and K.R. Sembach (STScI), he has identified a relatively cool, highly-ionized, intermediate-velocity cloud toward the Perseus OB1 Association. Highly ionized gas (i.e., Si IV, C IV, and O VI) is generally thought to arise from the interaction of hot gas with cool clouds, however, O VI was undetected. In addition, this cloud has a C IV/Si IV ratio identical to the Galactic average of 3.8. This work will shed light on the formation mechanisms of C IV and Si IV in the ISM.

Gerard Kriss, JHU graduate student R. Telfer, and W. Zheng used archival *HST*/FOS spectra of quasars to study the ionization and composition of the intergalactic medium. The distribution of individual quasar spectral indices shows a broad shape that matches the distribution inferred from *FUSE* and Keck observations of He II to H I column density ratios (Telfer *et al.* 2002). This confirms that quasars are the likely sources for most of the ionizing radiation at redshifts of 2 to 3. In other research, Kriss and the *FUSE* AGN Working Group used *FUSE* observations of O VI and Lyman-β absorption to evaluate the relationship between UV absorbers and X-ray absorbers in low-redshift AGN (Zheng *et al.* 2001; Brotherton *et al.* 2002). In all cases, the *FUSE* spectra show multiple kinematic components spanning a wide range of ionization parameters and column densities. Julian Krolik and Kriss developed a physical explanation for this complexity as the natural condition for a thermal wind driven off the exposed faces of the obscuring torus (Krolik & Kriss 2001). At the critical ionization parameter for evaporation in these models, there is a broad range of temperatures that can co-exist in equilibrium at nearly constant pressure. This results in a strongly inhomogeneous gas flow. High temperature, highly ionized gas causing X-ray absorption can co-exist with more densely clumped, lower temperature gas that forms UV absorption lines.

Julian Krolik's primary interests are in theoretical investigation of topics related to accretion onto black holes. He has ongoing programs involving large-scale numerical simulations of MHD and radiation diffusion effects in accretion disks surrounding black holes, as well as studies of detailed spectral formation in these circumstances. In addition, he participates in phenomenological studies of several related topics, such as the relation between Fe Kα emission profiles and dynamics of accreting material and broad absorption lines in quasars.

Jeffrey W. Kruk is a research scientist and the Deputy Chief of Observatory Operations for the *FUSE* project. He led the development effort for operating *FUSE* with only two reaction wheels, and is leading the present development for operations without gyroscopes. He is a member of the *FUSE* D/H and O VI working groups. His research interests include white dwarfs, chemical evolution, and the intergalactic medium.

Nicolas Lehner's research focuses on trying to understand better the interstellar gas in galaxies and their peripheries. In particular, he is interested in the gaseous matter that is the signature of energetic processes between galaxies, between galaxies and extragalactic diffuse gas, and in regions of massive star formation in galaxies. Lehner has principally used optical and ultraviolet spectroscopic (in particular *FUSE* for the past two years) observations to study the gas in the Galaxy, in high-velocity clouds, and in the Magellanic Bridge, a region of gas that links the Small and Large Magellanic Clouds. The goals are to derive the physical conditions within the observed gas; to determine the abundances of various atomic and ionic species; to measure the physical characteristics of the observed gas; and to disentangle ionization effects from depletion onto dust grains or nucleosynthetic effects. Ultimately, the purpose of this work is to relate these absorption diagnostics to other properties of the absorbing systems, including metallicity, star formation history, and processes that feed matter into galaxies or expel gas into intergalactic space. All these properties are important contributors to our understanding of the formation and evolution of galaxies and the space between them.

André Martel joined the ACS science team in 1999 as an associate research scientist. He was involved in a wide-range of pre- and post-launch calibration activities for ACS. Outside of instrument testing and verification, Martel is researching quasars and blackhole masses. A paper on the first ACS coronagraphic images of 3C273 will be submitted by November 2002.

