PHYSICS & ASTRONOMY

FALL 1986

Comet Halley shines in the sky on the night of March 21, 1986. David LaBounty, an Olathe major in KU's astronomy program, captured this look at the comet from Mount Locke, Texas, near McDonald Observatory of the University of Texas. LaBounty attached his camera to a Celestron C8 telescope to track the comet and shot with Tri-X at 400 ASA, which was pushed during development to 1600.

Comet fans, centennial guests fill historic year

Editor's note: Bruce Twarog, assistant professor of physics and astronomy and a survivor of comet mania, regrouped after a long, busy year and recorded this account of its campaigns.

What do you get when you cross Comet Halley with a hundred-year-old astronomy program? Very tired and very touchy.

The conjunction of two unrelated events, the return of Comet Halley and the centennial anniversary of the astronomy program at the University of Kansas, proved to be a public relations boon—but a logistical nightmare—for the hardy band of astronomers and space physicists who roam the hallowed corridors and murky underworld of the basement of Malott Hall.

No one but Steve Shawl foresaw the coming deluge that began so innocently with a trickle of phone calls from reporters in the late spring of 1985. Like Henry Fonda in *The Grapes of Wrath*, Shawl packed his wife and children into a wagon and headed for California in search of a brighter future, or at least a brighter year while on sabbatical leave.

Meanwhile, back at the observatory, the beleaguered foot soldiers of science held their ground against overwhelming odds. When it was all over and the smoke had cleared, the department resembled the battlefield in the film *Zulu*: countless invaders chanting homage to a gutsy handful of surviving defenders, around whom shoulder-high stood hard-won battle trophies:

- interviews with six television stations in Lawrence, Kansas City, and Topeka, including a live report from the observatory one dark and not-so-stormy night
- an equal number of radio and newspaper interviews covering every topic from telescope purchases to the origin of comets
- observatory open houses that displayed the comet to more than 1,300 people, including 600 on one night in November
- distribution of 400 booklets titled *Helpful Hints to Halley Hunters* to local elementary and junior high schools
- talks by faculty to the Rotary Club, the Kiwanis, Lawrence High School, the University of Chicago Alumni Club of Kansas City, the Astronomical Society of Kansas City, and the Tulsa Astronomical Society
- talks by dozens of our students at the Museum of Natural History
- sales of posters, handbooks, charts, and 100 T-shirts proclaiming "I saw Comet Halley at the KU Observatory 1985-86" by the Astronomy Associates of Lawrence
- visits to foreign lands by Dave Beard, who took part in a comet cruise to South America, and by undergraduate major David LaBounty to Texas, where he ob-

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Historic

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tained the accompanying photo at great personal risk

• and phone calls too numerous to count

For action above and beyond the call of duty, Barbara Anthony-Twarog, Tom Armstrong, visitor Ed Barker, Dave Beard, and Bruce Twarog must all be cited for offering a one-credit-hour course on comets to more than 50 students in Lawrence and Kansas City.

When it was finally over, the weary warriors looked with glazed expressions at their commanding officer, Chairman Davidson, and asked, "Why us?" To which Davidson could reply only, "Because you're 'ere, lad, nobody else."

On a more serious level, the centennial celebration of the astronomy program proved as successful as comet tracking and demonstrably more enjoyable for the staff and students. With the support of the university, we scheduled a monthly series of visits by distinguished astronomers and alumni for colloquia and public lectures.

The series began in September 1985 with Craig Wheeler of the University of Texas. Wheeler was followed by two KU alums, Ed Sion of Villanova University and Humberto Campins of the Planetary Science Institute in Tucson, Arizona.

In January, the Spencer Fund cosponsored a visit by Frank Drake, now a dean at the University of California, Santa Cruz, who presented an excellent talk about the search for extraterrestrial intelligence to nearly 500 people. In February, Steve Shore of New Mexico Institute of Mining and Technology paid a snow-canceled visit planned for the previous year.

We closed out the semester with consecutive trips by four KU alums: Harold Corwin of Texas, Ed Barker of Texas, Ron Snell of the University of Massachusetts, and finally Clyde Tombaugh of the University of New Mexico, who attended a Sunday brunch with our undergraduates and faculty as part of his class reunion in May.

More than 1,200 people attended the talks by the visiting speakers. Although the centennial celebration was a gratifying tribute to the long-term success of the program, we regretted that only a small percentage of our alumni could return and talk with our students.

We hope that all of you will visit sometime in the near future, or at least in the summer of 1988 when we will cohost the summer meeting of the American Astronomical Society in Kansas City. ■

A Letter from the Chairman

Once again I am pleased to greet all of our alumni and friends and share with you some of the many new and exciting things that have been happening this past year in our department. This fall I will complete my tenth year as chairman. As I look back over the decade now ending, I realize that we have been able to maintain the excellence of our education for undergraduates and have been able to attract fine young men and women into our graduate program; a number of you who are reading this have left these halls and have taken your place in the science community both here and abroad. It has been ten years of hard work, and I have enjoyed seeing physics and astronomy and now atmospheric science advance each year.

