HEADNEWS: THE ELECTRONIC NEWSLETTER OF THE HIGH ENERGY ASTROPHYSICS DIVISION OF THE AAS

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Notes from the Editor - **Paul Hertz, HEAD Secretary-Treasurer,** paul.hertz@hq.nasa.gov, 202-358-0986

Beginning this month, HEAD will only be delivering the table-of-contents for HEADNEWS into your mailbox. The newsletter itself can be found online at http://www.aas.org/head/headnews/headnews.may01.html.

The HEAD Executive Committee has begin planning the next HEAD Division meeting, which will be a joint meeting with the APS Division of Astrophysics (DAP) April 20-23, 2002, in Albuquerque, NM. The meeting will include invited and contributed talks, poster sessions, and evening workshops like recent HEAD meetings, as well as the opportunity to attend plenary and other sessions of the Spring APS Meeting. A first announcement will be sent to HEAD members in June 2001, and abstracts will be due January 11, 2002.

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2. Minoru Oda (1923 - 2001)

An Obituary Prepared for the HEAD Newsletter
Compiled by Lynn Cominsky (Sonoma State University) from information supplied by Phil Edwards and Hajime Inoue (ISAS), Kazuo Makishimi (University of Tokyo) and George Clark (MIT). See also Nature 410, 888 (19 April 2001).

Minoru Oda, known to many as the father of Japanese X-ray astronomy, passed away on March 1, 2001, at the age of 78. Prof. Oda's passing happened to coincide with the last KSC commanding pass of the ASCA satellite before it re-entered the Earth's atmosphere. But whereas ASCA's deteriorating orbit was known well in advance, Prof. Oda's death came as a shock to his colleagues. Prof. Oda held many prestigious positions during his long and illustrious career including: Science Advisor to the Japanese Ministry of Education, Culture and Science in the early 1980s, Professor and then Director of the Institute of Space and Astronautical Science (a research institute that is often referred to as the Japanese NASA) in the mid-1980s, President of the Institute of Physical and Chemical Research (RIKEN) from 1988-1993 and President of Tokyo University of Information Sciences until the time of his death.

After beginning his career in radio astronomy and cosmic-ray astronomy, Oda-sensei (as he was known in Japan) made many contributions to X-ray astronomy, in particular the study of X-ray binaries, but he also worked to promote space science generally, and articles he wrote and co-authored were published in journals ranging from Sky and Telescope and Physics Today to Nature. His invention of the modulation collimator, first

used to identify the counterpart of Sco X-1 in 1966, led to the most accurate positions for X-ray sources available, prior to the launch of imaging X-ray telescopes. He played an important role in the third world-wide burst watch campaign in 1979-1980 to detect optical bursts that accompanied X-ray bursts. The newly-launched Hakucho satellite was hurriedly pressed into service to provide X-ray coverage, following the Solar maximum-induced reentry of SAS-3 in 1979. Cominsky fondly recalls "many late night phone calls with Minoru, when I was a graduate student working with Walter Lewin at MIT. He and I would work out the Hakucho schedule for communication to the ground-based observers who were scattered across the globe, eagerly hoping to be among the first to catch coincident optical and X-ray bursts." The group that Oda founded was responsible for the launching of the entire array of Japanese X-ray satellites: Hakucho, Tenma, Ginga and ASCA. Just before his death, his unflagging efforts were instrumental in obtaining funding from the Japanese government for the recovery mission Astro-E2.

Less widely known among HEAD members, perhaps, are his contributions to scientific fields outside of mainstream X-ray astronomy. Oda's efforts led to the creation of the successful Japanese solar-X-ray observational program, including the Hinotori and (still-orbiting) Yohkoh satellites. He encouraged international collaboration in the field of interplanetary exploration with the Japanese launches of two probes sent to Comet Halley, and in 1997, Oda was an honored guest at the launch of his long-time dream, HALCA, a space VLBI satellite.

Prof. Oda's many honors include the Asahi Prize (for observations made with Hakucho), the Nishina Memorial Award, the Onshi Award, and the Order of Cultural Merit, which is given to only five individuals each year, for extraordinary contributions to the development of Japanese culture. He also received the International Academy of Aeronautics Theodore van Karmann award in 1987 and the COSPAR Space Science Award in 1996.

In the scientific community, Minoru Oda was well-known for his openness, enthusiasm and vigor and he will be remembered for these as well as for his scientific leadership. Among friends, he was also known for his sense of humor, love of fine foods, and deep appreciation of the beauty of nature. "Minoru's yearly Christmas greetings were always very dear and special: beautiful aquarelles of flowers that he had painted himself. I still have the whole collection going back at least a decade", says Walter Lewin. Oda is survived by his wife, Tomo Oda, and his two children, both scientists.

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3. Reuven Ramaty (1937-2001)

NASA Press Release

Reuven Ramaty, a renowned expert on cosmic rays, gamma rays and nuclear astrophysics and a leading theorist at NASA's Goddard Space Flight Center, Greenbelt, Md., for over 30 years, died April 8 at his home in Silver Spring, Md., of complications from amyotrophic lateral sclerosis (often called Lou Gehrig's disease). He was 64 years old.

Only a week before his death, Ramaty was notified that he was the recipient of the first Yodh Prize from the International Cosmic Ray Conference. The inveterate scientist remained active in his research until his final moments, pouring through data on cosmic rays on the very day he passed away. He is survived by his wife, Vera, his two daughters, Daphne and Deborah, and five grandchildren.

Ramaty's contributions to the fields of solar physics and cosmic rays are enormous, reflected in his 160 publications in refereed journals and conference proceedings and more than 5,000 citations to his work in the open literature. Ramaty was also the principal investigator on four NASA-funded theory initiative and a co- or guest investigator on several space-science missions.

The field of positron astrophysics -- the study of gamma rays produced by matter-antimatter annihilation -- was essentially invented by Ramaty and his longtime colleague, Richard Lingenfelter of the University of California, San Diego. Ramaty and Lingenfelter were also key in establishing the field of solar gamma-ray-line astronomy, a technique used for establishing the abundance of elements in the sun as well as determining how sun flares are produced.

More recent work included study of the origin of cosmic-ray acceleration and the theory that our own Sun accelerates atomic particles to nearly light speed much like a supermassive black hole does in the center of some galaxies. The Sun, therefore, can serve as a "local" physics laboratory for particle acceleration and physics.

Born in Timisoara, an ethnic Hungarian section in Romania, Ramaty grew up on the eve of World War II in a multicultural environment and immigrated to Israel at age 11. Fluent in Hungarian, Romanian, Hebrew, English and French, Ramaty graduated from Tel Aviv University in 1961 and moved to the United States, where he earned his doctorate degree in Physics from the University of California, Los Angeles, in 1966.

Ramaty joined NASA's Goddard Space Flight Center first as a post-doctoral research associate in 1967 and then as a government-employed astrophysicist at Goddard's Laboratory for High Energy Astrophysics in 1969. From 1980 to 1993, Ramaty was the head of the Theory Office at the Lab.

Through the 1970s and 1980s, Ramaty's interpretation of gamma-ray data from the COS-B, SAS-II and HEAO-C missions guided the development of the highly successful Compton Gamma Ray Observatory. Ramaty was a major influence in the success of the Solar Maximum Mission, as well, and colleagues say that his active encouragement and involvement was instrumental to the realization of NASA's upcoming HESSI mission.

A lover of language and travel, Ramaty was a visiting professor at Nagoya University in Japan in 1993 and a member of the Ph.D. dissertation committee at the University of Paris and the Pierre & Marie Curie University in Paris in 1992 and 1997, respectively. He was also a visiting scientist at Caltech, Stanford University, University of California (Berkeley), University of Pennsylvania, and Washington University in St. Louis. As Adjunct Professor of Physics at the University of Maryland since 1983, Ramaty was the advisor for six Ph.D. recipients.

Ramaty also served the high-energy astronomy community in a variety of other

positions, including Associate Editor of Physical Review Letters; Chair of the American Physics Society Division of Cosmic Physics; Chair of High-Energy Astronomy Division of the American Astronomical Society; and Divisional Councilor for Astrophysics at the APS. He organized several conferences, edited eight conference proceedings, authored numerous review articles that reached broad scientific audiences, and gave scores of invited talks worldwide.

