

The Kirkwood Society

A Newsletter for Alumni and Friends of the Astronomy Department at Indiana University

Summer/Fall 2003

GREETINGS FROM THE CHAIRMAN!

It is hard to believe another year has gone by, and it has been a full one. The Department is more vigorous than ever. All faculty members have grants for teaching and/or research projects and are actively pursuing investigations on everything from neutrino oscillations and planet formation, on the smaller scales, to surveys of dwarf galaxies and the nature of dark energy on the larger scales. Of course, if you know this Department, and you presumably do if you receive this Newsletter, you know that we also do lots and lots of research on the stellar and galactic scales in between. At the same time, many faculty and graduate students are involved in a wide range of innovative teaching and outreach initiatives, which include development of sixth grade units on the origins of planetary systems and incorporation of real hands-on research experiences into our courses for both majors and nonmajors. Due to our recent increase in faculty size, we are now able to provide more varied undergraduate offerings, including some courses with smaller class sizes on a range of special topics, like astrobiology and cosmology. Our major outreach event during the past year was Astrofest, and I hope you will all enjoy the collage of images from Astrofest that we have included. We cannot possibly do justice to everything that this Department does in any one Newsletter, but we hope that the various articles in this issue will give you a tasty sampler.

Special thanks, as always, to all the friends and alumni of the Department who have supported us generously over the last year. Much of what we do depends on you. Please visit the Department's web page (see p. 8) for more information about our activities and please feel free to contact me by email at durisen@astro.indiana.edu.

DISCOVERY IN THE CLASSROOM Research Experience for Introductory Astronomy Students



Students in Pilachowski's Freshman Seminar class interact with observers at the WIYN 0.9-m Telescope via a remote video link.

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This edition has a Special Astrofest Insert!

Astronomy has always been a popular subject on the Bloomington campus. More than a thousand students sign up each year for our 100-level introductory astronomy courses, and these classes may be the students' only direct experience with science. They come with preconceptions about what astronomy is – they've heard about the Big Bang and about black holes, but many think science is just a body of facts to memorize. Experiencing the creative process of scientific discovery first-hand is not what they are expecting. The opportunity to participate actively in scientific research and to experience the thrill of original discovery and the creation of new scientific knowledge is rare, particularly for non-science majors.

New course materials, developed by Caty Pilachowski in collaboration with Travis Rector of the University of Alaska for use in our introductory A105 Stars and Galaxies course, allows undergraduate students to participate in original astronomy research using the WIYN 0.9-m telescope at Kitt Peak. Students can explore what science is by doing science,

searching for novae in the Andromeda Galaxy. The discovery of new stars from astronomical imagery is conceptually accessible to non-science students, and the methodology is relatively simple. The concept is based on the Research-Based Science Education (RBSE) program developed at the National Optical Astronomy Observatory in Tucson.



Caty's Freshman Seminar students selected the Triangulum Galaxy for observations with ultraviolet, blue, visual, red, near-infrared, and hydrogen alpha filters. The blue and ultraviolet filters highlight the young stars in the galaxy, which trace out the spiral arms, while the longer wavelength filters pick up the more uniform background of old stars. The H-alpha filter shows the many star-forming regions found in this galaxy.

The process begins with observations of the Andromeda Galaxy. Weather permitting, students view Andromeda at the Kirkwood Observatory, although the view is disappointing to many because of Bloomington's well-lit sky. IU Bloomington's access to the WIYN 0.9-m telescope at Kitt Peak, Arizona, however, provides students with an authentic observing experience on a research telescope. Through videoconferencing, students on the Bloomington campus can interact with the on-site observer at the 0.9-m while the images they will examine are being obtained. Students monitor the progress of the observations, view new data, and ask questions. Students learn about how research telescopes are used, about instrumentation, and about how astronomers acquire data to carry out scientific investigations. Later in the semester, students are given the opportunity to select targets and filters for observations of eye-catching celestial objects. Examples from Fall 2002 can be seen at www.astro.indiana.edu/classes.html. One is shown on this page.

