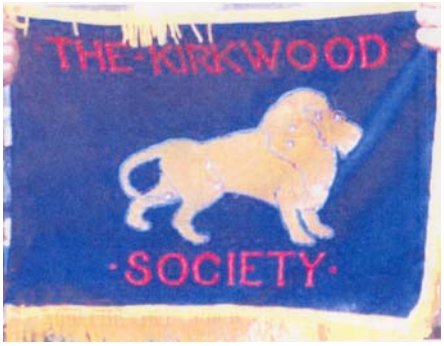
The Kirkwood Society

A Newsletter for Alumni and Friends of the Astronomy Department at Indiana University Fall 2005

Raise the Banner High!



Kirkwood Society Banner was provided to Dr. Frank K. Edmondson by Dr. Robert R. Brownlee (Ph.D Astronomy, 1955). Bob made a postage stamp of the banner and used it to mail this picture to Frank.

Greetings from New the Chairperson!

As we begin the 2005-6 academic year, a pause to reflect on some of the milestones the Astronomy Department reached in the last 12 months helps to maintain a good perspective on where we are and where we are headed. Kent Honeycutt's retirement, discussed elsewhere in this newsletter, is perhaps the most momentous. Characteristically, Kent continues his active role in Department life, always ready to volunteer and pitch in when needed, at Link Observatory or the Forest, in the lab, or with a student. Just as we celebrate 15 years of RoboScope operations and data, Kent is hard at work commissioning the new 50" telescope at the Morgan-Monroe State Forest and getting it ready for robotic operations.

We also bid farewell to three hardworking graduate students, Steve Margheim, Allen Rogel, and Stella Kafka, who successfully defended their dissertations this summer and are moving on to positions elsewhere. And while we'll miss Steve, Allen, and Stella, and wish them well, we also welcome three new graduate students to the Department, Jayce Dowell, Gabriel Lubell, and Christian Johnson.

Outgoing Chair Dick Durisen has also left a significant legacy to the Department from his term in "the big office". Dick led the Department's successful effort to obtain funding for the new One Degree Imager camera for the 3.5-meter telescope of the WIYN Observatory at Kitt Peak. ODI will be an extremely capable camera for surveying large areas of sky and will play an important role in addressing key scientific problems in the next decade. IU's share of ODI funding was provided by the Office of the Vice President for Research, with the aid of the College of Arts and Sciences. The camera, which is expected to begin operations in 2009, was also awarded $2.1M in funding from the National Science Foundation. With IU's commitment and federal support, ODI is well on its way.

On the education side, we have added a new introductory astronomy course, A103: The Search for Habitable Planets, to the undergraduate curriculum. This course, taught by Dick Durisen, explores the origin, nature, and history of life on Earth, prospects for life in our own and other planetary systems, extrasolar planet detection, and the possibility of other technological civilizations. Other faculty are actively developing new course materials and incorporating research activity into our courses for undergraduate majors.

Our top goal for academic year 2005-6 is to complete a successful search for a new faculty member to fill Kent Honeycutt's position; of course, no one can take Kent's place! Beyond that, the Department is developing a vision of where we want to be in five or ten years, including participation in a major new observational facility of national scope. Developing a plan for achieving that goal is this year's task. Check back next year to see how we're doing!

– Caty Pilachowski

Please visit our website at www.astro.indiana.edu for more information about the Department.

INSIDE THIS ISSUE

Celebration of 15 years of Roboscope Operations

Stella Kafka and Kent Honeycutt

A brief ceremony at Friday Science Lunch on July 22 marked fifteen years of RoboScope operation. This 0.41-m telescope was installed in Morgan-Monroe State Forest north of campus in 1965 and was converted into an automated, unattended facility in 1989. RoboScope decides when to open up and which targets to observe. The images are reduced on-the-fly and the magnitude of each variable object is added to the database. All auxiliary operations, such as detector calibrations and re-filling the CCD detector dewar with liguid nitogen, are also executed without oversight. RoboScope operated in this fashion until recently, generating a valuable database that documents long-term changes in the brightness of about 150 stellar and extragalactic accretion sources.