Beside the Yodh Prize, Ramaty received three other major awards in his career: the Exceptional Scientific Achievement Medal from NASA in 1981; the Lindsay Award from Goddard in 1980 for his work on gamma-ray bursts; and the Senior U.S. Scientist Award from the Alexander von Humboldt Foundation in 1975.

On December 11, 2000, he presided over a symposium in his honor entitled, "A Tribute to Reuven Ramaty's Contributions to High-Energy Solar Physics and Astrophysics." The meeting presenters described the current state of scientific exploration that was inspired or otherwise guided by Ramaty's lifetime of achievements.

Services were held for Reuven Ramaty on April 12, at the Danzansky-Goldberg Memorial Chapel in Rockville, Md. He is buried at the Judean cemetary in Rockville.

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4. HEAD News: Rossi Prizes - Lynn Cominsky, HEAD Press Officer, Sonoma State University

Rossi 2000 prize awarded for Gamma-ray Burst Theoretical Predictions

Three of the most well-known names in astrophysics have won the 2000 Bruno Rossi Prize for their pioneering work on gamma-ray bursts, daily explosions from deep in space that outshine the entire universe before fading away in as quickly as a few seconds.

Peter Meszaros, Bohdan Paczynski and Martin Rees were awarded the annual prize for their development of theoretical models of gamma ray bursts years before observational scientists had adequate tools to study the phenomena, which represent the most powerful events known in the universe, second only to the Big Bang in total energy.

Peter Meszaros is the Head of the Department of Astronomy and Astrophysics at Pennsylvania State University. His research predicted the presence of gamma-ray burst afterglows in X-ray and optical light, which can last days to months longer than the actual burst and are readily observed today.

"It is an honor and a pleasure to be involved in this endeavor with such valued and distinguished friends and colleagues," said Meszaros. "Gamma-ray bursts have been and remain a major puzzle, so the recent observational advances and its interplay with the work of many theorists has been very exciting. But much remains unsolved, and new surprises can be expected from future missions."

Bohdan Paczynski is the Lyman Spitzer Jr. Professor of Astrophysics at Princeton

University. He is currently involved with the Optical Gravitational Lensing Experiment. Among his many awards are the 1999 Gold Medal of the Royal Astronomical Society and the 1997 Henry Draper Medal of the National Academy of Sciences.

"For several decades now, gamma-ray bursts have been among the most fascinating and most enigmatic events in the Universe," Paczynski said. "Although still a mystery, it is clear that these bursts offer a new probe of the universe at high redshifts, and perhaps they will provide direct evidence of the earliest star formation activity."

Sir Martin Rees is Astronomer Royal for the Royal Observatories of England and a professor at the University of Cambridge Institute of Astronomy. A renowned expert on cosmology, Rees has authored more than 400 scientific papers and six books.

"It is a special pleasure to share the Rossi award with two good friends and admired colleagues," said Rees. "We shouldn't forget, however, that the study of gamma-ray bursts is primarily an achievement of observers: Despite the contributions of many theorists, they remain baffling phenomena. The only sure thing is that they involve fascinating and 'extreme' physical processes."

The annual Rossi lecture was given by Peter Meszaros at the 2001 winter meeting of the AAS, scheduled for January 7-11 in San Diego, California.

Winners of 2001 Rossi Prize named for Black Hole Discovery

Two astronomers who first observed X-ray light being stretched by the crushing force of gravity near supermassive black holes are the winners of the 2001 Bruno Rossi Prize.

The work of Prof. Andrew Fabian, of the Institute of Astronomy in Cambridge, England, and Prof. Yasuo Tanaka, of the Institute for Space and Astronautical Science in Kanagawa, Japan, is a confirmation of Einstein's theory of general relativity, which postulates that mass curves the fabric of spacetime and therefore the path of light. Black holes, the source of extreme mass and gravity, provide an ideal laboratory to observe this phenomenon.

"I am of course delighted by the award and honored to share it with Yasuo Tanaka," said Prof. Fabian. "Very many people have been involved in the success of ASCA mission, which made testing our prediction possible, and we owe them many thanks."

"I view this distinction as a recognition of the achievements of the ASCA mission, in which I am deeply involved," said Prof. Tanaka, currently a visiting scientist at the Max Planck Institute for Extraterrestrial Physics in Garching, Germany. "I am indebted to all the young collaborators who have made this work together."

Profs. Fabian and Tanaka's discovery was made the Advanced Satellite for Cosmology and Astrophysics (ASCA), a joint Japanese-U.S. mission. Turning this X-ray telescope to several galaxies with extremely bright central regions (known as active galactic nuclei), the two scientists observed broad iron K-lines. This is a term that refers to the light signature, or spectrum, of hot iron atoms that is broadened or stretched by the tug of gravity. The observation is a strong indication that a black hole is powering the fantastic light show in the galaxy core.

Profs. Fabian and Tanaka are invited to deliver the Rossi Prize Lecture at the January 2002 meeting of the American Astronomical Society, held January 6-10, 2002, in Washington, DC.

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5. News from NASA Headquarters - Paul Hertz, HEAD Secretary-Treasurer, NASA Headquarters

Alan Bunner to Retire

Dr. Alan Bunner has announced that he will be retiring from NASA this summer. Bunner is Science Program Director for the Structure and Evolution of the Universe science theme in the Office of Space Science at NASA Headquarters. He is a member of the Space Science Board of Directors with responsibility for the science discipline areas of high energy astrophysics, extreme ultraviolet astronomy, submillimeter and radio astronomy, relativistic astrophysics, fundamental physics in space, and general relativity. Bunner previously served as Chief of the High Energy Astrophysics Branch at NASA Headquarters. His duties have included Program Scientist responsibilities for the Compton Gamma Ray Observatory, Astro-E, and the Chandra X-ray Observatory. He came to NASA Headquarters in 1985 after holding the position of Principal Scientist at the Perkin-Elmer Corporation, where he led a variety of research programs and studies. From 1967 to 1979, Bunner was an Associate Scientist at the University of Wisconsin, specializing in x-ray astronomy research.

Office of Space Science to Streamline its Organization

Ed Weiler, Associate Administrator for Space Science, announced his intent to streamline the Office of Space Science (OSS) at NASA Headquarters. The streamlined organization will organize all space science missions, projects, and programs into three science divisions: the Solar System Exploration Division, the Sun-Earth Connection Division, and the Astronomy and Physics Division. The A&P Division will contain almost all activities currently within two of the OSS science themes: the Struture and Evolution of the Universe (SEU) theme and the Astronomical Search for Origins (ASO) theme. The two science themes will be maintained as separate programs within the A&P Division. Weiler intends to appoint Anne Kinney, current ASO Science Program Director, as Director of the A&P Division. The high energy astrophysics program, and all SEU missions, will be managed within the A&P Division. Details of the new organization have not been finalized. The new organization will be implemented around July 1. The HEAD community will be provided with an update when plans have been finalized.

Opportunity in Astrophysics at NASA Headquarters

The Office of Space Science (OSS) at NASA Headquarters is seeking an experienced scientist to work at HQ to support activities in research management in the astrophysics program, with an emphasis on Mission Operations and Data Analysis (MO&DA) programs. This positions is normally filled for two years, with a possible one or two year extension, by individuals on leave from their home institution either through an Intergovernmental Position Appointment (IPA) or as a detailee. Details may be found at

http://spacescience.nasa.gov/codesr/white/astro_ipa.html. Expressions of interest should be forwarded to Paul Hertz by June 15, 2001. For additional information, contact either Paul Hertz (paul.hertz@hq.nasa.gov; 202-358-0986) or Dan Golombek (dgolombek@hq.nasa.gov; 202-358-0247).