We again have been fortunate to welcome a new faculty member in theoretical physics to our staff. You will read elsewhere in this newsletter about Adrian Melott, who has recently been a Fermi fellow at the University of Chicago and now is busily working at his terminal, which talks to the Cyber computer at Purdue University. He is continuing his work in the early universe. The department has had the good fortune to recruit a new assistant professor each year for the past four or five years. The Dean of the College of Liberal Arts and Sciences hopes to add twenty new faculty each year for the next ten years, and we certainly hope we will be able to attract our share of new assistant professors.

Our programs will feel the effect of the new College of Liberal Arts and Sciences core curriculum. For the first time, every student who receives a Bachelor of Arts degree from the University of Kansas will have to have taken a course in astronomy, physics, or chemistry. However, the university has grown tremendously in enrollment since Malott Hall was built. We will not be able to accommodate students in these three areas because of limited laboratory and auditorium space. Even now, some physics courses close during early enrollment.

We have been fortunate in obtaining resources to attract a large number of new men and women to our graduate program who are able to help us as teaching assistants. Also, we have attracted several very fine young men and women from other countries to come and do their graduate work with us. This adds to the flavor of the department in a large, internationally recognized university and certainly continues a long-standing tradition of our department.

Finally, we are pleased again that several of our students, especially our seniors, have done so well in receiving recognition as they have left this institution. Susan Tholen, who received a Bachelor of Science degree in physics in May, has been made an American Physical Society Apker Award finalist. This award goes to the outstanding graduating senior in the nation. Sue also has won a National Science Foundation Graduate Fellowship Award. As we state elsewhere, she plans to do her graduate work at Cornell.

Again, I hope that as you come to this part of the country in your various travels, you will stop by and visit with us and let us show you the changes we are making in our physical plant as well as in our programs. If you cannot drop by or you are far removed from Lawrence, fill out the questionnaire on page seven of this newsletter and send it to us. We want to know what you are doing and where you are and pass that information along to your former fellow students.

J. P. Davidson, Chairman

FACULTY NEWS

Melott brings diverse past to KU

Adrian Melott has joined the Department of Physics and Astronomy as an assistant professor beginning in fall 1986.

Melott's formal education has been wide-ranging both geographically and intellectually. He received a B.S. from Bethany College in Bethany, West Virginia, and a Master of Divinity from the Starr King School of Religious Leadership in Berkeley, California. After several years as a Unitarian minister, he obtained an M.A. in physics from the University of South Florida. He received a Ph.D. in physics at the University of Texas in 1981 under the direction of Professor Dennis Sciama.

His specialization is in the universe as a whole—or the cosmology of the early universe. His work on the role of the "missing mass" in the universe, its origin, and its influence in determing the form of super-clustering of galaxies is widely acknowledged.

Since receiving his Ph.D., Melott has held postdoctoral positions at the University of Pittsburgh and the University of Chicago. In the latter case, for three years, he was an Enrico Fermi postdoctoral fellow. He also has been an IAU visiting astronomer at the Department of Astrophysics, Oxford, U.K., and as an International Research and Exchange fellow at Moscow University and the Cybernetics Institute and Tartu Astrophysical Observatory, Estonia, both in the Soviet Union. ■

Adrian Melott, a specialist in the cosmology of the early universe, has joined the department faculty.

Departmental Colloquium

Professor Craig Wheeler, University of Texas. "Normal and Peculiar Supernovae of Type I."

Professor R. Ammar, University of Kansas. "ARGUS: A Study of Charm and Beauty."

Professor K. W. Wong, University of Kansas. "Radiative Transfer and the Master Equation."

Professor John Ralston, University of Kansas. "Puzzling Particle from Cygnus: Is a New Physics Needed?"

Professor Scott Baird, Benedictine College. "The Atmospheric Properties and Phenomena of RV Tauri Stars."

Professor Ed Sion, Villanova University, Pennsylvania. "Current Progress on the Formation of White Dwarfs."

Professor K. M. Lee, University of Missouri at Columbia. "Dynamics of Finite Layered Structure."

Professor J. Culvahouse, University of Kansas. "Some Examples of the Use of Computers in Physics Today."

Dr. Humberto Campins (B.A. Astronomy 1977), Planetary Science Institute, Tucson, Arizona. "Recent Observations of Comets."

Professor J. Laframboise, York University, Toronto, Canada. "Getting a Charge out of Space Flight."

Professor David Beard, University of Kansas. "Comets" and "New Rays on Old Comets."

Professor H. Munczek, University of Kansas. "The Mass of the Quark, Goldstone's Theorem and the Bound States of Quark and Anti-Quark."

Professor P. Rahman, Kansas State University. "New Effects of Adsorbates on the Surface Physics of Nickel."

Professor Ron Bass, University of Kansas. "Solid State Physics at Kansas University."

Professor D. Sprowl, University of Kansas. "Recent History of Earth's Magnetic Field."