As if having knowledge of the anniversary, the MicroVax control computer, installed in 1988, died sudden and irreparably in March 2005. The durability of the system, which operated nearly every clear night, is a testament to the quality of both the Boller and Chivens telescope and this early microcomputer.

Over 70 papers have been published using RoboScope data, most with student co-authorship. It would be impossible to name all the students who worked with RoboScope and with RoboScope data, but special mention should be made of Jeff Robertson and George Turner who devoted many years to the RoboScope project.

RoboScope is currently undergoing a brain transplant to covert the hardware and software to Linux. This is mostly being done by adapting the existing Linux software on the companion 1.25-m telescope at this site. We expect that RoboScope can resume operations when this conversion is completed.

R. Kent Honeycutt Retires

Dr. R. Kent Honeycutt retired from his position as John W. Hill Professor of Astronomy at the end of the Spring 2005 semester. Kent began his career at Indiana University in 1968 as an assistant professor, fresh from earning his doctoral degree at Case-Western Reserve University. During his years at IU, Kent set a high standard for citizenship, with two hard stints as Department chair (1982-86 and 1997-2002) and endless other service contributions. As a ground-based observer who believes deeply in the value of hands-on training, Kent took the lead over the decades to ensure that students and faculty at Indiana University have access to a broad complement of local and remote telescopic facilities for teaching and research. He was director of Goethe Link Observatory for over twenty years and was also involved in the development of the WIYN Observatory from its inception, with service on the Board of Directors until the year of his retirement.

Throughout his career, Kent has designed and built astronomical instruments, including CCD imagers, spectrographs, and entire telescopes. In this modern age, it is not just the hardware that matters, but the software used to operate equipment at its maximum efficiency to make once impractical observations routine. Kent has been a master of both. Among Kent's many innovations, two are most notable. Kent was a pioneer in time-resolved spectrophotometry and in robotic observing (see the previous article). Revolutions in astronomy come about largely through observing the Universe in new ways. There is much in the news about what we learn by opening previously unexplored parts of the electromagnetic spectrum or by improving spatial resolution. Kent has led the less heralded but equally important reconnaissance of the time domain – comprehensive study of the variability of objects in the Universe on both short and long time scales.

Normally one would talk about what a great void a retiree's absence will leave in the Department, but, in fact, Kent is in his office or lab all day every day just like before. One might expect someone about to retire to slow his pace of research, but Kent's productivity in the last two years has been at a career high. Kent is continuing to assist the Department with observatory oversight and maintenance, while remaining an active researcher, for at least one or two more years. Kent has been an unselfish leader and a stalwart colleague who has done more to advance the fundamental interests of the Department and the discipline than most of the rest of us combined. Thanks, Kent, and enjoy your new freedom!

The WIYN ODI Project

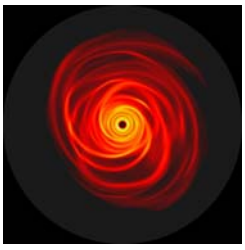
The One-Degree-Imager (ODI) Project is WIYN's plan to provide a major new facility instrument during the second half of the present decade. Imaging is one of the WIYN 3.5-meter telescope's particular strengths. Despite its modest size, WIYN has an important and unique advantage in having superb image quality over a very wide field of view, about one degree wide on the sky or twice the diameter of the Full Moon. The WIYN Tilt-Tip adaptive optics module, which corrects for atmospheric blurring, demonstrates that the WIYN 3.5-meter telescope delivers images with an intrinsic quality, i.e., sharpness, approaching that of the Hubble Space Telescope (HST) at red and near infrared wavelengths.