Cosmic Journeys Update

The "Cosmic Journeys" budget initiative for NASA's Office of Space Science was proposed for the FY 2002 budget to create an ongoing program line for a series of connected space missions in the Structure and Evolution of the Universe theme. This program line would create an opportunity for a linked set of astrophysics and physics missions focusing on using the Universe as a laboratory for the extremes in nature. Unfortunately, the new Administration brought a general policy of reduced government spending, turning down most proposed budget initiatives across many agencies. Cosmic Journeys was among these.

The near-term affected Cosmic Journeys missions, which remain part of NASA's Strategic Plan (and are also firmly endorsed in the new Astronomy and Physics decadal surveys), are Constellation-X, the Laser Interferometer Space Antenna (LISA), and the Advanced Cosmic Ray Composition Experiment for Space Station (ACCESS).

The current President's budget request for FY02 does however include substantial new technology funds to prepare for Constellation-X and LISA. NASA intends to continue to press for approval to continue and complete these two missions. In view of the difficulties with the Cosmic Journeys initiative, the Office of Space Science has strongly suggested that instruments satisfying the ACCESS science objectives could be proposed to NASA's Explorer program. The MIDEX Announcement of Opportunity that is currently in preparation has been modified slightly to enable this possibility.

Research Program Deadlines in 2001

The Office of Space Science issued its annual omnibus announcement calling for research proposals in space science, the Research Opportunities in Space Science 2001 (ROSS-01) announcement. ROSS-01 contains calls for proposals in over 25 programs. Deadlines for proposals in programs of direct interest to HEAD members include

- Space Astrophysics Program including laboratory astrophysics on June 21, and
- Astrophysics Theory Program on July 20.

The ROSS-01 announcement may be found at http://research.hq.nasa.gov/ (select Office of Space Science).

Explorer Program Update: SMEX

Last fall, 7 proposals were selected for concept studies in the first stage of the two stage competition for flight as the next two SMEX missions. In addition, two missions of opportunity were selected, one for flight and one for a concept study. On May 1, the 8 teams began six month Phase A concept studies. NASA expects to downselect by next Spring two of the SMEX proposals, and possibly the mission of opportunity proposal, for flight. Several of the missions propose science within the broad definition of high energy

astrophysics including an X-ray telescope with microcalorimeter (Joule, Rich Kelley of GSFC), a heavy nuclei cosmic ray experiment (Heavy Nuclei Explorer, Bob Bins of Washington U.), an imaging ultraviolet spectrometer (SPIDR, Supriya Chakrabarti of Boston U.), and an ultraviolet spectrometer mission of opportunity (SPEAR, Jerry Edelstein of U.C. Berkeley). Details on the study missions, as well as the downselect process, may be found at http://spacescience.nasa.gov/codesr/smex/.

Explorer Program Update: MIDEX

NASA intends to issue an Announcement of Opportunity this summer, probably in June, for the Medium-class Explorer (MIDEX) program. In the first stage of a two stage process, NASA will solicit proposals for MIDEX missions and missions of opportunity; eventually NASA will select two MIDEX missions, and possibly one or more missions of opportunity, for flight. MIDEX missions may be ELV or Shuttle launched free flyers or they may be Space Station attached payloads. Missions of opportunity may be contributions to a non-OSS mission, smaller Space Station experiments, long duration balloon missions, or astrobiology flight experiments. When released, the AO will be posted at http://research.hq.nasa.gov/ under "Space Science Opportunities." Additional information on the MIDEX process will be posted at http://explorer.larc.nasa.gov/explorer/midexacq.html.

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HEAD in the News (November 2000 - May 2001) - Lynn Cominsky, HEAD Press Officer, and Megan Watzke, Chandra Press Officer

It's been a busy six months for HEAD press activities. Our stories have had good coverage in the New York Times, Washington Post, and occasional television spots. Here are some of the highlights.

News from the HEAD Meeting in Honolulu (November 2000)

The Honolulu HEAD meeting (Nov. 6-10) featured a record number of reporters in attendance (including the two winners of the first Schramm award for High Energy Astrophysics Science Journalism Kathy Sawyer and Robert Zimmerman). Four press conferences were held and several written releases were issued. Despite the dominance of the national election news, HEAD news reports appeared in the Washington Post, Science Magazine, Science News and many web sites.

Monday's (November 6) press conference featured new results on active galaxies presented by Herman Marshall (MIT), Andrew Wilson (U of Md), Nancy Levenson (JHU), and George Chartas (PSU). Commentary was provided by Andy Fabian (Institute of Astronomy, Cambridge UK). Marshall showed new Chandra images of the X-ray jet in 3C273, Wilson showed Chandra images and explained a football-shaped cavity in the X-ray heated gas around the radio source Cyg A. Levenson showed ROSAT and ASCA data which indicated a strong connection between starburst regions and the accretion flow onto black holes in the center of Seyfert galaxies. Chartas spoke about an X-ray flare detected with Chandra in one of four lensed images of a distant quasar, and showed how future observations of additional flares could provide direct distant

measurements to the quasars.

Tuesday's (November 7) press briefing featured results on gamma-ray bursts presented by Luigi Piro (Istituto Astrofisica Spaziale, CNR, Rome, Italy) and Jay Norris (NASA/GSFC). Piro spoke about new iron lines found in data from two gamma-ray bursts which indicate a connection between gamma-ray bursts and supernovae, and also translated questions for his colleague Fillippo Frontera who joined the conference by phone from Italy. Norris spoke about new evidence for two distinct classes of gamma-ray bursts. Commentary was provided by your HEAD Press Officer, who still has a few things to say about GRBs when she is not busy running press conferences.

On Wednesday November 8, Harald Ebeling (Institute for Astronomy) spoke about 101 new galaxy clusters at intermediate redshifts and high luminosities that were discovered in the ROSAT All-sky survey data and then imaged and studied using ground-based telescopes in Hawaii. William Forman (CfA) explained the cosmological significance of finding this unexpectedly large number of clusters in this region of parameter space.

Thursday's (November 9) briefing featured new results on young stars presented by Yohko Tsuboi (PSU) and Norbert Schulz (MIT) with comments by AAS Past-President Andrea Dupree (CfA). Schulz spoke about extremely hot young stars discovered in the Orion cluster while Tsuboi presented her discovery of flaring X-ray emission from the youngest protostars (Class 0, only 10,000 years old), as well as evidence for ubiquitous X-ray emission from slightly older (Class 1) protostars.

Written releases on a 3-hour thermonuclear flare from a X-ray burster by Tod Strohmayer (GSFC) and a naked neutron star streaking through the galaxy by Fred Walter (Stonybrook), also attracted considerable press attention.

For more details of the press briefings, see http://perry.sonoma.edu/head2000/.

A teacher's workshop in Honolulu was sponsored by the Rossi X-ray Timing Explorer Learning Center and the Swift Education and Public Outreach Program. Jim Lochner (GSFC) and Laura Whitlock (SSU) led the workshops, which were attended by about 40 local middle and high school teachers. The RXTE workshop featured a tour of the X-ray sky where participants learned about black holes, pulsars and distant galaxies. The second workshop provided an "Astro Capella" musical introduction (courtesy of Alan and Karen Smale, GSFC) to the mysterious phenomena of gamma-ray bursts. Participants also learned how to play the cosmic gamma-ray burst lottery, and other new educational games.

News from the San Diego AAS Meeting (January 2001)

Victoria Kaspi and Mallory Roberts (McGill) used Chandra data to show that the pulsar in G11.2-0.3 is located in the exact center of the supernova remnant. This indicates that pulsar was indeed formed in the year 386, during an event that was witnessed and recorded by Chinese astronomers. The lack of motion of the pulsar indicates that it cannot be 24,000 years old, as indicated by the usual P/Pdot analysis, and calls into question the ages of other pulsars. G11.2-0.3 is only the second pulsar (after the Crab) to have been historically dated. The story received widespread coverage, especially in Canada, which had several correspondents in attendance in San Diego. See http://chandra.harvard.edu/press/01_releases/press_011001.html.