Dr. Michael Grady, Argonne National Laboratory. "Computer Simulation of Fermions in Lattice Gauge Theory."

Professor S. P. Singh, University of Arkansas. "Growth of Laser Light from Quantum Noise."

Professor J. Rosner, University of Chicago. "Bound States of Heavy Quarks."

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Proposals Funded

General Research Funds

Professor Anthony-Twarog, "Development of a New Metallicity Index for the Stromgren Photometric System," $2.8k.

Professor Koehler, "Evaluation of Temperature Profiles Derived from Microwave Radiance Measurements," $5.0k.

Professor Ralston, "Multiple-path Expansion in Quantum Mechanics and Quantum Field Theory," $5.9k.

Professor Shawl, "An Investigation of the Extinction Properties of Possible Dust Particles in Globular Cluster," $5.1k.

Outside Funding

Professor Anthony-Twarog, "Observational Studies of Stellar Evolution in Intermediate Age Open Clusters" (NSF) $31.7k.

Professor Ammar, Davis and Kwak, "Research in High Energy Physics" (NSF) $151.0k.

Professors Armstrong and Bass, "Plasma Interactions with Insulating Solids, A Proposal for Theoretical and Simulation Research" (ONR) $60.0k.

Professor Armstrong, "Voyager Mission Operations" (JHU-APL) $69.0k; "International Solar Polar Mission" (JHU-APL) $12.0k; "Galileo Energetic Particles Detector (EPD) Experiment" (JHU-APL) $26.0k.

Professor Armstrong, "Self-Consistent Numerical Simulation of Plasma-Insulator Interactions" (NASA) $120.0k.

Professor Armstrong, "Studies of Solar and Magnetospheric Particles" (APL-JHU) $44.6k.

Professors Armstrong and Bass, "Self-Consistent Numerical Simulation of Plasma-Insulator Interactions" (NASA) $45.0k.

Professor Armstrong, "International Solar Polar Mission" (JHU-APL) $18.0k; also "Voyager Mission Operations" (JHU-APL) $69.0k.

Professor Beard, "To Model the Magnetic Field of Jupiter" (NASA) $29.5k.

Professor Davidson, "1986 Kansas-Nebraska-Oklahoma Junior Science and Humanities Symposium" (Academy of Applied Science) $11.5k.

Professors McKay, Munczek and Ralston, "Pole Model Predictions for Weak and Electro-Weak Decays of Hadrons" (DOE) $55.0k.

Professors Munczek and McKay, "Gauge Model Study of CP and Parity Violations: Questions of Right-Handed Coupling and Hadron Stability" (DOE) $90.0k.

Professor Prosser, "Fusion Measurements in Light and Medium Mass Heavy-Ion Reactions" (DOE) $56.0k.

Professor Twarog, "Extensions and Expansion of the uvby Photometric System" (Research Corporation) $2.0k.

NEWS FR

Professor Anthony-Twarog has been nominated to the American Astronomical Society's Nominating Committee.

Professor Armstrong has been elected to the Board of Trustees of the Universities Space Research Association (USRA) to represent Region VIII.

Professor Bass has been appointed to serve on the Campus Fulbright Committee. The term is for three years.

Jerry Manweiler (TA) has received the "Speak-up" Award of the Kansas Jaycees.

Professor Shawl visited the Harvard College Observatory to use their plate collection.

Professor Twarog has been appointed to the Science Advisory Group for the Space Station Astrometric Facility Project of NASA-Ames Research Center and the University of Arizona.

Professors Anthony-Twarog and **Twarog** attended the AAS meeting in Charlottesville, Virginia, June 3-7. Professor Twarog presented a paper entitled "uvby Photometry of the Main Sequence of M67."

Professor Ralston attended the Los Alamos National Laboratory workshop on "Relativistic Dynamics and Quark-Nuclear Physics" on June 10-14. He gave a talk entitled "Covariant Field Theory Wavefunctions for the Skyrmion."

Professors Armstrong and **Bass** and **Dr. Ahmadian** (Ph.D. 1979) and **Mike Holmes** (RA) attended the 11th International Conference on Numerical Simulation of Plasmas in Montreal, June 25-27. Professors Armstrong and Bass and Mike Holmes presented a paper entitled "Approaches to the Existence and Stability of Boundary Equilibria in Finite Plasma Simulations," and Professor Armstrong, Dr. Ahmadian and Mike Holmes presented a paper entitled "Numerical Simulation of Bounded Electrostatic Plasmas."

Professors Bass and **Friauf** attended the Fifth International Conference on Solid State Ionics at Lake Tahoe, California, August 19-23. Professor Friauf chaired the session the Theory of Percolation Problems and Relaxation Processes.

Professor Kwak was invited to attend the 1985 International Symposium on Lepton and Photon Interactions at High Energies, in Kyoto, Japan, August 19-24. He and others presented ARGUS collaboration papers entitled "Observation of a New Charged Meson," "Search for the Gluon in Decays of χ_b (1^3P_1) Meson," and "Neutrino Mass from $\tau^+ \rightarrow \pi^+\pi^-\pi^-\nu_\tau$."