The ODI detector will be a Gigapixel camera using a radically new detector chip technology. Paving the focal plane of the 3.5-meter will be 64 OTA (Orthogonal Transfer Arrays), each of which consists of an 8x8 array of 512 pixel Orthogonal Transfer CCD's (OTCCD's). Within each OTA, several OTCCD's will detect the motion of guide stars and make local corrections for atmospheric blurring by shifting charges between pixels in two orthogonal directions. The ODI camera combined with the 3.5-meter telescope will provide stunning images with high scientific content. The ODI will also present interesting Information Technology challenges in handling, mining, and archiving the images, because every night of observing with the ODI will produce a Terabyte of data.

The total project will cost $7.5M over 4 years. WIYN has successfully raised $2.1M toward this total from the National Science Foundation through two major grants. IU's share of the remainder of the ODI Project totals roughly about $900K over four years. IU's Office of the Vice-President for Research has already committed to paying its share of the Project Scientist plus $200K per year for four years beginning in Academic Year 2004-2005. The other partners are committed to similar proportionate funding. The bulk of IU's share comes from the Special State Research Fund awarded to IU by the State of Indiana. A powerful argument for receiving these funds is our success competing for external support. During Calendar Year 2004, the Department received over $1M in new funding for WIYN-related research and education activities. The current calendar year promises to be comparably lucrative.

Research Highlight

Planets, Waves, Rings, & Rocks

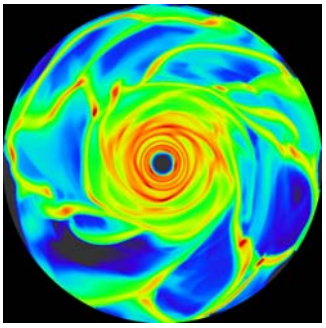


There is ongoing debate in the planetary science and astrophysics communities about how gas giant planets form. In one theory, called "core accretion", which has been the "standard" model for at least two decades, gas giants form relatively slowly. Smaller solid particles accrete first to make a "core", and then this solid core attracts a huge gaseous envelope from the gas disk once the core is large enough. Without something to accelerate it, core accretion may in fact be too slow to make gas giants before the gas disk disappears. Core accretion also has difficulty making the super-massive gas giants now frequently discovered around other stars.

The other theory, called "disk instability", suggests that a cold, massive disk may break up spontaneously into massive protoplanetary clumps. In a disk that is sufficiently cold or that has a high enough surface density, the gravity between neighboring pieces of disk gas can overwhelm the tendency of gas pressure to push them apart and of rotational shear to stretch them out. This results in what are now commonly called "gravitational instabilities" (GI's). The advantage of invoking GI's to make planets is that, if the mechanism works, it can produce protoplanets within only hundreds or thousands of years, rather than the several millions of years required for core accretion.

Since 1990, Dick Durisen's research group, including former doctoral students – Megan K. Pickett (Purdue University Calumet) and Annie C. Mejia (University of Washington) – and current students – Kai Cai, Scott Michael, and Aaron C. Boley – have been using 3D hydrodynamics simulations on supercomputers to study GI's in disks.

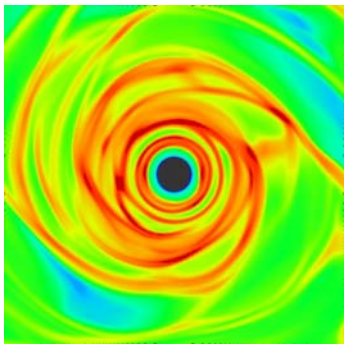
In the initial stages of gravitational instability, beautiful spiral waves grow in the disk as the gas pulls together into coherent structures. These spirals are waves of large scale that swing around the disk. What happens next depends on how fast the disk can radiate away the shock-generated thermal energy. For moderate cooling rates, the spirals reach a sustained nonlinear amplitude where shock heating is balanced by cooling, as shown in the red and yellow face-on disk that begins this article. For fast cooling, on the other hand, the spirals fragment into numerous small dense structures, as illustrated below. The red-centered blobs are dense clumps with multiple Jupiter masses.