New results strengthening the evidence for black holes were also presented in San Diego. HEAD members Ramesh Narayan (Harvard) and Michael Garcia (CfA) used Chandra data to distinguish between quiet neutron stars and black hole candidates. The putative black holes only emitted about 1% of the energy in quiescence as did the neutron stars, because the matter falling into the black hole is swallowed up, along with most of the X-radiation that it produces. The process, known as advection, has been advocated by Narayan and others for several years. The Chandra data, however, show the best evidence to date for the existence of advective event horizons. See http://chandra.harvard.edu/press/01_releases/press_011101.html.

News from Gamma 2001 (April 2001)

Four press briefings were held at the Gamma 2001 meeting in Baltimore, Maryland, April 3-6. The meeting, originally planned as the ninth Compton Gamma-ray Observatory Symposium, was renamed after the reentry of CGRO in the summer of 2000. Attended by over 200 scientists, many different gamma-ray results were presented from archival CGRO data, BeppoSAX, Chandra, XMM, RXTE and ground-based air shower arrays. Two New York Times articles and a big story in the Washington Post were some of the early results of these briefings.

The brightest gamma-ray burst in years, GRB010222, was discussed on Wednesday, April 4, by Luigi Piro (Istituto Astrofisica Spaziale, Rome) and Fiona Harrison (Caltech). Piro presented the Chandra and BeppoSAX results, indicating that the evidence is building up that longer GRBs are located in star-forming regions. Harrison showed data from the sub-millimeter James Clerk Maxwell telescope that discovered a starburst galaxy at the position of the GRB. Although originally believed to be afterglow radiation, the constant intensity in the sub-millimeter waveband is more likely to be evidence for the starburst nature of the host galaxy. Commentator Andy Fruchter (STScI) supported this interpretation, offering HST data from his talk later in the GRB session, that are consistent with this emerging picture.

The second briefing on April 4 featured the discovery of a new TeV galaxy and the confirmation of a third extreme AGN. Both results were from the Whipple observatory, and were presented by Veritas collaboration members Deirdre Horan and Hussein Badran (SAO). The confirmation inWhipple data of TeV emission from 1ES2344+514 and the discovery of extreme radiation from 1H1426+428 doubles the roster of TeV galaxies (which previously included only Markarian 501 and 421.) A class of "extreme" galaxies, in which we are looking directly down the jet, was previously predicted by Italian theorists at the Osservatorio Astronomico di Brera, Milan. These new detections consist of photons with mean energies 10 to 100 times those in the blazers studied by CGRO/EGRET. Similar to the EGRET blazers, these galaxies also show evidence for flaring activity on a time scale of days. Ever-quotable commentator Chuck Dermer (NRL) likened the study of these galaxies to "bug collecting," noting that "we are now seeing the most extreme type of bug that we can collect."

Press briefings on Thursday April 5 featured new results on pulsars and on EGRET unidentified sources. Simon Laycock (U Southhampton) presented the discovery with RXTE of two new X-ray pulsars in the SMC, and discussed reasons why this galaxy produces so many pulsars compared to our own Milky Way. Nichi D'Amico (Osservatorio Astronomico di Bologna), representing the Parkes multi-beam survey collaboration,

reported the discovery of over 30 young pulsars that may be associated with unidentified EGRET sources, as well as a total of over 600 new pulsars in the southern skies. Commentator David Thompson (GSFC) provided an excellent review of the importance of these newly discovered pulsars in the evolutionary picture.

More possibilities for unidentified EGRET sources were discussed at the second briefing on April 5, by Sergio Colafrancesco (Osservatorio Astronomico di Roma) and Merja Tornikoski (Metsahovi Radio Observatory, Finland). Colafrancesco presented predictions and some preliminary evidence for the association of these mysterious sources with clusters of galaxies, while Tornikoski used the Swedish-ESO Submillimeter Telescope in Chile to confirm the AGN nature of 9 of the low-confidence identifications in the southern hemisphere, by detecting strong high-frequency radio emission from these objects. Commentator Patrizia Caraveo (Istituto di Fisica Cosmica G. Occhialini, Milan) described some of her multi-wavelength approaches to tracking down the identifications of these elusive sources.

For more details of the press briefings, see http://perry.sonoma.edu/gamma2001/.

Other Chandra News

A team of researchers led by Jeff McClintock (Harvard-Smithsonian Center for Astrophysics) used Chandra and three other NASA space observatories to pinpoint the inner edge of a black hole. Data from Hubble, RXTE, EUVE, and Chandra show that the accretion disk of XTE J1118+480 is truncated at 600 miles from the event horizon, much farther away than the 25 miles that some theories predict. See http://chandra.harvard.edu/press/01_releases/press_050701.html.

On March 13, 2000, NASA HQ held a Space Science Update for the unveiling of the Chandra Deep Fields. Two independent teams obtained the images known as CDF-North (Gordon Garmire, Niel Brandt) and the CDF-South (Riccardo Giacconi). The results indicate that the early universe with teeming with black holes of all sizes. In addition to the multitude of supermassive and stellar-sized black holes, the astronomers also saw X-ray emission from young galaxies, groups, and clusters of galaxies. See http://chandra.harvard.edu/press/01_releases/press_031301.html.

Using Chandra, Andy Fabian and colleagues found the most distant cluster of galaxies ever detected in X-rays. At z=1.786, 3C294 is approximately 40 percent farther away than the next most distant X-ray galaxy cluster. Chandra's image reveals an hourglass-shaped region of emission extending outward some 100 kpc from the previously known central radio source. See http://chandra.harvard.edu/press/01_releases/press_021501.html.

Three high school students found the first evidence of a neutron star in the nearby supernova remnant IC443 using Chandra data -- a discovery that led to a first-place finish in the team competition at the Siemens-Westinghouse Science and Technology Competition. High-resolution observations revealed the existence of soft X-rays - presumably a neutron star - embedded in a nebula of cometary morphology within the supernova remnant. See http://chandra.harvard.edu/press/00_releases/press_121100.html.

Chandra was the recipient of two very prestigious awards in the past half-year. In

December, the Smithsonian Institution selected the Chandra team for the National Air & Space Museum trophy. And, in April, the National Space Club awarded the Chandra program with the Nelson P. Jackson Award. See http://chandra.harvard.edu/press/00_releases/press_111300.html.

Additional Chandra news releases can be found at http://chandra.harvard.edu/press/.

On the educational broadcast front, Chandra scientists and staff participated in two television broadcasts targeted at middle and high school students this spring. The shows, "Live from a Black Hole" and "Live from the Edge of Space and Time" contained taped segments about Chandra operations and science results, live interviews and science demonstrations, as well as a live, on-air question-and-answer segment. The programs aired on NASA TV and selected PBS stations nationwide, and will be rebroadcast on both. Accompanying education materials were developed by Dr. Laura Whitlock (SSU), Santa Rosa high school teacher Kara Granger, and Lindsay Clark (Adler Planetarium & MAP mission EPO) on behalf of the SEU Forum and posted on the Passport to Knowledge website with links to and from the Chandra public website. For more information, visit http://passporttoknowledge.com/universe/, http://chandra.harvard.edu/edu/passport.html, or http://universe.sonoma.edu/activities/.

News from RXTE

Black Holes May Take Space For A Spin. The fastest QPO from a candidate black hole (the microquasar GRO J1655-40, known to contain an unseen object of 7 solar masses) was reported by Tod Strohmayer at the April APS meeting in Washington, DC. Quasi-periodic oscillations at 450 Hz were seen to accompany the previously known QPOs at ~300 Hz, in data obtained with RXTE. This also marks the first time "twin peaks" have been observed in the power spectra from a black hole binary (although many have been observed in neutron star systems.) The 450 Hz oscillations are interpreted as a proof of black hole spin, as they imply a rotation radius that is inside the minimum stable orbit for a non-spinning black hole. Only if the black hole spins, can matter circulate at the distance implied by the faster QPO frequency. This story, accompanied by animations, received considerable press attention, and much television coverage. For details, see the May 1 issue of the Astrophysical Journal or: http://www.gsfc.nasa.gov/GSFC/SpaceSci/structure/spinningbh/spinningbh.htm.