With the help of the Teaching and Learning Technology Center on the IU campus, time-lapse "movies" of the observed fields near the center of Andromeda are made available to students over the Web. Students examine the datasets to identify "new" stars which appear. Over weeks to months, these stars gradually fade away. Tools are provided to estimate the brightness of the novae, and students can measure the decline in brightness of the novae as a function of time. Introductory astronomy students are able to make original discoveries of previously unknown novae through

their participation in this research project. If you want to try your hand at searching for novae in Andromeda, the Web tools can be explored at:

<http://www.astro.indiana.edu/novasearch/nova.html>.

Note that download times are slow, especially without a broadband link, because the images are large and numerous!

New data will be added periodically through the Fall semester, as the images are obtained from the telescope. Observing sequences from the years 1997-2002 are already available on the site, and 2003 looks to be a very good year already for finding novae, with more than three dozen nights scheduled with the WIYN 0.9-m telescope.

Pilachowski has been awarded both an Active Learning Grant from IU Bloomington's Instructional Support Services and an SBC Fellows grant to support the development of the new course materials. The support of the UITS Telecommunications Division, which has provided videoconferencing equipment used for remote observing, is also gratefully acknowledged.

RESEARCH HIGHLIGHT

The ChaMPlane Survey



The Earth-orbiting Chandra X-ray Observatory is producing a wealth of serendipitous X-ray source discoveries. Each time the Chandra telescope is trained on a particular astronomical object, additional tens to hundreds of previously unseen sources are detected. Two major programs are underway to catalog these serendipitous sources and to determine their nature through optical observations: the ChaMP (Chandra Multi-wavelength Project), which is an all-sky survey away from the plane of our Milky Way Galaxy, and the ChaMPlane survey of sources near the Galactic plane. Professors Phyllis Lugger and Haldan Cohn, together with graduate student Allen Rogel, have been participating in ChaMPlane, which is led by Professor Josh Grindlay at Harvard University.

The detection of X-ray emitting binary stars is of particular interest to ChaMPlane, since the total number of such stars in our galaxy and the distribution over X-ray binary types is highly uncertain. X-ray binary star systems contain a collapsed star—a white dwarf, neutron star, or black hole—

with a very close companion star that is typically a main-sequence star. The most common type of X-ray binary is a cataclysmic variable (CV) system, in which a white dwarf and a red dwarf orbit a common center of mass with a separation of about the diameter of our Sun. The diameter of the white dwarf is that of the Earth—just one-hundredth the diameter of the Sun. Since the white dwarf has a mass comparable to that of the Sun, despite its much smaller size, it has an extraordinarily strong surface gravity. In a CV system, gas spills from the surface of the red dwarf towards the white dwarf, is accelerated to very high speed by its strong gravity, and goes into orbit in an accretion disk about it. The high-speed, turbulent motion of the gas in the accretion disk heats it to temperatures in the range of millions of degrees, which causes the gas to emit the strong X-ray radiation that is detected by the Chandra Observatory. In addition to cataclysmic variables, the ChaMPlane survey is expected to detect other X-ray binaries containing neutron star and black hole primaries, very hot B-type emission stars that have binary companions, M-type emission stars with very active coronas, and a range of “background” objects that lie well outside of our Milky Way Galaxy but shine through the dust near the Galactic plane. These distant objects include other normal galaxies and galaxies with extremely active nuclei. This latter class includes quasars, the most distant objects in the universe.

The first phase of the ChaMPlane survey is to detect and catalog all of the X-ray sources in approximately 100 fields that have been observed by the Chandra Observatory near the Galactic plane. Objects that produce X-ray radiation by gravitational accretion, such as X-ray binaries, typically produce optical hydrogen-line emission, particularly the $H\alpha$ line. Thus, the second phase of the ChaMPlane survey is to detect $H\alpha$ emitting objects in the Chandra fields by observing them with the CCD mosaic imagers on the Kitt Peak (Arizona) and Cerro Tololo (Chile) 4-meter telescopes using $H\alpha$ and R-band filters. An $H\alpha - R$ color index is determined for each object, and those with excess $H\alpha$ emission are flagged. The lists of X-ray objects and $H\alpha$ -excess objects are correlated and lists of objects of interest for spectroscopic follow-up are generated. Of particular interest are objects that show both X-ray and $H\alpha$ emission.