The critical questions for direct planet formation by disk instability are whether realistic cooling is ever so rapid and, if it is, whether the fragments survive long enough to be considered protoplanets. Proper answers require the inclusion of a realistic treatment of radiative transport in the 3D hydrodynamics code. Technically, for a multi-dimensional, time-varying system, hydrodynamics and radiative transport are notoriously difficult pieces of physics to combine together in one computer calculation. Annie Mejia and Kai Cai, working with Dick Durisen, have created such a scheme, and Aaron Boley is now working on an even better algorithm. They find that radiative cooling of real disks is too slow for fragmentation to occur.

If Durisen's group is right and disk instability is not capable of making gas giant planets directly, how does Nature

produce gas giants so easily by the slow core accretion process? They think the answer lies in rings. Near the boundary between outer disk regions of sustained GI activity and an inner hot region that is not GI active, stable dense rings with multiple Jupiter masses appear and grow. Gravitational torques produced by the spiral waves drive gas systematically inward in the disk, and it piles up where the GI's becomes weak. These same spirals produce localized resonances. There are many different spiral waves in the GI active part of the disk, and multiple resonances on the inactive side could marshal gas into dense rings between the resonances. Dense red rings can be seen in the inner part of the face-on disk below.



Why are rings so interesting? A solid core cannot grab its share of hydrogen and helium gas to become a gas giant until it becomes sufficiently massive. One of the reasons core accretion is slow is that it takes a long time to feed solids to the core. The special beauty of a dense gas ring as the site for core growth is that solids tend to migrate to the center of a gas ring in a disk. Imagine a rock in the outer part of a gas ring. With gas pressure decreasing outward, a rock will orbit faster than the gas, experience a head wind, lose angular momentum to gas drag, and spiral inward. In the inner part of a gas ring, gas pressure increases outward. The rock will orbit more slowly that the gas, experience a tail wind, gain angular momentum by gas drag, and spiral outward. Thus, gas rings are good for feeding solid particles to a growing core at the center of the ring

When you put these pieces together you get a hybrid theory of planet formation where rings accelerate the process of core accretion. The notion that planet formation is related to GI's in disks may also have implications for the production of the puzzling millimeter-sized glassy structures called "chondrules" that make up the bulk of primitive meteorites. The shocks waves associated with GI spiral waves may have been strong enough to flash heat pre-chondritic material in large volumes of the Solar Nebula.

For further information about work by the Indiana University hydro group and its various collaborators, please visit the web site at http://westworld.astro.indiana.edu/.

Summer REU Program 2005

Research Experience for Undergraduates

Left to Right: Rachel Matson, Stephen Kaeppler, Sean Couch, Cameron McKinney, Jennifer Kissinger, Sharina Haynes, Philip VanStockhum.

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

Tennessee State University undergraduate **Sharina Haynes** worked with Caty Pilachowski to determine the composition of low-luminosity giants in the globular cluster Messier 3. The spectra were obtained with the Hydra fiber spectrograph on the WIYN 3.5-meter telescope in March, and Sharina selected four stars near the intersection of the horizontal branch and the giant branch for analysis. She identified spectral lines, measured equivalent widths, and determined their compositions using a model atmosphere analysis. Sharina is continuing her research during the academic year at TSU, and will present her work at the annual meeting of the National Society of Black Physicists in February, and follow-up work at the AAS meeting in Calgary in June.

Steven Kaeppler, a physics and astronomy student at the University of Wisconsin, worked with Stuart Mufson and Nick Mostek to determine the properties of Light Emitting Diodes (LEDs) as a function of wavelength under a variety of environmental conditions. LEDs are currently the baseline calibration lamp sources for the SuperNova Acceleration Probe (SNAP) experiment, a proposed cosmology satellite that will survey the sky looking for Type IA supernovas. This experiment requires unprecedented photometric accuracy to accomplish its mission goals of measuring the properties of the Dark Energy driving the acceleration of the Universe which puts difficult constraints on the internal calibration lamp sources. During the summer, Steve determined the procedures for making LED spectral the measurements as the temperature of the LED was varied. In addition, Steve did a detailed Web search to identify suppliers of LEDs over the range of wavelengths accessible to the SNAP optical and near infrared cameras.