News from XMM

Evidence for the black hole nature of the microquasar GRS 1758-258 was presented at Gamma 2001 by Andrea Goldwurm (Service d'Astrophysique, Saclay), who used the EPIC X-ray cameras to observe a state transition in the energy spectrum from the source. Commonly observed in classic black hole candidates such as Cygnus X-1, and considered an identifying characteristic of black holes, such spectral transitions have not previously been observed from this source.

A big press conference was held on December 6, 2000 to mark the first anniversary of XMM-Newton observations. A special issue of Astronomy and Astrophysics (volume 365) coincided with this first major release of results, and features over 55 science papers. The press conference highlighted XMM-Newton spectral studies of clusters of galaxies, the diffuse X-ray background, supernova remnants and X-ray emitting accretion disks near black holes. A summary of this press conference appears in

Science magazine (2000 December 15; 290: 2049).

Another recent XMM-Newton highlight was the X-ray detection of the most distant quasar. With a redshift of 5.8, the quasar SDSS 1044-0125 (originally discovered in Sloan Digital Sky Survey data) beats the former record holder, which had a redshift of 4.7. The feat was achieved by a team of U.S. and European astronomers, led by Niel Brandt (PSU). The result appears in the February 2001 issue of The Astronomical Journal (volume 121, page 591).

Other XMM news stories include the observation of over 150 sources in the Lockman hole at higher X-ray energies, and an X-ray study of comet McNaught-Hartley. X-ray observations of comets, first begun by ROSAT, are relatively rare, and technically difficult, as they involve faint objects which move through the telescope's field of view at a rapid rate. Detailed analysis of the EPIC spectral data for this comet may help to resolve the mechanism for cometary X-ray production.

For more about XMM-Newton news, see http://sci.esa.int/xmm/.

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7. EUVE Completes Mission - Brett Stroozas, EUVE Project Manager, and Roger Malina, EUVE Observatory Director, University of California, Berkeley

On 31 January 2001, NASA decommissioned the Extreme Ultraviolet Explorer (EUVE) satellite, marking the end of a scientific era. Upon completion of EUVE's final science observation (HD 37394) on 26 January, EUVE's U.C. Berkeley-based Flight Operations Team conducted end-of-life tests on the spacecraft batteries and the science payload backup high-voltage power supplies. Then, on 31 January, the Project held a well-attended "celebratory wake" in the EUVE control center, at which time EUVE was commanded into safe-hold mode and set adrift, to subsequently orbit the earth in silence until its re-entry in early 2002.

The scientific legacy of EUVE is impressive and covers a broad range of astronomical fields. EUVE delivered the first complete maps and catalogs of the sky in four EUV bandpasses. Over 1500 EUV emitting objects were cataloged and an atlas of EUV spectra provides a systematic understanding of the emission physics in objects ranging from clusters of galaxies, stellar coronae, accretion disks in cataclysmic variables, solar system objects, and the local interstellar medium. Information on the EUVE mission and its scientific contributions and publications is available on the Project's web site at http://www.ssl.berkeley.edu/euve/.

A conference is scheduled to examine the scientific legacy of EUVE as well as to discuss future EUV missions in development or being proposed. Details of the 22-24 July 2001 conference are available at http://www.ssl.berkeley.edu/euve/conference/.

The establishment of the permanent EUVE data archive at HEASARC and STScI at http://heasarc.gsfc.nasa.gov/docs/euve/euvegof.html and http://archive.stsci.edu/euve/ will ensure that these rich data sets will continue to be analyzed for years to come.

In addition to science, the rich EUVE legacy will also include its vanguard role in other areas. Through its innovative technology testbed program, the EUVE Project significantly reduced mission operations costs by implementing automated telemetry monitoring and paging, as well as outsourced spacecraft operations and science management at UCB. And under the leadership of Dr. Isabel Hawkins, the Project established a very successful, model education and public outreach program that has since spun itself off into the Center for Science Education at http://cse.ssl.berkeley.edu/euve_epo/.

In the end, we should all be extremely proud of the significant legacy -- scientific and otherwise -- of the EUVE mission. On a personal note, those of us from CEA are very pleased to have had the opportunity to serve the scientific community, and are grateful to have played a role in EUVE's many successes and accomplishments.

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8. Rossi X-ray Timing Explorer News - Jean Swank, NASA's Goddard Space Flight Center

RXTE is well into the observing program for the 6th round of proposals. Operations are stable with selected assignments of the detectors covering the observations. Satellite performance has been good. Both new observations and analyses of archival data are yielding exciting results. We have a track record now of simultaneous observations with Chandra and XMM and have developed smooth advance planning communications.

An important new RXTE result by Strohmayer is that the microquasars GRO J1655-40 = Nova Sco 1994 (2001, ApJ, 552, L49) and GRS 1915+105 (2001, in press) sometimes have two high-frequency quasi-periodic oscillations (QPOs). This is the first detection of two simultaneous kilohertz QPOs in black hole candidates. Their phenomenology is quite different from the phenomenology of the kilohertz QPOs seen in neutron-star low mass X-ray binaries (LMXBs). The relationship between the two sets of kilohertz QPOs is not yet clear.

If the 450 Hz frequency of the new QPO seen in GRO J1655-40 is the azimuthal frequency of keplerian orbital motion around a black hole, the spin of the hole must be prograde and the dimensionless angular momentum is probably greater than 0.2. In other interpretations, the angular momentum might be much closer to unity. The 450 Hz QPO in GRO J1655-40 has an energy dependence which is different from the 300 Hz QPO that was first detected in this source (Remillard et al 1999, ApJ 520, 776). The 450 Hz QPO was found only in a higher energy (above 13 keV) data stream. Perhaps the best link to this and related stories is via http://universe.gsfc.nasa.gov/whatsnews/. This story can also be found at http://www.gsfc.nasa.gov/GSFC/SpaceSci/structure/spinningbh/spinningbh.htm.

RXTE has now begun its 6th year of watching the sky for transients. During the first 5 years, 11 new black hole candidates appeared, some very bright but a few quite weak, such as XTE J1118+480, which appeared a year ago. Even so, a year has now passed without a new one appearing. Instead, XTE J1550-564 has reappeared for the 4th and 5th times, at a tenth of the flux of the Crab nebula (Tomsick et al. and Jain et al., IAUC 7575). There have also been some disappearances of note: first the hard emission and

then the soft component of GRS 1758-258 were found to be decaying (Smith et al., in IAUC 7595, astro-ph/0103381, and astro-ph/0103304). Among the neutron star LMXBs, KS 1726-31, which has been very useful in revealing correlations between various characteristics of Type I bursts (radius expansion, decay time, oscillations; see Muno et al. 2000, ApJ, and Muno et al. 2001, astro-ph/0105042), has not been detectable by the PCA for at least 100 days.

Although no new, bright BHC transients have appeared, there have been other transients, such as neutron stars in binaries. Several new accreting pulsars have been found with relatively long periods. They probably have massive, early-type companions. KS 1947+300 = GRO J1948+32 reappeared with an 18 s pulse period (Levine, IAUC 7523; Swank & Morgan, IAUC 7531); the ASM data and pulse timing indicate that the binary period is about 41 d (Corbet, Morgan, in preparation). Two new pulsars in the SMC bring the total there to 25 (Corbet et al., IAUC 7562). The 27 s pulsar XTE J1543-568 has been shown to have a very circular 75.56 day orbit (in't Zand et al., astro-ph/0104468). Her X-1, reappeared in October of 2000 after having been off for 18 months and has persisted normally since then.

Two transient LMXBs, SAX J1750-2900 and SAX J1711.6-3808, are currently being followed as they decay from recent outbursts to about 200 mCrab. At the November 2000 HEAD meeting, Heise et al. reported that a third burst from SAX J1808.4-3658 had been found in which there was evidence for the 401 Hz oscillation period (in't Zand et al., astro-ph/0104285). No additional persistent sources of fast, coherent oscillations have been found, but SAX J1808.4-3658 is expected to have an outburst this summer. If one occurs, observations of it will displace many other observations. A relatively slow (0.59 s) pulsar 4U 1822-37 has recently been discovered (Jonker et al., astro-ph/0104356), despite evidence that the neutron star is not seen directly!