Stephan R. McCandliss is a research scientist with a broad interest in astronomical instrumentation, atomic and molecular spectroscopy, dust scattering and extinction properties in the far UV, amd the interaction of hot stars with their nebular environments. He is a principal investigator on a NASA-supported grant to develop windowless lamps to support onboard calibration of far-UV spectroscopic instrumentation. He is also a co-investigator on Paul Feldman's NASA sounding rocket program entitled, "Rocket and Laboratory Studies in Astronomy," which has an emphasis on far-UV, long-slit spectroscopy. He is PI and Co-I on numerous *FUSE* and *HST* proposals to investigate the properties of symbiotic stellar systems, and search for molecular hydrogen fluorescence in reflection nebula. His recent collaborators include B.-G. Andersson, B. Espey (Trinity College, Dublin), E. Burgh (U. Wisc.), JHU graduate student K. France , T. Keyes (STScI) and J. Sokoloski (CfA).

David Neufeld's research is primarily in the area of molecular astrophysics, and emphasizes the importance of astrophysical molecules as diagnostic probes that provide unique information of general astrophysical importance that is obtainable by no other means.

Birgit Otte joined the *FUSE* group as a postdoctoral fellow in August 2001. She is working on O VI emission in the halo of the spiral galaxies NGC 4631 and NGC891, a collaboration with E.M. Murphy (UVA), J.C. Howk (UCSD), and Q.D. Wang (UMA). O VI emission has been observed in this galaxy in a region of Hα filaments and stronger-than-average soft X-ray emission, suggesting the existence of a galactic fountain in NGC 4631. No O VI emission could be observed in NGC 891 probably due to extinction within this spiral galaxy and in the Milky Way.

Another project is O VI emission in the halo of the Milky Way along a sight line observed in January 2002, a collaboration with W.V. Dixon and R. Sankrit. The O VI intensities, which are lower than all previously measured O VI emission line intensities, and the velocities, which match that of Hα filaments and the Perseus arm, suggest that the emitting gas is located in the halo above the Perseus arm, while previous O VI measurements along other sight lines are thought to come from gas in or around the Local Bubble.

Work on gas of the Vela supernova remnant, a collaboration with W.P. Blair and R. Sankrit, is in its early stages.

Andrew Ptak is conducting research on starburst galaxies with T. Heckman, with emphasis on *Chandra* and XMM-Newton observations of ultra-luminous IR galaxies. He is working with E. Colbert and T. Heckman on an optical and X-ray survey of ultra-luminous X-ray point sources in galaxies which may be intermediate-mass black holes. He is working on a survey of low-luminosity AGN using *Chandra* and XMM-Newton. Finally, he is actively involved in scientific software developement, most notably he is the PI of a NASA-funded program to develop automated data analysis software.

David Sahnow is the instrument scientist for the *FUSE* project and works on calibration issues related to the detectors and the optical performance of the *FUSE* instrument. He is also involved in several projects using *FUSE* PI-team data. Starting in 2002, he is also working on detector calibration issues for the Cosmic Origins Spectrograph, which will be installed on the *Hubble Space Telescope* in 2004.

Ravi Sankrit is part of the *FUSE* team and is interested in optical and UV studies of supernova remnants and other emission line nebulae.

Sandra Savaglio is an associate research scientist. Her main interests regard the high redshift Universe, in particular the study of the heavy element enrichment in young galaxies.

She is a member of the Gemini Deep Deep Survey (GDDS). The GDDS is an observational program (PIs: R. Abraham and K. Glazebrook) focused on a galaxy survey in the redshift range $1<z<2$. She is focusing her attention on the metallicity in the ISM of the galaxy sample, using both emission and absorption lines. Her analysis takes advantage of the combination of Gemini Multi-Object Spectrograph and the Nod & Shuffle mode that allows the detection with high efficiency of a large number of spectra simultaneously.