Cameron McKinney, Purdue University undergraduate, worked with Liese van Zee and graduate student Aaron Boley this summer to investigate star formation in the outer disks of spiral galaxies by combining HI and R-band data with deep H alpha images. He derived rotation curves and column densities from HI synthesis maps to study the relationships between gas disk parameters and star formation rates. Cameron will present his results at the AAS meeting in January.

Butler University undergraduate **Sean Couch** worked with Haldan Cohn and Phyllis Lugger to identify Chandra X-ray sources in the nearby, collapsed-core globular cluster NGC 6397. This study, which was done in collaboration with Adrienne Cool (San Francisco State University) and Jay Anderson (Rice University), used a new dataset of deep Hubble Space Telescope images, taken with the Advanced Camera for Surveys. Sean's work focused on determining the distribution and properties of cataclysmic variables (CVs) in this cluster, which comprise about half of the X-ray sources. He identified two new CV candidates, which brings the total number of likely CVs detected in NGC 6397 to 11. This is the largest optically identified population of CVs in any globular cluster and will provide important information on CV evolution. Sean will present his results at an AAS Meeting and will co-author an Astrophysical Journal article reporting the results.

Undergraduates **Rachel Matson** from U. Denver and **Philip van Stockhum** from Princeton U. worked with Constantine Deliyannis during the summer of 2005 as part of the IU Astronomy REU program. Both students worked with UBV photometric open cluster data taken on a single night at the WIYN 0.9m telescope during November 2004 to determine the basic cluster parameters of NGC 2420 and NGC 2506. They processed, reduced, and analyzed the data to derive cluster reddenings, metallicities, distances, and ages. Rachel and Philip also completed posters for presentation of their results at the January 2006 AAS Meeting. They, along with all the other REU participants, also gained experience observing at the WIYN 0.9m and/or WIYN 3.5m telescopes at Kitt Peak.

Jennifer Kissinger from Florida Institute of Technology worked with Stella Kafka on a survey for variable stars in the field of the old open cluster NGC2141, as a part of the WIYN Open Cluster Study (WOCS). Although NGC2141 is one of the oldest clusters known, it had never before been searched for variable stars. Time-resolved, multi-color photometric data were obtained in the Winter/Spring of 2005, using the WIYN 0.9m telescope located at Kitt Peak Arizona. A total of seven nights of monitoring lead to the discovery of 22 new variable stars. Seven of those are of the W UMa type - which are contact binary stars with periods around 8 hours, eleven are eclipsing binaries with at least one eclipse resolved, and one is a delta-Scuti pulsating star. These results will be presented at the Winter 2006 meeting of the AAS, in Washington DC and a journal paper is currently in preparation.

SPECIAL Events of the year

WIYN Guest Night

In April, the Department hosted a visit to the 3.5-meter WIYN Telescope at Kitt Peak for alumni and friends. After a picnic supper, where we enjoyed a spectacular view of the mountain, the group toured facilities at the summit and watched the sunset. Once darkness fell, the weather and seeing cooperated to provide exquisite celestial views, as well. Oohs and ahs greeted such sights at Saturn, the globular cluster Messier 3, the Sombrero Galaxy, and the jet in the elliptical galaxy Messier 87. Alumnus Ron Probst, on the staff of the Kitt Peak Observatory, also brought his own portable telescope to provide a contrasting view of the sky, and shared his extensive knowledge of night-sky lore.