RXTE has still not seen a burst from XTE J1808.4-3568, but continuing observations of bursters have now caught a number of rare bursts. Only the second from X 2127+119 in M15 will be reported at the AAS meeting in June (Smale). A completely new class of bursts, with durations about 4 hours, has been identified in data from BeppoSAX and RXTE observations. Bursts of this type have now been seen by BeppoSAX from 4U 1735-44, Serpens X-1, and KS 1731-260 and by RXTE from 4U 1820-30 and 4U 1636-534 (see the references in Wijnands, astro-ph/0103125).

On April 18, BeppoSAX observed a giant flare from SGR 1900+14 (GCN 1041, Guidorzi et al., IAUC 7611). The narrow-field instruments followed up after 8 hours and RXTE followed up 1 day later. Simultaneous Chandra and RXTE observations were successfully carried out on April 22 and again on April 30. The Chandra data are in the public archive, as are two selected RXTE observations. RXTE observed the source daily during the period when it was active, following an approved TOO proposal (Woods et al., GCN 1056).

Cycle 7 Schedule

RXTE Cycle 7 will feature fully electronic proposal submission. The Cycle 7 Announcement and Appendices are expected to be released in June, with a proposal due date in September.

Data Processing Changes

After five years of successful XSDC operations, the RXTE production data processing pipeline has recently been taken over and redesigned by RXTE GOF and SOF personnel. This new, streamlined processing pipeline has dramatically reduced the typical time lag between an RXTE observation and the archiving and distribution of production data. Data now generally appear in the online area within two weeks of the observation and sometimes within a week. In addition, the response to "red flags" in the processing pipeline has markedly improved.

Observers are reminded that the SOF posts the realtime data within hours of an observation and the "production" data as soon as they are available, about a day after the observation,; these data have not been finally processed. Both types of data can be obtained in PGP encrypted packages at http://xte.gsfc.nasa.gov/docs/xte/SOF/XTESOF.html.

Software and Calibration

Reconstruction of the attitude for a week in September 2000 for which the onboard processing failed should be released soon. The PCA group hopes to issue by September response matrices and models for background which are appropriate for PCU 0 after the loss of the propane layer. Updates to other calibrations will continue.

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9. Chandra X-ray Observatory Status - Belinda Wilkes, Chandra X-ray Center

Chandra continues to perform well with wall clock observing efficiency around 70%, apart from a period of intense solar activity in April 2001 during which observations were halted on several occasions. The Cycle 3 deadline was March 15, 2001. The peer review for the 730 proposals recieved will be held in Boston this June. Shri Kulkarni has taken over as chairman of the Chandra Users' Committee (CUC) from Craig Sarazin, whom we thank for his many years of dedicated service. The next CUC meeting will be held on June 29-30. For a list of current members on the CUC web page, visit http://asc.harvard.edu/udocs/users.html, or, select Chandra Users' Committee on our web pages. Chandra Data Analysis (CIAO: Chandra Interactive Analysis of Observations) software workshops were held at CfA in January and April 2001, and the next is planned for October 2001.

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10. High Energy Transient Explorer - George Ricker, Principal Investigator, MIT

The High Energy Transient Explorer (HETE) was successfully launched on October 9, 2000. This mission is dedicated to the detection and prompt dissemination of accurate locations for gamma-ray bursts (GRBs). The launch was entirely successful, placing HETE in an equatorial orbit of inclination 1.9 degrees, with a perigee of 595 km and an apogee of 635 km.

The spacecraft power system, momentum management, and sun tracking are working perfectly. During orbit night, the satellite drift rate is now controlled to ~1"/s. The star camera aspect system provides the actual pointing direction of the satellite every second to an accuracy of ~10". During December-January, calibration observations with the WXM were able to localize the Crab Nebula to a precision of 0.1 degrees, close to the mission goal of 5' or less. Similarly, observations with the Soft X-ray Camera (SXC) were able to localize the Crab Nebula to a precision of 20", demonstrating that HETE's mission goal for accurate localization of bright GRBs can be realized in orbit.

Following calibrations using the Crab Nebula, coordinated operations of the three principal scientific instruments commenced in February 2001. Since launch, the French Gamma-ray Telescope (FREGATE) has been operational 20% of the time and has detected 12 GRBs confirmed by other satellites and 14 bursts not seen by other satellites. Four of these bursts were of the "soft" variety, lacking emission at energies above ~50 keV. We expect to increase the operational efficiency of FREGATE, as well as of the WXM and SXC, to 40%-50% over the next few months. Four GCN circulars were issued (for GRBs 010213, 010326A, and 010326B).

The in-orbit performance of the HETE science instruments has been as follows-- FREGATE: Completely nominal. WXM: Hardware performance has been completely nominal. Testing and optimization of on-board triggering has been an ongoing activity. SXC: The density of atomic oxygen at the altitude of the HETE orbit is much greater than expected, likely due to solar maximum. This effect has led to erosion of the SXC outer optical blocking filter. The consequent light leak has necessitated a change in the flight software to correct for the resulting CCD bias. This software modification works well, and fully restores the SXC localization precision (<20" at present), as verified by astrometry using Sco X-1 during the lunar dark time in May. The SXC is currently in observing mode for half of each lunar month. Further operational changes will enable the observing mode to extend to 2/3 of each lunar month; SXC observations will not be possible for 4-5 days on each side of full moon because of the light leak. The HETE secondary science goal of soft X-ray observations below 1.5 keV will also not be realized due to the light leak.

During the February-April period, dissemination of the first few HETE burst localizations were delayed by ~1-2 orbital periods so that the flight location could be checked on the ground and the full spacecraft aspect record could be used. Beginning on May 25, a GCN "rapid alert" socket interface will be enabled, permitting initial burst notifications, albeit with coarse aspect, to be issued with delays of ~seconds-minutes. The initial GCN/HETE Notice will specify only that a candidate event has been localized to within ~1 degree by the WXM or the SXC. Follow-up GCN/HETE Notices will provide additional localization information, if any, as soon as it is derived.

During the May-August period, the fields-of-view of the HETE science instruments will include Sco X-1 and the Galactic Bulge region. Many of the known sources in this region of the sky are scientifically interesting (i.e., X-ray bursters, SGRs, AXPs). They will also be useful for further reducing the systematic errors in the accuracy of the WXM and SXC localizations. (Already, using May data from Sco X-1, we have been able to confirm the Crab-referred astrometric calibration of the WXM and the SXC to < 5' and < 20", respectively. Further improvements with additional data are anticipated.)

The Galactic Bulge will exit the HETE FOV in August, allowing sensitive GRB operations

to resume away from the Galactic plane in September, with a projected detection rate of 2 to 5 GRBs per month promptly localized to ~10' and reported directly from the HETE Burst Alert Stations (BAS) via GCN. The SXC should provide localizations of ~10"-20" at a rate of ~ 1 per month. Both rates are consistent with pre-launch expectations.

We are concerned that it has taken longer than anticipated for HETE to achieve its full potential in terms of scientific operations. Many observing programs dependent on HETE have been left in a state of uncertainty and we apologize to our colleagues for this situation. The delay has been due primarily to programmatic factors. The HETE Operations team, though both dedicated and highly motivated, is understaffed, due to smaller than expected MO&DA funding. As a result, the same small 6 person team has been overseeing daily (and nightly) mission and tracking network operations as well as simultaneously addressing command load preparation, software revision, science data, archive, and calibration issues. Unscheduled spacecraft reboots have added to the workload of the Operations team and reduced HETE's observing efficiency; the origin of this problem has been identified, and a software fix is being tested. A recent increase in funding from NASA will enable us to add 3 persons to the HETE Operations Team for the next 8 months, so that software revisions to permit full automation of operations can be completed while the science mission proceeds.

HETE is a collaboration between NASA; MIT; Los Alamos National Laboratory, New Mexico; France's Centre National d'Etudes Spatiales (CNES), Centre d'Etude Spatiale des Rayonnements (CESR), and Ecole Nationale Superieure de l'Aeronautique et de l'Espace (Sup'Aero); and Japan's Institute of Physical and Chemical Research (RIKEN). The science team includes members from the University of California (Berkeley and Santa Cruz) and the University of Chicago.