She also studies the Gamma ray burst (GRB) afterglows as probes of warm and cold gas at high redshifts. She takes advantage of the accurate (within 10 arcsec) and nearly real-time GRB positioning of the High Energy Transient Explorer (HATE2), to obtain broad band, high resolution, high signalto-noise spectra of bright, high redshift ($z \geqslant 2$) GRB events. The UV Echelle Spectrograph (UVES) at the VLT has given first interesting results for GRB020813. The data show for the first time the complexity of the absorbing material associated with the ISM in the GRB host galaxy. Future analysis will also allow the detailed study of the warm filaments and cluster outskirts, together with the metal enrichment and heating histories of the intergalactic medium.

She has also derived the column densities of heavy elements in three GRB optical transients. Her findings support the idea that similar observations obtained using QSO sight lines probe mainly low gas/dust regions of high redshift galaxies, while the more powerful GRBs can be detected through denser regions (molecular clouds and star forming regions). Therefore GRB and QSO absorption lines together provide a more complete picture of the global properties of the interstellar medium in high redshift galaxies.

Finally, she has taken VLT/UVES high resolution spectra of the very high redshift galaxy ($z = 2.72$) MS1512-cB58. The major result of this study is that from the comparison with the mean absorption associated with the intergalactic gas clouds (Lyman-α forest) distributed along QSO sight lines, a significant excess of Lyman-α forest absorption at ~ 150 Mpc from MS1512-cB58 appears to be present. This excess may be due to the presence of a super cluster of Lyman-α clouds.

Robin Shelton explores hot gas in the Milky Way's interstellar medium using a variety of observational and computational tools. Shelton is particularly interested in the Galaxy's halo, Local Bubble of hot gas surrounding the solar neighborhood, and individual supernova remnants. During the last two years, she has concentrated on analyzing the emission from O VI ions in roughly 300,000 K gas. With the help of two dozen colleagues, she made the first high resolution observation of O VI emission from the interstellar medium, an observation which constrains the pressure and other physical characteristics of this gas. Other observations followed.

One of the difficulties in studying hot gas via its emission is determining which regions along the line of sight contributed to the observed emission and by how much. By employing a "shadowing" strategy, she recently measured the emission from the Local Bubble alone, finding it to be extraordinarily dim. The 2 sigma upper limits on the null detection are two to three times lower than the predictions from the standard models of the Local Bubble. The stark discrepancy raises questions about the physics of the $\sim 300{,}000$ K transition zones between hotter and cooler gas.

In collaboration with K.D. Kuntz (GSFC) and R. Petre (GSFC), Shelton is examining the X-ray emission from an unusual supernova remnant and its pulsar. The remnant is the exemplar of a new class, "Mixed Morphology" or "Thermal Composite" supernova remnants. The centers of these remnants are unusually bright in thermal X-rays. *Chandra* observations shed some light on the issue. They reveal that the center is more abundant in metal ions. The abundance gradient appears to be due to supernova ejecta and more advanced dust destruction near the center of the remnant. While the abundance gradient increases the center's luminosity, it is not sufficient to explain the full brightness of the center. Other possibilities have been explored. The most promising is an entropy-mixing phenomenon such as thermal conduction.

Marco Sirianni is an associate research scientist for the ACS team. Sirianni was responsible for a large variety of pre- and post-launch ACS calibration tasks in partucular related to the detectors performance, creation and delivery of ground reference files for the STScI pipeline, interim calibration period proposal development as well as proposals to monitor CCD performance and photometric calibration during Cycle 11. He assisted with CCD data analysis during the mission aliveness and functional tests. He is currently involved in the calibration of the photometric performance of ACS and working on establishing conversion between the ACS photometry and other photometric systems. With H. Tran, he co-authored the first ACS manuscript submitted to ApJL on the Tadpole galaxy. His research interests include the initial mass function in young globular clusters in the Magellanic Clouds, super star clusters and young compact clusters in starburst galaxies.