Professor Ralston attended the APS Division of Particles and Fields meeting in Eugene, Oregon, August 12-15. He gave a talk entitled "Coherent Enhancements of the High Energy Neutrino Total Cross-Section."

Professor Wong attended the Multiple Scattering of Waves in Random Media and Rough Surfaces International Symposium and Workshop at Pennsylvania State University, University Park, July 29 where he presented an invited paper entitled "Auto-correlation Functions Among Dense Random Scatterers."

Professor Zeller and **Dr. Dreschhoff** (Adjunct) were invited guests at the Change of Command Ceremony for the Commander of the U.S. Naval Support Force, Antarctica, August 16 at the Naval Construction Battalion Center, Port Hueneme, California. They also received a patent on "Production of Elements and Compounds by Deserpentanization of Ultramafic Rocks" in September. This patent was a by-product of their research.

Dr. Dreschhoff attended the Antarctic Orientation Conferences sponsored by NSF in Washington, D.C., September 9-11. Dreschhoff and Zeller also attended the Sixth Gondwana Symposium at Ohio State University, Columbus, August 19-23 where they presented a paper entitled "Radioactive Mineral Accumulations Associated with the Pre-Beacon Erosion Surface in the Transantarctic Mountains, Antarctica."

Claude Laird received the Antarctic Service Medal of the United States from the National Science Foundation.

David Lehew was named top individual weather forecaster during last year's National Weather Forecasting Contest. This is the first time a KU forecaster has won the contest.

Professor Beard attended the 1985 Comet Workshop at the University of Michigan, Ann Arbor, October 16-18 where he presented a paper entitled "The Creation of Ionized Tail Rays in Comets."

Professors Goldhammer and **Prosser** attended the fall meeting of the APS Division of Nuclear Physics, Asilomar, Pacific Grove, California, October 28-30.

Professor Goldhammer attended an invitational symposium on New Degrees of Freedom in Nuclei also at Asilomar on October 31.

Professors Bass, Culvahouse, Friauf, Sapp and **Wiseman** together with **B. Aghdaie, R. A. Murray, G. A. Rezvani, S. N. Sun** and **F. Zandiehnadem** attended the 33rd Midwest Solid State Conference in Kansas City, Missouri, November 8-9. The following papers were presented: "The Frequency Dependent Dielectric Function for the Pen Insolator at Long Wavelengths" by Professor Bass; "Molecular Dynamics Simulation of the Hall Effect in a Fast-Ion Conductor" by

Sun and Bass; and "A Structural Model for Sodium Silicate Glass" by Murray and **Professor Ching** (Adjunct). Professor Bass also chaired the session on "Superconductivity and Lattice Dynamics."

Professor Shawl attended a meeting of the Large Telescope Consortium at the University of New Mexico, Albuquerque, October 25-26.

Professor Davidson has been appointed to fill a vacancy on the executive committee of the Kansas Academy of Science until 1987.

Professor Culvahouse has received a sabbatical leave for the fall 1986 semester.

Professor Munczek visited Buenos Aires, Argentina, on December 6-16 to take part in a panel in charge of selecting new faculty for the Physics Department of the University of Buenos Aires. He was appointed to the panel by that university.

Professor Bass attended the workshop called "Dynamics Days" at the Center for Studies of Nonlinear Dynamics, La Jolla, California, January 7-10.

Professor Armstrong presented a paper entitled "A Large 30 Mhz Riometer Absorption Event at South Pole Associated with Interplanetary Ions Below 10 MeV" (with D. Venkatesan and D. Hudon, Dr. Patrick Briggs, Ted Rosenberg and Sumant Krishnaswami) at the Fall Annual American Geophysical Union National Meeting, San Francisco, California, December 7-13, 1985.

Sue Tholen (RA/TA) presented a paper entitled "Correlation between SSC Amplitude and Triggering of Magnetospheric Particle Bursts" (with L. J. Lanzerotti of AT&T and Prof. Armstrong) at the 1985 Fall Annual American Geophysical Union National Meeting, San Francisco, California, December 7-13.

O M H O M E

Professor Armstrong presented a paper entitled "Numerical Studies of Energetic Particle Dynamics in the Magnetotail during Bursts" (with Bernard Yu) at the American Geophysical Union Chapman Conference on Magnetotail Physics at the Johns Hopkins University Applied Physics Laboratory, Laurel, Maryland, October 28-31, 1985.

Mona Kessel (RA) presented a paper entitled "Particle Acceleration Due to Shocks in the Interplanetary Field: High Time Resolution Data and Simulation Results" at the 19th International Cosmic Ray Conference, August 11-13, 1985, La Jolla, California. The manuscript was also published in the conference proceedings. Also **Professor Armstrong** presented a paper entitled "Solar and Interplanetary Particles at 2 to 4 MeV during Solar Cycle 21. Solar Cycle Variations of Event Sizes and Compositions" (coauthored by Joe Shields and Steve Eckes and Dr. Patrick Briggs). This manuscript also appeared in the conference proceedings.