IR Teachers Workshop

The Department's education and outreach program extends beyond school visits to Kirkwood Observatory! In early August, faculty member Caty Pilachowski, aided by Glenn Simonelli from the School of Education and Aubrie Maxwell, an IU astronomy instructor, organized and presented a workshop on infrared astronomy for high school teachers. Attended by local teachers as well as by teachers from neighboring counties, Columbus, and Indianapolis, the workshop included active-learning and inquiry-based activities that the teachers could use in the classroom to help students learn about the electromagnetic spectrum and the properties of infrared light. Also included were two activities using data from the Spitzer Space Telescope. In one activity, teachers measured the infrared fluxes of stars in the cluster IC 4665 to identify stars with dusty disks that may indicate the presence of planets. In another, the teachers compared the density of stars in optical and near infrared images of the Trifid Nebula to estimate the amount of extinction from dust, and then compared their estimates to longer wavelength Spitzer images showing the thermal emission from the dust itself. The workshop was funded through an Education and Public Outreach grant from the Spitzer Science Center, with contributions from the National Science Foundation.

Lectures by Geoff Marcy

The Department hosted **Dr. Geoffrey W. Marcy**, Professor of Astronomy at UC Berkeley, as a 2004-2005 Patten Lecturer. Geoff is best known as the co-discoverer of most of the currently known planets around other stars (extrasolar planets). He accomplished this through his pioneering

development of high precision Doppler shift measurement techniques, for which he received the Henry Draper Medal in 2001. He delivered two excellent public lectures – "Planets, Yellowstone, and Prospects for Life in the Universe" on October 12 2004 and "Hunting for Solar Systems with Earth-Like Planets" on October 14 2004.

Lecture by Janice Bishop

Dr. Janice Bishop, an astrobiologist from the SETI Institute and the UC Berkeley Astrobiology Institute, gave a Women in Science Lecture titled "The Exploration of Mars" on October 26 2004. Her well-attended public lecture was co-sponsored by the Departments of Astronomy and Geological Sciences.

Graduate Degrees

Aaron C. Boley received his Master of Arts degree in Astronomy in Fall 2004 and gave a successful Ph.D. candidacy seminar in May 2005. With his research advisor, Dick Durisen, he is investigating the behavior of global shocks in protoplanetary disks and their ability to thermally process solids.

Scott Michael received his Master of Arts degree in Astronomy in Fall 2004. He is currently working with Dick Durisen on numerical studies of protoplanetary disks, including the migration of solid particles and the effects of alpha viscosity.

Stella Kafka successfully defended her Ph.D. dissertation entitled "Exploring Stellar Activity on the Secondary Star of Cataclysmic Variables" on June 29, 2005. Stella worked under the direction of Kent Honeycutt. The dissertation was a study of spectroscopic and photometric effects in CVs that are likely due to chromosphric activity on the mass-losing M-dwarf star in these systems. Several effects were found to be consistent with activity. These include optical flares and H-alpha line profiles during the low state of the polar AM Her, plus the shapes of transitions to and from the low state in polars and disk CVs. The evolution of CVs is driven by loss of orbital angular momentum, thought to be due to a magnetized wind on the secondary star. Observations such as these can hopefully be used to study the degree to which stellar activity controls evolution in CVs. Stella has accepted a position as a postdoctoral fellow at Cerro Tololo Interamerican Observatory (a branch of the National Optical Astronomy Observatories) in La Serena, Chile.

Allen Rogel successfully completed his Ph.D. dissertation entitled "The ChaMPlane Project: Spectroscopic Follow-up and Theoretical Modelling" in July, 2005. Allen's research was supervised by Phyllis Lugger and Haldan Cohn. His work provided critical spectroscopic follow-up for the ChamPlane survey of Galactic plane X-ray sources, which is led by Jonathan Grindlay (Harvard University). The central goal of Allen's work was to estimate the cataclysmic variable (CV) density in the local Galactic plane, by testing possible CV detections from Chandra X-ray and NOAO optical imaging. Allen used the Hydra multiobject spectrograph on the 3.5m WIYN telescope to obtain spectra for over 1000 objects, in order to determine their likely physical nature. His survey detected five new CVs, 30 new quasars, 14 new lithium stars, and a substantial number of chromospherically active, late-type stars. Allen developed a theoretical model for the galactic CV distribution in order to translate his CV detection rate into a CV space density. The resulting density value lies between the estimates from previous X-ray and optical studies, with an uncertainty range that is consistent with these studies. Allen has begun an Instructor position as a member of the faculty at Bowling Green State University.