Paule Sonnentrucker is a postdoctoral fellow with *FUSE* . She investigates the chemical abundances and the physical conditions of the atomic and molecular gas forming the interstellar medium combining far ultraviolet, visible and near-infrared spectroscopic diagnostics.

Alex Szalay is the principal investigator of the National Virtual Observatory Project funded by the National Science Foundation. His other research interests include multicolor properties of galaxies, galaxy evolution, the large-scale power spectrum of fluctuations, gravitational lensing, and the Sloan Digital Sky Survey (SDSS) Project.

Aniruddha R. Thakar is leading the development and data distribution effort for the Sloan Digital Sky Survey (SDSS) Science Archive. The first officially scheduled public SDSS data release — Data Release 1 or DR1 — is due in January 2003. This will be the successor to the Early Data Release (EDR) released in June 2001. The database management systems for the SDSS Science Archive have been migrated from Objectivity to Microsoft SQL Server. The loading and validation of the archive data as well as the tools and interfaces for data access and data mining of the SDSS Science Archive are being developed by the JHU SDSS group under the supervision of A. Szalay. In addition to being the development team manager and chief database scientist for the SDSS Science Archive, Thakar is also closely involved with JHU's participation in the National Virtual Observatory. He is PI on a NASA Applied Information Systems Research Program (AISRP) grant to develop distributed query and cross-matching services for the NVO. In association with Budavari and JHU Computer Science graduate student T. Malik, Szalay and Thakar have developed a prototype distributed query service called SkyQuery which won the second prize in a Microsoft Web Services contest. Thakar has been recently awarded another NASA AISRP grant for developing a High-Speed Data Access Component prototype for the Virtual Observatory. M. Nieto-Santisteban joined the SDSS group in July and she will be working with Thakar on the VO data access component.

Hien Tran is an associate research scientist for the ACS team. His research interests include active galactic nuclei. Tran played a vital role in preparing the ACS Early Release Observation program prior to launch. Following launch, he supported the SMOV campaign by monitoring ACS UV contamination. He also analyzed ACS ERO data of the Tadpole and Mice galaxies, and with M. Sirianni *et al.* submitted the first ApJL paper on "ACS Observations of Young Star Clusters in the Interacting Galaxy UGC 10214." Analysis of the data shows that many young, blue star clusters can be identified in the tails of UGC 10214, with ages ranging from ~ 3 Myr to 10 Myr. The extreme blue $V-I$ (F606W$-$F814W) colors of the star clusters found in the tail of UGC 10214 can only be explained if strong emission lines are included with a young stellar population. The most luminous and largest of these clusters was found to have a mass density that is too low for it to evolve into a normal globular cluster. Tran will be leaving JHU for Keck Observatory in January 2003.

Alan Uomoto led the JHU team that designed and built the Sloan Digtal Sky Survey spectrographs. These instruments are capable of measuring 640 spectra at once and are now measuring galaxy redshifts and quasar and stellar spectra at Apache Point Observatory. About 250,000 spectra have been obtained, including a large fraction of the highest redshift quasars. Uomoto is now building a high-throughput, near-infrared spectrograph designed for studies of high redshift ($z>5$) quasars and low-temperature brown dwarfs with the Apache Point 3.5 m reflector. He is also working on a project with D. Golimowski and JHU graduate student M. Hendrickson to discover and study low-temperature brown dwarfs in the SDSS and 2MASS catalogs.

Professor **Ethan T.Vishniac** is currently studying astrophysical magnetohydrodynamics. These include: the nature of the strongly turbulent MHD cascade in the solar wind, the interstellar medium, and in accretion disks, the generation of large scale magnetic fields in astrophysical objects and the role of magnetic helicity transport in generating these fields, and the nature of magnetic reconnection in astrophysical plasmas. This work includes both numerical simulations and the derivation of general scaling laws.