Allen, Phyllis, and Haldan are using the Hydra fiber-fed, multi-object spectrograph on the WIYN 3.5 meter telescope for the follow-up spectroscopy. This work forms the basis of Allen's Ph.D. dissertation. Typically 60-70 spectra can be obtained in each fiber setup. Ten fields have been surveyed to date and 530 sources have been identified. These include 5 new cataclysmic variables, 4 B-type emission stars, 184 M-type emission stars, and 28 active galactic nuclei/quasars. As part of his dissertation, Allen is developing a model for the CV distribution in the Milky Way Galaxy, which will allow a determination of the total CV number, based on the ChaMPlane survey. The number of CVs detected so far is consistent with a total galactic population of about 3.5 million—with substantial uncertainty given the small sample size. As the ChaMPlane survey proceeds and more CVs are

discovered, these census results will become increasingly firm.

SUMMER REU PROGRAM

Research Experience for Undergraduates



Left to Right: Kevin Vogel, Jonathan Burkle, Danny Gibbs, Kurt Soto, Ella Braden, Doug Hoffman

The Department's Research Experience for Undergraduates (REU) Program, funded by a grant from the National Science Foundation, completed its second summer of activities.

Danny Gibbs from the University of Wyoming worked with IU graduate student Stella Kafka, studying the variable star population of the relatively old (1.6 Gyr) and understudied open cluster NGC 6939. Such variables can be used for distances and to study stellar evolution among stars of common distance, age, and metallicity. The data used for this project are several nights of CCD monitoring obtained by Arne Henden at the U.S. Naval Observatory, Flagstaff, plus multi-color photometry obtained by Danny Gibbs at the 0.9m WIYN telescope at Kitt Peak. Nine periodic variables were found, eight of which are new, consisting of several W UMa type and eclipsing binary systems.

Doug Hoffman from Georgia Institute of Technology did research with Kent Honeycutt on photometry of the cataclysmic variable DK Lacertae, which was a nova in 1950 and suddenly faded by 2-3 mag in 2000. CCD images acquired during this low state were studied with the hope that an asymmetric disk might reveal the orbital period. Doug found that the low state variations are very different from those in the high state, but do not seem to be periodic. This is apparently the first old nova that has shown a VY Scl low state. The character of the 1 mag low-state variations are unusual and interesting, and their nature remains puzzling.

Kurt Soto of the University of California Berkeley did his research with Caty Pilachowski on spectra of solar-type stars in 3 to 30 million-year-old star clusters from WIYN and from the CTIO Blanco 4-m telescopes. Kurt classified the spectra by spectral type, measured their radial velocities, determined the intensity of stellar activity from the strength of the emission in the core of the Ca II K-line, and

determined the projected rotational velocity of each star. The goal of the research is to determine how the intensity and frequency of stellar activity changes with age and rotation among such young stars.

During this summer **Jon Burkle** from Wheaton College, Stuart Mufson, and IU graduate student Nick Mostek have been testing the feasibility of calibrating spectrophotometric standard stars for the SNAP mission at select spectral regions in the near infrared from the ground. This calibration scheme would compare the star to a NIST calibrated light source in narrow bandpass filters known to be free of water vapor, and hopefully other sources of atmospheric absorption. The tests were done using a single channel photometer built this spring at Indiana that was mounted on a Meade 8-inch telescope.

Ella Braden from Whitman College and **Kevin Vogel** from the University of Nebraska at Kearney are determining the general parameters (reddening, metallicity, distance, and age) of two Galactic disk star clusters, using UBVR photometric data and modern analysis techniques. During the first week, they prepared a detailed observing program which they then carried out during the second week at the WIYN 0.9m telescope at Kitt Peak. Several photometric nights yielded excellent data. During subsequent weeks, they analyzed cluster data by applying psf-fitting techniques and aperture corrections using DAOPHOT II. They also worked with the standard field data, determined the transformation equations using IRAF, and standardized the cluster data. Multiple color-color diagrams (involving U) then simultaneously yielded the cluster metallicities and reddenings, and color-magnitude diagrams yielded the cluster distances and ages. Finally, the participants compared their work to (scant) previous work.