Steven Margheim successfully defended his Ph.D. dissertation entitled "Lithium in the Pleiades" on July 13, 2005. Steve worked under the direction of Constantine Deliyannis. The dissertation was a survey of lithium abundances in the Pleiades with the Hydra MOS on the WIYN telescope. The survey benefited from higher quality data than was previously available, improved data analysis techniques, and a large sample of Pleiades members. Results include evidence for detection of the earliest formation of the Lithium Gap, the primordial cluster lithium abundance from a plateau spanning over 2000K in T_{eff}, and a reduction in the Li dispersion previously observed in cooler cluster dwarfs. Steve is now a Gemini Science Fellow at Gemini South in Chile, where he is the Instrument Scientist for the new high-resolution echelle spectrograph, bHROS.

Undergraduate Degrees

Antonio Buono received his B.S. in Astronomy & Astrophysics degree in Spring 2005.

Elizabeth Cole received her B.S. in Astronomy & Astrophysics degree in Spring 2005.

Noah Kearns received his B.S. in Astronomy & Astrophysics degree in Spring 2005.

Jun Omori received his B.S. in Astronomy & Astrophysics degree in Spring 2005.

Tyler Poniatowski received his B.S. in Astronomy & Astrophysics degree in Spring 2005.

Ian Roederer received his B.S. in Astronomy & Astrophysics degree in Spring 2005. He is now attending Graduate School at the University of Texas at Austin

Timothy Seger received his B.S. in Astronomy & Astrophsycis degree in Fall 2004.

Awards

Ian Roederer received the 2005 Hollis and Grete Johnson Award for Excellence in student research.

Jun Omori received the 2005 Astronomy Alumni Award for Overall Academic Excellence.

Kevin Croxall and **Heather Jacobson** received the 2005 Goethe Link Prize for Outreach and Public Education in Astronomy.

Aaron C. Boley received a prestigious three-year NASA Graduate Student Research Program Fellowship to support

his work on the processing of solids by shocks in protoplanetary disks. He was also awarded an Indiana Space Grant Consortium Fellowship for Summer 2005.

Scott Michael received a 2005-2006 Indiana Space Grant Consortium Fellowship for his research on turbulence and migration of solids in self-gravitating protoplanetary disks.

Faculty News

Haldan Cohn and Phyllis Lugger are enjoying a well-earned sabbatical for Fall 2005. In addition to spending time doing research in Bloomington, they plan short trips to visit collaborators at Northwestern and Harvard Universities.

Liese van Zee received an Outstanding Junior Faculty Award for 2005-2006 which will provide release time from teaching in Spring 2006.

Frank K. Edmondson received a Distinguished Scholar of the Academy award from the Indiana Academy of Sciences. This occurred in May 2004 but was not mentioned in the last Newsletter due to an oversight by the humbled Editor. Belated congratulations, Frank!

Former IU Astronomy faculty member **Dr. J. Paul Mutschlecner**, now a Scientist at Los Alamos National Laboratory, is still actively researching. He recently submitted a paper to the Journal of Geophysical Research on Infrasound from Earthquakes. The co-author was **Dr. Rodney W. Whitaker** (Ph.D., Astronomy, 1976).

Alumni News

Mr. Michael Breault (Graduate Student 1980 to 1984) is a write/designer of computer and video games. He currently lives in Champaign, Illinois and works for the game company Volition. His last project was a game based on the Punisher comic book series. His wife's name is Mary, and they have a teenage son and daughter. You can reach Mike at mikebro42@hotmail.com.

Dr. Linda May French (B.S., Astronomy, 1973) received tenure in Illinois Wesleyan University's Department of Physics in Spring 2005.