Professor Beard was the Astronomer lecturer aboard the Ocean Princess on a cruise from Barbados to Palm Island, Grenada, the Orinoco River to Ciudad Guayana, Angel Falls, to Tobago, St. Lucia and Martinique, January 5-12.

Mike Holmes (RA) and **Rick Desko** (RA) had five slides accepted in the Brunnier Gallery and Museum of Iowa State University, Ames, in their Images of the Universe Competition.

Professor Beard attended the annual West Coast meeting of the American Geophysical Division in San Francisco where he and **Mark Gast** (RA) presented a paper entitled "The Saturnian Magnetic Field."

Professor Ralston attended a workshop on "Quark/Gluon Phenomena" in Los Alamos, February 7-8. He gave a paper entitled "From Skyrmions to Partons."

Sue Tholen (RA/TA) has received an NSF graduate fellowship. She plans to attend the graduate physics program at Cornell.

Professor Bass and **S. N. Sun** (TA) attended the March meeting of the American Physical Society in Las Vegas, Nevada, March 31-April 4. Professor Bass presented a paper entitled "The Dielectric and Loss Functions for Penn Insulator" and he and Sun a paper entitled "The Hall Effect in Fast Ion Conductors."

Professors Davidson and **Sapp, Robert Curry** and **Sue Tholen** attended the annual meeting of the Kansas Academy of Science on April 4 at Emporia State University. Professor Davidson chaired the first Physics and Engineering session. Tholen presented a paper entitled "Correlation of Geomagnetic Storm Sudden Commencement with Triggered Magnetospheric Particle Bursts." Curry presented a paper entitled "VLBI Observations of a Compact Double Radio Source." Tholen received second place in the Tomanck Award Competition.

Professors Anthony-Twarog, Davidson, and **Twarog, R. D. Desko, K. Mukherjee, D. Payne, D. Bishir, D. Long, E. Heim, R. Heindon, T. Whitacre, S. Randle,** and **N. Mattila** attended the Mid-American Regional Astrophysics Conference in Kansas City, April 11-12. Desko presented a paper (with Davidson and D. J. Bord) entitled "VIRIS-VAX Interactive Reduction of IUE Spectra"; Mukherjee (with Anthony-Twarog) a paper entitled "CCD and Photographic BV Photometry in IC4651"; Twarog (with D. Payne) a paper entitled "BV Photographic Photometry in NGC 6259"; and Anthony-Twarog (with K. M. Cadworth) a paper entitled "Proper Motions and Photometry in NGC 6791."

Professor Bass has been granted a one-year leave of absence to be spent at Mission Research Corporation in Colorado Springs.

Scott Randle (astronomy junior) has received an Undergraduate Research Award of $1.0k to support his research on Dwarf Cepheids.

Tri-Tau, a group of engineering physics, engineering, and physics students, have received $500 from the Student Senate to design, build, and launch a set of experiments aboard the space shuttle.

The following prizes and awards were announced at the Honors Banquet: outstanding senior in physics and astronomy: Susan Tholen; Norman Storer Award: Tamara Whitacre; outstanding teaching assistant awards: Alex Cohen, Ned Keller, and Jerry Manweiler. The following were admitted to Sigma Pi Sigma: Geoff Bohling, Larry Devlin, Brad Evans, Ned Keller, Mark Phillips, and Rod Schoonover. President of the Atmospheric Science Club is Raul Filardi.

The officers for the Society of Physics Students for 1986-87 are Steve Jancich, president; Roger Herndon, vice president; and Colleen McKee, secretary-treasurer. The officers for the Astronomy Associates of Lawrence are Erich Heim, president; Ned Mattiler, vice president; Rick Desko, secretary; and Ida Mae Sutton, treasurer.

Steve Ball (RA), **Jerry Manweiler** (TA), **Rod Schoonover** (TA), and **Sue Tholen** (TA) attended the Zone 9 meeting of the Society of Physics Students at the University of Missouri at Rolla, April 19-20. Manweiler presented a paper entitled "The Isochronous Pendulum."

Professors Ammar and **Prosser,** and **Vince Reinert** (RA) attended the meeting of the American Physical Society in Washington, D.C., April 27-May 1. Professor Ammar presented an invited paper entitled "Recent Results from ARGUS Detector at DORIS II."

Professor Ralston attended a workshop on Physics Simulation at High Energies in Madison, Wisconsin, May 5 where he presented a paper entitled "Limitations on Predictability of Supercollider Physics." He also attended the First International Conference on the Physics of Phase Space at the University of Maryland, College Park, May 20-23, where he gave a paper entitled "Multiple Path Expansions in Quantum Mechanics and Quantum Field Theory."