All of the students visited WIYN this summer. Most obtained CCD imaging data using the WIYN 0.9-meter telescope. All were able to tour the various facilities at Kitt Peak, see some sights in Tucson, and enjoy some Mexican food! Most of the REU students are expected to present their work at the Atlanta AAS meeting this winter.

ASTROFEST

A Celebration of IU Astronomy

Despite torrential rain on the day of the Kirkwood Observatory rededication, Friday October 25, 2002, the lobby was crowded with dozens of visitors who came from near and far for the historic occasion. Brief comments were given by Kent Honeycutt, Tom Swafford, Martin Burkhead, and Kumble Subbaswamy. Dick Durisen formally rededicated the Observatory by unveiling a new plaque now fastened to the lobby wall. The inscription reads

Kirkwood Observatory Rededication
25 October 2002
Originally Dedicated 15 May 1901
in Honor of Daniel Kirkwood (1814-1895).
Professor of Mathematics of Indiana University
(1856-1886).

Weather forced cancellation of the evening open house and star party. Saturday October 26, 2002 featured an afternoon of talks about uses of the WIYN Observatory for science and teaching. Speakers included IU faculty Caty Pilachowski, Haldan Cohn, Phyllis Lugger, and Con Deliyannis, who had behind the scenes help from Liese van Zee. Additional talks were given by George Jacoby (Director of the WIYN Observatory), Eric Wilcotts (University of Wisconsin), and distinguished alumna Martha Haynes (Cornell University). Dick Durisen acted as master of ceremonies.

Saturday evening, well over 100 people attended a reception and dinner in honor of Professor Emeritus Frank K. Edmondson's 90th Birthday. Many who could not be there sent messages to be read or conveyed to Frank at the dinner, including Hugh Van Horn, Arlo Landolt, Don Fernie, David C. Camp, Len Kuhl, Philip Barnhart, Ron Probst, Tom Gehrels, Vera Rubin, Kenn Gros Louis, Henry Giclas, William Potter, and many more. Most notable among these was Robert Kraft (D. Sci. IU 1995) who sent a warm three-page letter of reminiscences accompanied by a \$1,000 gift to the Department. Many astronomical organizations sent official acknowledgments, including the American Astronomical Society, AURA, IU Foundation, and the Center for the History of Physics of the AIP.

The after-dinner ceremony, presided over by Dick, was a tribute to the many lives and institutions Frank has touched. Among those who shared thoughts, memories, and congratulations at the podium were Caty Pilachowski, Jeff Alberts, Cathy Sideli, Peggy Thompson, and Dick. Frank received a number of plaques and citations, including a picture of Daniel Kirkwood that is now mounted in Frank's honor in Kirkwood Observatory. The inscription reads, "Presented to Dr. Frank K. Edmondson, Professor Emeritus on the occasion of his 90th birthday, August 1, 2002." A touching high point of the evening was Christina Lirot's PowerPoint presentation of Frank's life, set to the music of Gustav Holst's *The Planets* and using photos gathered from the Department's and from daughter Margaret Olson's own collections. Frank was presented with a CD of the presentation as well as paper copies of the slides.

For those who were not able to be with us and as memorabilia for those who were, we have a special insert with collages from the Kirkwood Observatory Rededication and WIYNFest on one side and Frank's 90th Birthday Celebration on the other. Can you identify everyone? I bet Frank can.

MARSFEST

The Invasion for Mars

Just as I thought we could not top the number of participants at an outreach event set by Astrofest, along comes Mars perihelic opposition and an Earthling horde bent on a telescopic glimpse of the Angry Red Planet. On August 27, 2003, as this Newsletter was going to press, the Department held Marsfest in response to public demand. Three talks on Mars were given in SW 119 to standing room only crowds from 8:30pm to past 10:00pm: Caty Pilachowski "The Exploration of Mars", Martin Burkhead (assisted by Barbara) "Life on Mars", and Dick Durisen "Why is Mars so Close?" Afterwards, approximately 2,000 people viewed Mars from Kirkwood Observatory or through telescopes set up by the Stonebelt Stargazers from Bedford in the 6th and Dunn IU parking lot. Kirkwood Observatory was open until 3:30am. Special thanks are due to Nick Mostek, Steve Margheim, Aaron Boley, Kai Cai, Stuart Mufson, Heather Jacobson, Kevin Croxall, Christina Lirot, Brenda Records, IU Physical Plant, and the Stargazers for helping us pull this off.