In February, **Dr. Katy Doremus Garmany** (B.S. Astrophysics 1966), past President of the Astronomical Society of the Pacific, visited the Department to bring us up to date on new developments in astronomy outreach and education. Katy serves as a Senior Education Specialist at the National Optical Astronomy Observatory in Tucson. Before joining NOAO, Katy served as Director of Columbia University's innovative college-level astronomy program at Biopshere 2 in Arizona. At NOAO, she is currently developing and teaching introductory astronomy at Tohono O'odham Community College in Sells, near Kitt Peak National Observatory.

Dr. Arne Henden (Ph.D., Astronomy, 1985), Senior Research Scientist for USRA at the U.S. Naval Research Laboratory in Flagstaff, Arizona, has been appointed Director of the America Association of Variable Star Observers. The President of AAVSO said, "With his extensive experience working with amateurs and his professional reputation as one of the world's leading premier photometrists, Henden is a perfect fit as the new leader of the AAVSO."

Dr. Phil Inderwiesen (M.A., Geology, 1979) and his wife Pat Tovson were honored to have an asteroid named after them by the members of the Fort Bend County Astronomy Club. Phil and Pat live in Needville, Texas. You can contact them at tovinder@considated.net.

Ms. Lisa Johnston (B.S., Astronomy & Astrophysics, 2003) has become an Assistant Editor of Sky & Telescope.

Over the past year, **Dr. Arlo Landolt** (M.A., Astronomy, 1961, Ph.D., Astronomy 1962), Ball Family Professor Emeritus of Physics and Astronomy at Louisiana State University, retired from his 18 years of distinguished service as Secretary of the American Astronomical Society (1980 to 1989, 1995 to 2004). Arlo is know especially for providing the astronomical community with photometric standard stars, which have been used for decades, and he was one of the first scientists to winter in Antarctica during the International Geophysical Year in 1957.

John Martellaro (B.S. Astrophysics, 1969) is playing an important role in connecting astronomers to the world at meetings of the American Astronomical Society. John, who works for Apple Computer, arranges for Apple's sponsorship of the Cyber Café at each meeting. The Cyber Café offers internet access (using Apple computers!) for all attendees at the meeting, and is always the most popular area in the exhibit hall. John serves as Federal Account Manager and manager for Enterprise and Government Sales at Apple, and is well known for his technical commentary and writing about industry trends and corporate decisions on the Web.

Dr. Russell Palma (B.S., Astrophysics, 1974) has taken a new position as Professor of Physics at Minnesota State University, Mankato, while continuing as an Adjunct Professor at the University of Minnesota and working with data from the Genesis Spacecraft. We hope to have an update from him soon on the results of the mission at a departmental colloquium. You can reach Russ at russell.palma@mnsu.edu.

Dr. Adam Rengstorf (Ph.D., Astrophysics, 2003) has become a tenure-track Assistant Professor in the Department of Chemistry and Physics at Purdue University at Calumet, joining Associate Professor **Megan K. Pickett** (Ph.D., Astrophysics, 1995) and Assistant Professor **Shawn Slavin** (Ph.D., Astrophysics, 2002).

Dr. Aaron Steinhauer, (Ph.D., Astrophysics, 2003) has begun a tenure-track Assistant Professorship at SUNY-Geneseo in August, 2005.

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, David E. Ellies, Interim Executive 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 an email to astdept@indiana.edu or send your news notes to The Indiana University Alumni Association, P.O. Box 4822 Bloomington, IN 47402-4822.

Astronomy Alumni & friends

Update Your Information!

Please send this information to:
Astronomy Department
727 East 3rd Street
Swain Hall West 319
Bloomington, IN 47405-7105
or Fax 812.855.8725

Name _____ Date _____

Spouse Name _____

Home Address _____

City _____ State _____ Zip _____

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

_____

Email _____ Phone _____

Where are you? What are you doing?

_____

_____

_____

Indiana University
Astronomy Department
727 East 3rd Street
Swain Hall West 319
Bloomington, IN 47405-7105

1023800