Professor Koehler attended the second conference on Satellite Meteorology/Remote Sensing in Applications in Williamsburg, Virginia, May 13-16. He presented a paper entitled "An Evaluation of Scan Angle Dependence in TIROS-N Microwave Measurements."

Professor Zeller and **Dr. Dreschhoff** attended the Spring American Geophysical Union Meeting in Washington, D.C., May 18-23. They presented papers entitled "Uranium Mineralization in Southern Victorian Land, Antarctica," and "Yearly Nitrate Flux in Antarctic Snowfall and its Relation to Solar Activity."

Professor Kwak gave a seminar at the Institute Fur Hochenergie Physik Osterreichische Akademic der Wissenschaften, Vienna, Austria, on July 4. His talk was entitled "Charm and Beauty with ARGUS."

Professor McKay gave talks entitled "Chiral Dynamics" and "Anomalous

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Chiral Lagrangians" at Zhengzhou University, Henan Province of the People's Republic of China, on August 10. He was part of a group discussing university exchanges between Henan Province and most of the Big Eight schools. He also gave a theoretical physics seminar at Argonne National Laboratory on September 9 entitled, "Chiral Anomalies, Effective Actions and Pion and Techni-pion Phenomenology."

Professor Shawl gave a colloquium at the University of Michigan, Ann Arbor, on July 9 entitled "Current Research on Galactic Globular Clusters."

Professor Wong gave seminars on the "Generalized Master Equation" at the University of Missouri, Kansas City, on April 26, at the University of Texas, Arlington, June 3-4, and the University of Hong Kong, June 29.

Professor Ammar, the current MASUA Honor Lecturer, gave a MASUA lecture at Kansas State on October 10 entitled "Some Recent Results from the ARGUS Experiment at DESY." He also presented colloquia at the University of Oklahoma, Norman, October 17, and Oklahoma State University, Stillwater, October 18.

Professor Anthony-Twarog gave the departmental colloquium at the Department of Physics and Astronomy, University of Nebraska, Lincoln, on November 14 entitled "Turning CCD's and Narrow Band Filters Loose on Two-Billion-Year-Old Clusters."

Professor Ammar presented a colloquium at the University of Nebraska, Lincoln, December 5, entitled, "Study of Charmed Particles."

Professor Anthony-Twarog presented a paper at the International Astronomical Union Symposium No. 118 in Christchurch, New Zealand, December 2-6, entitled "uvby Photometry with a CCD."

Professor Munczek gave an elementary particle theory seminar at the City College of the City University of New York, November 25, entitled "Phenomenology of Dynamical Symmetry Breaking in QCD."

Professor Ralston has given the following talks: University of Oklahoma, Norman, November 14, a seminar entitled "Covariant Method for Soliton Matrix Elements," a joint OU-OSU TV seminar; also a colloquium entitled "Puzzling Particles from Cygrus X-3: Is New Physics Needed?" which was repeated the next day at Oklahoma State University, Stillwater, as well as a colloquium entitled "Physics and Politics of the 100 Mile Supercollider." On November 19 at the University of Minnesota, Minneapolis, he gave a seminar entitled "Two-fluid Model of the Skyrmion" and the next day a seminar at the Argonne National Laboratory entitled "Covariant Methods for Soliton Matrix Elements."

Professor Twarog gave an invited paper at the International Astronomical Union Symposium No. 118 in Christchurch, New Zealand, December 2-6, entitled "Stellar Photometry with Small Telescopes."

Professor Kwak gave a colloquium entitled "New Discoveries from ARGUS" at the University of Missouri at Columbia, on December 11.

Professor Anthony-Twarog gave a seminar at Michigan State University, East Lansing, on January 21, entitled "CCD Stromgren Photometry in Clusters."

Professor McKay gave a seminar at Northwestern University, Evanston, Illinois, on January 27, entitled "QCD Partons at Small X and Ultra High Energy Cross Sections."

Professor Ammar gave a MASUA Lecture at the University of Missouri at Rolla, on February 13, entitled "ARGUS: A Study of Charm and Beauty."

Professor Davis gave a High Energy Physics seminar at the University of Indiana, Bloomington, on February 28, entitled "Recent Results from ARGUS."

Professor Ralston gave a seminar at Washington University, St. Louis, April 15, entitled "Two-Fluid Approach to the Skyrmion."

The following faculty have been appointed to or are currently serving on the following committees: Professor Armstrong, University Committee on Distinguished Professors; Professor Davidson, College Advisory Board for Western Civilization; Professor Prosser, College Committee on Graduate Studies; Professor Wiseman, College Committee on Undergraduate Studies and Advising-Chairman; Professor Davidson is serving as president of the KU Chapter of Phi Beta Kappa this year.

Degrees Granted

Bachelor of Arts In Atmospheric Science
Ray Edward Carter, Jr., with departmental honors; Barbara Lynn Pratt, Cary Patrick Smith, Kevin John Stevens.

Bachelor of General Studies (Atmospheric Science)
Terence John Bryant, Anthony Frank D'Agostino, James Dean Hunley, David Mark Lehew (departmental honors, graduation with highest distinction), Stephen Randall McMillian.