SPECIAL THANKS

Computer Cluster in SW 311

The Department has been blessed many times over recently by the generosity of its friends and alumni. With greater emphasis on research-based learning in our undergraduate major program, our students, including visiting REU students, need access to a dedicated state-of-the-art computer cluster outfitted with machines capable of running astronomy-specific software like IRAF, DAOPHOT II, and GIPSY and utilizing large datasets and databases. In mid-academic year, as Liese van Zee's new and improved A452 class approached, our undergraduate computer cluster in SW311 urgently required an upgrade. Hearing of our need, Chris Knowles and Marcia McAllister supplied a targeted gift of \$10,000 that enabled us to buy five new machines and replace the obsolete monitors on five pre-existing computers in time for use by Liese's students. Special thanks are also due to Kent Honeycutt, who played a critical role in facilitating the gift by hosting a WIYN observing night for friends of IU Astronomy in November 2002.



Students using part of our new Undergraduate Computer Cluster

GRADUATE DEGREES

Annie C. Mejía is completing her Ph.D. in Astronomy titled, "Gravitational Instabilities in Disks around Young Stars," with research advisor Dick Durisen. Although she has already moved to Seattle this August to begin her postdoc with Tom Quinn's group at the University of Washington, Annie has not quite finished writing her dissertation and will be returning during the Fall semester to defend. To study planet formation, Annie has produced state-of-the-art global 3D hydrodynamics simulations of gravitational instabilities in protoplanetary disks that are longer and include more physics than any others to date. Although a citizen of Venezuela, she has been a long-term resident of our Department (10 years) and already holds an IU B.S. in Astronomy & Astrophysics (1997) and an IU M.A. in Astronomy (2000). During her graduate career, she received the Swain Fellowship (2002-03), a McCormick Research Grant (2002), and the top award for her research poster at IU's Women in Science Fair (2002).

Adam Rengstorf completed his Ph.D. in Astronomy under the supervision of Stuart Mufson with the acceptance of his dissertation "Quasar Detection via Variability in a High Galactic Latitude Drift Scan Survey". In this dissertation, Adam searched for quasars using variability data collected by the QUEST (Quasar Equatorial Survey Team) collaboration with the 1-m Schmidt telescope at the Venezuelan National Observatory over the course of three observing seasons. Subsequent spectroscopic confirmation work of the quasar candidates was carried out at the WIYN 3.5-m telescope. In the course of this work, 30 quasars were identified, 50% of which are newly discovered and 50% of which are independent rediscoveries. Adam will be a postdoc this Fall at the University of Illinois working under the direction of Dr. Robert Brunner, where he will be involved with the National Virtual Observatory initiative as well as continuing his quasar research with the newly-completed QUEST 2 camera on Mt. Palomar.

Aaron Steinhauer completed his Ph.D. Dissertation in Astronomy titled, "Formation and Evolution of the Open Cluster Lithium Gap", with research advisor Constantine Deliyannis. In August, Aaron moved to Gainesville, Florida to begin his postdoc with Elizabeth Lada at the University of Florida. Using new UBVR photometry and WIYN/Hydra and CTIO/Hydra II spectra, Aaron conducted the most comprehensive and detailed study of Li depletion in open cluster stars to date. Several important results include a) delineation of the timing and degree of Li depletion in solar-type stars, b) discovery of a strong correlation between effects of rotation and Li depletion, and c) discovery of a new class of Li-rich dwarfs. Aaron has presented results at AAS Meetings, an Abundance meeting (Seattle 2002), and a Clusters meeting (Coimbra, Portugal, 2001). Aaron was the recipient of the prestigious COAS Dissertation Year Fellowship and the Bernice E. Covalt Memorial Fellowship.

Janet Casperson was granted a Master's degree in 2003

under the supervision of Liese van Zee. Janet processed and analyzed the first imaging observations of the SMUDGES survey. In addition to identifying dwarf galaxy candidates for follow-up spectroscopy, Janet investigated the galaxy luminosity function in the field and in the Virgo cluster. Janet will be teaching Physics at Portland State University this coming year and plans to apply to graduate school in Education this Fall.