Gerard Williger and Liske (Edinburgh) used pixel opacities to study absorption systems toward a 1 deg field of $z>2.5$ QSOs. They confirmed the existence of the proximity effect, in which absorption systems have lower opacities in the vicinity of their backlighting QSO. They also found an example of the foreground proximity effect, in which a QSO close to the absorbers toward a higher redshift QSO several arcmin away show decreased opacity. Smette (Liege), Heap (GSFC), Williger, Tripp, Jenkins (Princeton) and Songaila (Hawaii) used *HST* STIS spectra to measure the He II Gunn-Peterson effect toward HE2347-4342. The softness of the UV background field varies by a factor of 70 over scales of a few Mpc, probably due to the presence of local ionizing sources. Tripp, Jenkins, Williger, Heap *et al.* used STIS echelle data for 3C 273 to constrain the metallicities of two QSO absorbers in the Virgo cluster. A photoionization model implies an absorber thickness of 70 pc, implying pressure confinement. The Si/C ratio indicates enrichment by Type II supernovae, most plausibly provided by a galactic wind. Williger, Campusano (U. de Chile), Clowes (U. Central Lancashire) and Graham (Imperial College, London, UK) found that a large QSO group at $1.2<z<1.4$ which spans 2.5×5 deg on the sky contains an overabundance of Mg II absorbers, which in turn implies a galaxy overdensity associated with the QSOs. The Mg II absorbers and QSOs correlate on a scale of 9/h Mpc, which is consistent with observed galaxy-AGN correlations.

Professor **Rosemary Wyse** researches the formation and evolution of galaxies, using both theoretical and observational approaches. Much of her work focuses on the study of resolved stellar populations of Local Group galaxies, including the Milky Way Galaxy.

Tahir Yaqoob has been working on various research projects related to understanding the properties and astrophysics of active galactic nuclei (AGN). The research is driven by X-ray and UV observations, utilizing *Chandra*, *ASCA*, *RXTE*, *XMM*, and *HST*. Three of the key programs are: (1) Detailed high-resolution X-ray grating spectroscopy to diagnose and constrain models of the physics of AGN. (2) Spectroscopic and variability study of the Fe-K emission line complex in order to understand the black-hole/accretion-disk system in AGN. (3) Understanding the relation between the X-ray and UV absorbers using simultaneous X-ray and UV observations, and thus infer the structure and kinematics of outflowing winds from the AGN. Detailed study of individual sources, as well as collective statistical studies of the results are underway. These projects are being conducted with a number of collaborators: JHU graduate students U. Padmanabhan and J. Gelbord, B. McKernan (JHU), K. Weaver (JHU/GSFC), I. George (UMBC/GSFC), J. Turner (UMBC/GSFC), R. Mushotzky (GSFC), S. Kraemer (CU/GSFC), J. Gabel (CU/GSFC), M. Crenshaw (GU), J. Kriss (STScI), J. Lee (MIT).

Yaqoob is also the coordinator for CAS/LHEA coop activities (LHEA is the Laboratory for High Energy Astrophysics at the NASA/Goddard Space Flight Center). In 2001, the coop organized a major international workshop entitled "X-ray Emission from Accretion onto Black-Holes," held at Johns Hopkins University, 20–23 June, 2001. The workshop was well-attended, with over 100 participants from institutions around the world, with significant participation by members from CAS and LHEA. The workshop was very productive, and further details of the program, including the full papers for many of the contributions, can be found at www.pha.jhu.edu/groups/astro/workshop2001/.

Janos Zsargó is a postdoctoral fellow with the *FUSE* mission. His current research interests include hot and intermediate temperature gas in the Galactic halo, turbulence, heat conduction, and photo-ionization in the interfaces between the hot and warm phases of the interstellar matter, radiatively driven stellar winds of early-type stars, shocks and instabilities in stellar winds, magneto-hydrodynamics in the interstellar medium and in stellar convective zones, chemical composition of the interstellar medium (CH^+ chemistry in the ISM and chemistry in diffuse ISM gas).

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