Bachelor of Science (College)
Joseph Daniel Ahern (physics), Brian Elliott Bell (atmospheric science), David Walter Bishir (astronomy), David A. Bondank (physics), Raul E. Filardi, Jr. (atmospheric science), Mary Alice Walker Irvin (atmospheric science), John Keld Madsen (atmospheric science), Abdul Malik Mastura (geophysics), Steven Curtis Mauch (atmospheric science, departmental honors), Don Michael Payne (astronomy), Patrick Herbert Schlager (atmospheric science), Rodney D. Schoonover (physics, departmental honors), Susan Marie Tholen (physics, graduation with highest distinction), Steven Lewis Webb (atmospheric science), Christopher Kim Wikle (atmospheric science, departmental honors-graduation with highest distinction), and Matt Isa Zuraida (geophysics).

Bachelor of Science in Engineering Physics (School of Engineering)
Alan P. Lampe.

Master of Science in Physics
Joy Julius Christian, Lowell Kay Dirksen, Ramona Louise Kessel, Chang Yong Lee, Toru Miyabori, Gregory Warren Neely, Mohammad Ali Talebian-Darzi, Yu Wu.

Colloquium

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Professor S. I. Chu, University of Kansas. "Structure, Dynamics, and Symmetry in Intense Field Multiphoton Processes."

Professor Justin Huang, University of Missouri at Columbia. "Some Comments on Spin 2 Gravity Field."

Dr. E. M. Gaposhikin, Lincoln Laboratories, M.I.T. "Implications of Precision Satellite Tracking for Geophysics."

Professor Ed Barker, University of Texas, Austin (MA Astronomy 1964). "An Update on Comet Halley: Ground-Based and Space-Based Observations."

Professor Adrian Melott, University of Chicago. "Dark Matter and the Large Scale Structure of the Universe."

Professor Mark Novotny, Northeastern University. "Effect of Quenched Disorder on Critical Phenomena."

Professor Alexander Calder, University of British Columbia, Vancouver. "Numerical Simulation of Time-Dependent Electrode Plasma Interactions."

NEWS FROM OUR ALUMNI

Rebecca Chaky (Ph.D. 1981) and Mark Reiber had a son, Steven George at 8:31 p.m. on May 22, mass and length follow: 8/32 slugs, 22/12 feet.

Gloria L. Manney (B.S. Engineering Physics 1982) has received an L. H. Brown Trust fellowship at Iowa State University, Ames. It will support her research in uses of water vapor to study atmospheric dynamics, which is being done under the supervision of Dr. John L. Stanford.

Merle Reinhart (B.S. Astronomy 1983) has been hired as a console operator at the Space Telescope Science Institute at Johns Hopkins University.

Dr. David Tholen (B.S. Astronomy 1978) has named the asteroid (#3724) that he discovered three years ago "KANSAS." The naming citation reads ". . . named for the discoverer's home state . . . motto *Ad Astra per Aspera* . . . (also) the University of Kansas in honor of the Centennial of Astronomy at the University."

Monti R. Wilson (Ph.D. 1971) is now a research physicist at Opti-Copy in Lenexa. His address is 7906 W. 99th, Overland Park, Kansas 66212. Opti-Copy is at 10930 Lackman Road, Lenexa, 66219.

Fred E. Fare (B.S. 1986) is now commanding officer of the USS *George C. Marshall* (SSBN654). His current address is 24 Old Quarry Road, Gales Ferry, Connecticut 06335.

James D. Patterson (Ph.D. 1962) worked last summer at Sandia National Laboratories with Dr. Pete Richards under the sponsorship of the Associated Western Universities. He is in the Department of Physics/Space Sciences at Florida Institute of Technology in Melbourne. His home address is 1271 Creel Road, N.E. Palm Bay, Florida 32905.

Daryl W. Preston (Ph.D. 1970) is at the Physics Department of California State University in Hayward. He recently had published two Laboratory Manuals of Experiments in Physics by John Wiley. His home address is 1827 Marin Avenue, Berkeley, California 94707.

Brad Roth (B.S. 1982) married Shirley Oyog on May 11, 1985, in Nashville, Tennessee. Both are working on their Ph.D.s in Physics at Vanderbilt University. They live at 2151 Acklen Avenue, Apt. 9, Nashville, Tennessee 37212.

Professor Bruce Richard Barrett (B.S. 1961) is on leave of absence from the University of Arizona, Tucson (August 1985-August 1987) to serve as a program director for theoretical physics at the NSF in Washington, D.C. His address for that period is Physics Division, Room 341, NSF, Washington, D.C. 20550.

Steven C. Woronick (B.S. 1981) is a graduate student at the Physics Department, SUNY at Stony Brook, Stony Brook, NY 11794. He presented a paper at the March meeting of the American Physical Society March 31-April 4 in Las Vegas, Nevada, entitled "Interatomic Distance in Strained-Layer in As/GaAs Heterostructures."