David Herrick received an M.A. in Astronomy during Fall 2002 working with Dick Durisen on ballistic transport in Saturn's rings. David modified an existing ballistic transport code to allow treatment of two distinct populations of meteoroid impact ejecta, those from cratering events and those from impacts which disrupt ring particles. David is now an Assistant Professor at Grifford Technical Community College in North Carolina.

Angela Sarrazine completed her M.A. in Astronomy with Con Deliyannis and continues to work on her Ph.D. in Education. For her astronomy thesis, Angela worked on precision UBVR photometric data of the nearby, rich, young open cluster M35, and she re-evaluated the cluster's basic parameters. Angela is an Astronomer at the Fernbank Science Center in Atlanta, where she designs and implements planetarium shows and astronomy classes, and runs public nights with the 36" reflector.

Heidi Tebbe was granted a Master's degree in 2003 under the supervision of Liese van Zee. Heidi derived the rotation curves for a small sample of gas-rich dwarf irregular galaxies using spatially resolved neutral hydrogen maps from the VLA. Based on the derived rotation curves and the distribution of luminous matter (stars and gas), she measured the dark matter content of these galaxies and investigated the shape of the dark matter halo. Heidi is now enrolled in a Master's program in the Telecommunications department at IU.

UNDERGRADUATE DEGREES

Eric Thompson's (B.S. Astronomy & Astrophysics) senior thesis, supervised by Katy Pilachowski, was titled "Spectroscopy of Red Giants in M4 with the WIYN telescope". He determined the composition of three dozen giant stars in the globular cluster M4 and found several with measurable lithium abundances. Eric received the Hollis and Grete Johnson Award for Excellence in Student Research. He is commissioned as an officer in the Air Force, and is now serving at Kirtland Air Force Base in New Mexico.

Matt Wimmer (B.S. Astronomy & Astrophysics) will be attending graduate school at the University of Alabama in the Fall.

Jason Ten Barge (B.S. Astronomy & Astrophysics) graduated with Honors, was inducted into Phi Beta Kappa, and received the Astronomy Alumni Award for Overall Academic Excellence. His senior thesis was titled "Stellar

and Gaseous Kinematics of Blue Compact Dwarf Galaxies" with Katy Pilachowski as his research advisor. He presented his thesis research as a poster at the Summer AAS meeting in Nashville, TN. Jason will be entering a doctoral program in Physics at the University of Texas, Austin.

TALE OF TWO C(K)ATY'S

Stars of Indiana Rising

The Influence of IU Astronomy on the national and international astronomical community grows even stronger, spanning continents east and west. At the present time Katy Pilachowski, our first Daniel Kirkwood Chair of Astronomy, is president of the American Astronomical Society, while Katy Garmany (B.S. Astrophysics 1966) is presiding over the Astronomical Society of the Pacific. With IU hegemony over the Western Hemisphere and the Pacific Rim in hand, should we plan to move on to world domination?

FACULTY NEWS

This summer **Martin & Barbara Burkhead** continued to visit National Parks and help them add some astronomy to their evening talks. They provided "backpack" information about the planets and solar system as well as a listing of the various interesting astronomical events of the summer. Martin also gave evening talks on Mars at several of the Parks. They continue to stress that a dark sky and being able to see the Milky Way is a part of the National Park's mission! They are having some success. They spent two weeks on a small Alaska vessel explaining tides. They also saw lots of whales and glaciers. Tough work, but someone has got to do it!

Hollis & Grete Johnson served with LDS Charities in Beijing, China, where they worked as volunteers with China Charity Federation (CCF), a nation-wide charitable organization. On behalf of CCF, they visited orphanages, old folks homes, schools, and private homes across many faraway and poorer parts of China. In the CCF office they edited, wrote, taught, and served by visiting corporations, distributing relief goods to flooded villages, obtaining medical equipment for a hospital, setting up a charitable center for computer instruction, and planting trees. Hollis presented several university lectures. Finally, having avoided SARS, they are writing a book about Charity in China.