Ongoing updates and further details are provided by the HETE Mission Operations Team at the official website: http://space.mit.edu/HETE/.

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11. XMM-Newton Updates - Ilana Harrus, XMM-Newton US GOF, NASA's Goddard Space Flight Center

Satellite and instruments

The observatory has been performing well. Although at the beginning of the mission there were some problems with two of the read-outs for the RGS CCDs, none of the remaining CCDs have had problems since then. All instruments on-board are collecting data and the satellite is now operating at more than 60% efficiency. Check out the results of the February ESA Delta review at:
http://sci.esa.int/content/searchimage/searchresult.cfm?aid=1&cid=1&oid=26203&ooid=26

Data distribution and software

XMM-Newton data have started to arrive to Guest Observers. US PIs have received 17 data sets so far, and more than 200 sets (GO plus GT) have been sent to the ESA center in Vilspa (Spain) where they are processed and then sent to PIs.

There have been more than 150 downloads of the public data accessible from the US GOF archive pages (a mirror site to the SOC pages).

The CAL-PV data are being reprocessed and should start appearing in the public archive.

Please check the pages of the Long Term Schedule at http://xmm.vilspa.esa.es/news/advance_plan.html to see when is your observation scheduled.

For those who have already gotten data, check out the pages at http://heasarc.gsfc.nasa.gov/docs/xmm/xmmhp_analysis.html which contains software, scripts, and recipes for XMM-Newton data analysis. If you still have questions, write to the U.S. GOF at xmmhelp@athena.gsfc.nasa.gov for additional help.

There will be a XMM-Newton Science Analysis System (SAS) software demo at the AAS meeting in Pasadena in June on Tuesday afternoon in room C209 between 2 and 4. The XMM-Newton GOF scientists will be there to answer your questions on the XMM-Newton system, data analysis issues, how to get started, and analyzing XMM-Newton data.

Science from XMM-Newton

The US GOF maintains a list of all papers written on XMM-Newton data analysis. The list (about 65 papers) can be accessed at: http://heasarc.gsfc.nasa.gov/docs/xmm/xmmhp_bibliography.html.

The first XMM-Newton general conference. "New Visions of the X-ray Universe in the XMM-Newton and Chandra era" will be held 26-30 November 2001 at ESTEC (Noordwijk, NL). For more information on the workshop, please go to: http://www.estec.esa.nl/conferences/01C12/. We encourage US XMM-Newton Guest Observers to submit abstracts to this meeting.

AO-2

The next AO for observing with XMM-Newton will probably be released in late summer and proposals will be due in mid to late late fall. This schedule is subject to change, so please check the latest news pages at: http://heasarc.gsfc.nasa.gov/docs/xmm/xmmgof.html for updates as the time nears.

The XMM-Newton Learning Center

A completely remodeled XMM-Newton Learning center is open at http://heasarc.gsfc.nasa.gov/docs/xmm_lc/. You'll find there lessons plans, information on X-ray astronomy, the instruments on-board XMM-Newton, all the ESA press releases, and much more. Check it out!

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12. HESSI READY FOR LAUNCH - David Smith, U.C. Berkeley

The High Energy Solar Spectroscopic Imager (HESSI), a Small Explorer spacecraft built to perform x-ray and gamma-ray imaging and spectroscopy of solar flares, is now scheduled for launch on June 4, 2001. HESSI is a joint project of the Space Sciences Laboratory (SSL) at the University of California, Berkeley, NASA's Goddard Space Flight Center, the Paul Scherrer Institute in Switerland, and other institutions. Professor Robert P. Lin, U. C. Berkeley, is the Principal Investigator.

The launch will take place from Cape Canaveral Air Force Station following a captive-carry flight from Vandenberg Air Force Base of the Pegasus XL rocket aboard its dedicated L-1011 aircraft. HESSI's circular orbit, 38 degrees inclination at 600 kilometers altitude, will carry it over a new ground station at Berkeley several times a day for command uplink and data downlink.

HESSI's primary goal is to understand the mechanisms for the acceleration, interaction, and energy loss of energetic particles associated with solar flares. Its single instrument consisting of 9 germanium detectors under 9 pairs of fine grids will provide unprecedentedly high-resolution imaging (down to 2 arcsec) and high-resolution spectroscopy (down to 1 keV resolution) over a range of > 3 orders of magnitude in photon energy (3 keV to 17 MeV). The 15-rpm spacecraft spin will cause rapid modulations in the count rate in each detector due to the transmission of the associated grid pair. These fast modulations can be deconvolved by a variety of techniques to reproduce the image of the flare on the Sun.

The origin and fate of energetic electrons in flares will be studied via imaging and spectroscopy of the hard x-ray bremsstrahlung continuum produced by their interactions. Energetic protons and other nuclei will be studied via nuclear lines from nuclear de-excitation, neutron capture, and positron annihilation.

Since the HESSI detectors are unshielded, and every photon is recorded with its energy and interaction time even when flares are not in progress, HESSI will also function as a high-energy-resolution, all-sky detector for non-solar astrophysics. Planned astrophysics projects include high-resolution spectra of gamma-ray bursts, studies of cyclotron lines and period variations in accreting pulsars, and measurements of the line shapes of the 511 keV and 1809 keV lines from the Galactic Center. In addition, the Crab Nebula will enter HESSI's solar field-of-view once per year, allowing 2-arcsecond imaging of the nebula up to 100 keV or higher.

All HESSI data will be public from the time of collection, and participation from the community in solar and non-solar analyses is encouraged. More information is available from the HESSI websites at U. C. Berkeley and Goddard: http://hessi.ssl.berkeley.edu/ and http://hesperia.gsfc.nasa.gov/hessi/.

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13. Swift Mission News - Lynn Cominsky, Swift Press Officer, Sonoma State University

On February 12, 2001, Swift was confirmed for flight hardware development by NASA Headquarters. This is the final and most important step in the review process that began with Preliminary Design Reviews last year. Looking ahead, the mission CDR will be July 12-13 of this year at NASA's Goddard Space Flight Center. The next Swift science team meeting will be July 23-24 at the University of Leicester, hosted by Alan Wells and his colleagues. In April, NASA announced plans to exercise a contract option with the Boeing Company for a Delta II 7320-10 expendable launch vehicle to launch Swift. Swift is on schedule for launch in September, 2003 from Cape Canaveral, Florida.

Swift Education and Public Outreach has produced its first release of educational materials, which focus on teaching the electromagnetic spectrum. Swift slinkies, card decks with power, and Spin-a-Spectrum wheels, each accompanied by teacher's guides, are now available. To make your own, see the EPO section of the Swift web site: http://swift.sonoma.edu/. The first distribution of these materials was at a teacher's workshop organized by James Lochner (NASA/GSFC) and held in conjunction with Gamma 2001, in April in Baltimore, Maryland. Phil Plait from Sonoma State University presented the workshop, which was developed by Laura Whitlock (SSU). Padi Boyd, Alan Smale and Karen Smale (NASA/GSFC) presented a GRB workshop later in the day, and Dieter Hartmann (Clemson U) and Chryssa Kouveliotou (NASA/MSFC) gave lectures to the teachers about gamma-ray bursts and gamma-ray astronomy. During the same week in April, Whitlock was in Orlando, Florida, presenting a GRB workshop at the National Council for Teachers of Mathematics.

The Swift exhibit booth and a poster about Swift educational activities were both in attendance in January, 2001 at the joint meeting of the AAS and the AAPT. It is estimated that about 3000 people were in attendance. Swift materials were also used in workshops given by Whitlock at the HEAD meeting in Hawaii (November 2000), the California Math Council meeting in Asilomar (December 2000), and the National Science Teacher's Association meeting in St. Louis (March 2001). Finally, the first two Swift-funded segments of the Penn State produced "What's in the News?" show have been aired to millions of middle-school students nation-wide.