The following kind of news is always a pleasure to convey. Congratulations are due to **Con Deliyannis** for receiving tenure and promotion to Associate rank at IU. He breezed through the process, of course, but it was hard to convince Con of that beforehand. His color-coded dossier was one of the most comprehensive from this Department to date. Would we expect any less of him? Con is now enjoying a well-earned "at home" sabbatical doing science and writing papers.

Liese van Zee received a College of Arts and Sciences Summer Faculty Fellowship for Summer 2003 in support of her research on dwarf galaxies.

PASSINGS

I have to share some sad events amidst all the news of accomplishments and celebration. **Delores “Dee” Owings**, whom many IU Astronomy alumni will remember as the tireless supervisor for astrometric measurements of asteroid plates at IU’s Minor Planet Center, passed away on November 21, 2002. Dee worked as Frank’s assistant for 29 years before her retirement. Many professional astronomers owe their first taste of painstaking astronomical research to Dee. Others will remember her as landlady of “Astrohouse”. She will be missed and fondly remembered by us all.

Jeffery S. Rainbolt (B.S. Astronomy & Astrophysics 1988) died tragically at the age of 36 on August 16, 2002.

ALUMNI NEWS

After 20 years at NOAO Headquarters in Tucson, AZ, **Sam Barden** (B.S. Astronomy & Astrophysics 1977) is moving to Anglo Instrumentation Observatory in Sydney Australia. Sam’s important contributions to NOAO and WIYN instrumentation, including the original Hydra fiber positioner, will be sorely missed.

Philip E. Barnhart (M.A. Astronomy 1955) is working with a volunteer group at OSU building an all-sky radio telescope to look for transient events. He and his wife Esther were prevented from attending Astrofest by hip problems.

Reta Beebe (Ph.D. Astrophysics 1969) was awarded the 2003 Harold Masursky Award of the AAS for outstanding service to planetary science and exploration. Reta is Director of the NASA Planetary Atmosphere Data Node and is chairperson of the NRC Committee for Planetary and Lunar Exploration.

Jack O. Burns (Ph.D. Astronomy 1979) became Vice President for Academic Affairs & Research for the University of Colorado System beginning in January 2002. This is the number two administrative job in the University. He is also a Professor in the Department of Astrophysical & Planetary Sciences at CU-Boulder.

Forest Hamilton (B.S. Astronomy & Astrophysics 1987) was a member of the Hubble Heritage Project which received the 2003 Klumpke-Roberts Award of the ASP for outstanding contributions to public understanding and appreciation of Astronomy.

Lynn D. & Jennifer J. Neakrase (both B.S. Astronomy & Astrophysics 1997) report that Jennifer received her M.S. in Physics from Arizona State University in May 2003.

William H. Potter (M.A. Astronomy 1950) in an email of

reminiscences for Frank, corrects the Depression-era hamburger price reported in the last Newsletter. They were about six for a quarter, not a quarter each!

John Reynolds (B.S. Astrophysics 1976) and wife A-Lan have now moved to Tucson.

Eric Schlegel (Ph.D. Astronomy 1983), a Research Scientist at Harvard University, published his first book titled “The Restless Universe” (Oxford University Press, 2002).

Mark S. Leonard (B.S. Astrophysics 1977) has been given a new assignment with Shell Oil in Moscow, Russia. We have no details about contact information.

Glenn M. Spiczak (Ph.D. Astrophysics 1995) and wife Heather had their second child, a boy, in August 2002. Glenn is now an Assistant Professor of Physics at UW-River Falls.

GIFTS

If you would like to discuss a gift or bequest to Indiana University, please contact the Development Office in the College of Arts and Sciences, Tom Herbert, Director, (812) 855-6276.

TELL US ABOUT YOURSELF

Pass along the latest about yourself for our newsletter. Contact the Astronomy Department by regular mail or send me an email at durisen@astro.indiana.edu. You can also send your news notes to The Indiana University Alumni Association, P.O. Box 4822 Bloomington, IN 47402-4822.

WEBSITE

Be sure to visit our Web site to keep updated on news and activities within the Department. www.astro.indiana.edu.



Astronomy Alumni & friends

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When did you graduate from Astronomy and with what degree(s)?

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