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14. GLAST Mission News - Lynn Cominsky, GLAST Press Officer, Sonoma State University

NASA Goddard Space Flight Center in Greenbelt, Md., has chosen the Lockheed Martin Corporation and TRW to perform its spacecraft accommodation study for the Gamma-Ray Large Area Space Telescope (GLAST) Observatory. The two contractors, working independently, will each receive $600,000 to develop an optimal design for a spacecraft to house GLAST's two main instruments, the Large Area Telescope (LAT) and the GLAST Burst Monitor (GBM). The six-month spacecraft accommodation study will conclude with a written report from both contractors and a presentation before the Non-Advocacy Review (NAR) Board, which is the GLAST Project's gateway to the implementation phase of the program. The NAR is currently scheduled for November 2001.

After completion of the Lockheed Martin and TRW accommodation studies, GLAST

Project management at NASA/GSFC will review the results and factor them in to the GLAST spacecraft concept, which is captured in a spacecraft specification document. This specification will be the basis for a Request For Offer (RFO) to elicit proposals from the aerospace industry to build the GLAST spacecraft. The spacecraft proposals are expected in the Spring of 2002. The GLAST launch has been officially changed to March, 2006 (about six months later than previously planned.)

In February a pre-baseline review of the GLAST Large Area Telescope (LAT) was conducted at a meeting that included experts from both NASA and the Department of Energy. The LAT team is now preparing for a mid-summer balloon flight from Palestine, Texas, of a flight-scale tower, and for a PDR/Baseline Review in the fall.

The GLAST Burst Monitor (GBM) team has recently released a Request for Proposals to provide the Data Processing Unit for this instrument. A contractor for the GBM detector crystal assemblies and power supplies will be selected in June.

The GLAST Science Working Group meeting in April included a special AGN workshop organized by Dave Thompson (GSFC) that included many observers from the community. There is a new GLAST science brochure available. Copies in either high or low resolution may be downloaded from: http://glast.gsfc.nasa.gov/science/.

GLAST Education and Public Outreach is gearing up, with a redesign of the EPO web site (http://www-glast.sonoma.edu/) and the sponsorship of the teacher's workshop held in conjunction with Gamma 2001, which also featured a talk about GLAST by Deputy Project Scientist Steve Ritz (For more about this teacher's conference, see the Swift Mission article.) Quest chats were held with GLAST scientists on: January 24: Neil Gehrels (GSFC), February 28: Dave Thompson (GSFC), March 28: Daniel Suson (TAMUK) and April 25, Steve Ritz (GSFC). Archives of these chats can be found at: http://perry.sonoma.edu/quest.htm. These chats are now organized and moderated by Phil Plait (SSU.)

The GLAST exhibit booth and a poster about the GLAST Ambassador program were both displayed in January 2001 at the joint meeting of the AAS and the AAPT. About 20 teachers have thus far applied to be GLAST Ambassadors, in an internationally competitive program, which will select 10 Ambassadors late this summer. GLAST Ambassadors are educators who will help develop, test and disseminate information about GLAST-related physical science and mathematics.

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15. Chandra Fellows Named - Megan Watzke, Chandra Press Officer, Chandra X-ray Center

Five scientists have been chosen as Fellows of the fourth annual Chandra X-ray Observatory Postdoctoral Fellowship Program. The fellowships are open to recent astronomy and astrophysics graduates worldwide. They will work for three years at an astronomical host institution in the United States on problems broadly related to the scientific mission of the Chandra Observatory. The Chandra X-ray Observatory Fellowship Program is a joint venture between NASA and the Chandra X-ray

Observatory Center in cooperation with the host institutions.

The 2000 Fellows are: Elizabeth Blanton (Columbia University) to be hosted by the University of Virginia; Li-Xin Li (Princeton) to be hosted by the Harvard-Smithsonian Center for Astrophysics; Andisheh Mahdavi (Harvard University) to be hosted by the University of Hawaii; Erik Resse (University of Chicago) to be hosted by the University of California at Berkeley; and Masao Sako (Columbia University) to be hosted the California Institute of Technology.

Applications for next Fellowship competition will be due on a date to be specified in November 2001. Further information about the Fellowship program may be found at http://cxc.harvard.edu/fellows/Chandra_fellow.2001.html.

We encourage institutions interested in being host institutions to send us brief descriptions of their facilities, which we will post on our website for potential applicants to read.

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16. Meeting Announcements

High Energy Universe at Sharp Focus (16-18 July @ St. Paul, MN)
To mark the 2nd anniversary of Chandra's launch, a 3-day Chandra Science Symposium will be held in July 2001 in St. Paul, Minnesota, as part of the Astronomical Society of the Pacific's 113th Annual Meeting. Entitled "X-Rays at Sharp Focus: A Symposium of Chandra Science," this will be the first major international meeting dedicated to results from Chandra. The program will include all major science areas covered by Chandra observations --- highlighted by invited review talks by noted experts. Web site: asc.harvard.edu and click on "Sharp Focus" link or http://www.aspsky.org/meetings/2001/science.html.

Statistical Challenges in Modern Astronomy III (18-21 July @ State College, PA)
The SCMA conferences provide a unique forum for astronomers and statisticians to discuss complex methodological issues arising in modern astronomical research. The third conference to be held this summer focusses on observational cosmology and a variety of other astrostatistical topics including Bayesian statistics, time series analysis, multiscale methods and spatial statistics. The conference features a distinguished group of invited speakers from both fields and emphasizes cross-disciplinary commentary and discussion. A preliminary program with speakers and titles is now available. Scholars and graduate students from both fields interested in astrostatistics are encouraged to attend. Contributed papers for the poster session are welcome. Please register and arrange travel and accomodation as soon as possible. Please see the web site at http://www.astro.psu.edu/SCMA/.

Two Years of Science with Chandra (5-7 September @ Washington, DC)
The meeting will highlight key science results from the first two years of operation of the Chandra X-ray Observatory. Virtually all topics in X-ray astronomy will be covered, including (but not limited to) stellar corona, supernova remnants, high resolution AGN spectroscopy, black holes, neutron stars, normal galaxies, galaxy clusters, resolution of

the X-ray background, gamma-ray bursts, etc. Contributions covering recent results from XMM-Newton and other X-ray observatories will also be presented.
http://asc.harvard.edu/symposium_2001/

X-Ray Astronomy School (10-12 September @ Greenbelt, MD)
A 3-day intensive X-ray astronomy school intended for graduate students and recent post-docs with little or no experience in X-ray astronomy will be held at NASA's Goddard Space Flight Center in Greenbelt, MD, on September 10 to 12, 2001. The attendance will be restricted to less than 40 people. A nominal fee will be charged. The emphasis will be on the foundations of X-ray astronomy rather than any particular software tools. For more information on the workshop, please write to xrayschool@milkyway.gsfc.nasa.gov or see the web-site at: http://xrayschool.gsfc.nasa.gov/.

Gamma-Ray Burst and Afterglow Astronomy 2001: A Workshop Celebrating the First Year of the HETE Mission (5-9 November 2001 @ Woods Hole, Massachusetts)
Gamma-ray Burst Astronomy is developing rapidly as an exciting new discipline of high energy astrophysics, following on from the discovery of objects at redshifts reaching Z=4.5, with much higher values anticipated. To celebrate the first year of the HETE mission, and to present new results from both HETE and other observatories, there will be a workshop in a unique setting in the village of Woods Hole, Massachusetts, on Cape Cod, during the week of 5-9 November 2001. Abstracts for contributed talks and posters will be solicited in a second circular in May and will be due in September.
http://space.mit.edu/HETE/WH2001/ or grb2001@earthlink.net

New Visions of the X-ray Universe in the XMM_Newton and Chandra era (26-30 November 2001 @ ESTEC, Noordwijk, Netherlands)
The first XMM-Newton general conference. "New Visions of the X-ray Universe in the XMM-Newton and Chandra era" will be held 26-30 November 2001 at ESTEC (Noordwijk, NL). For more information on the workshop, please go to: http://www.estec.esa.nl/conferences/01C12/. US XMM-Newton Guest Observers are encouraged to submit abstracts to this meeting.

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