An important message to our alumni:

The cost of producing and mailing the Department of Physics and Astronomy Newsletter is shared by the Physics and Astronomy Development Fund and the KU Alumni Association.

Membership in the Alumni Association provides automatic membership in the Physics and Astronomy Professional Society and receipt of its newsletter. Annual dues are $25 per person or $30 for husband and wife. (Write to Alumni Association, 1266 Oread, Lawrence, Kansas 66045 for full information.) Members receive eight monthly issues of *Kansas Alumni*, regular communications regarding all KU activities and meetings in their area, assistance in locating KU friends, notification of campus events and reunions, and eligibility for travel with the "Flying Jayhawks"—plus the satisfaction received from personal involvement with their alma mater.

Questionnaire

Please fill in and return to the Alumni Committee, Department of Physics and Astronomy, The University of Kansas, Lawrence, KS 66045.

Name_____ Degree from KU_____ and year_____

Address_____

City_____ State_____ Zip_____

Business Address:_____

News items, suggestions and comments:_____

Faculty Publications

Professors Ammar, Davis, and **Kwak, Dr. Coppage** and **Shri Kanekal** (RA) with the ARGUS Collaboration, "A Determination of the Muon Pairs Branching Ratio of the γ' Meson," Zeit. Fur Phys. *C28*, 45 (1985);

"Search for Narrow States Coupling to τ Pairs in Radiative γ Decays," Phys. Lett. *154B*, 452 (1985);

"Search for Fractionally Charged Particles Produced in e^+e^- Annihilation at 10 GeV Center of Mass Energy," Phys. Lett. *157B*, 326 (1985);

"Radiative Decays of the Υ(2s) into the three χ_b States," Phys. Lett. *160B*, 331 (1985);

"Observation of B-meson Decay into J/Ψ," Phys. Lett. *162B*, 395 (1985), both with the ARGUS Collaboration;

"An Upper Limit on the Mass of the Tau Neutrino," Phys. Lett. *163B*, 404 (1985);

"Observations of a New Charmed Meson," Phys. Rev. Letters *56* 549 (1986) with the ARGUS Collaboration.

Professor Armstrong, Dr. Tariq (Ph.D. 1984), and **J. W. Lowry** (M.S. 1984), "Electrodynamic Interactions of Ganymede with the Jovian Magnetosphere and the Radial Spread of Wake-Associated Disturbances," J. of Geophysical Research, *90*, 3995 (1985).

Professor Armstrong, Ramona Kessel (RA), **R. A. Murray** (RA), and **R. Hetzel** (M.S. 1984), "Numerical Simulation of Positive-Potential Conductors in the Presence of a Plasma and a Secondary-Emitting Dielectric," J. Appl. Phys. *57*, 4991 (1985).

Professor Armstrong, Dr. Robert B. Decker (Ph.D. 1979), and **Mark E. Pesser,** "Shock Drift Acceleration" in *Collisionless Shocks in the Heliosphere: Reviews of Current Research* Geophysical Monograph 35, 271 (1985).

Professor Bass, "Kinetic Energy of an Electron Gas," Phys. Rev. *B32*, 2670 (1985);

"The Green's Function for a Finite Linear Chain," J. Math. Phys. *26*, 3068 (1985).

Professor Beard, "Solar Pressure and Molecular Decay in Cometary Atmospheres," Ap. J. *295* 668 (1985), with T. A. Whelan and **M. A. Gast** (RA).

Professor R. C. Bearse, N. J. Roberts and **V. L. Longmire,** "Extrinsic and Intrinsic Complexities of the Los Alamos Plutonium Processing Facility Journal," the Institute of Nuc. Mat. Management XIV, 295 (1985).

Dr. R. M. Bunch (Ph.D. 1981), **Professor W. P. Unruh,** and **Dr. M. V. Iverson,** "Light Scattering Measurements of Diffusional Growth of Precipitates in Nickel- and Cobalt-Doped MgO," J. Appl. Phys. *58*, 1474 (1985).

Professors D. W. McKay and **H. J. Munczek,** "Anomalous, Chiral Lagrangians of Pseudoscalar, Vector, and Axial-Vector Mesons Generated from Quark Loops," Phys. Rev. *D32*, 266 (1985).

Professor McKay, "The Wess-Zumino Lagrangian and Colored Techni-Pseudo-Goldstone Bosons," Physics Letters *169B* 79 (1986) with Bing-Lin Young.

Professor Ralston, "Covariant Method for Soliton Matrix Elements," Phys. Rev. *D33*, 496 (1986);

"Two-Fluid Model of the Skyrmion," Physics Review, *D33*, 2003 (1986).

Professor Twarog, "The Chemical Evolution of the Galaxy" in *The Milky Way Galaxy*, I.A.U. Symposium No. 106, Ed. by H. Van Woerden, *et al.* 1985, pp. 587-596.

Professors Wong and **Zhu** (Visiting Professor), "Physical Implications of Multi-Neighbor Activations in the Master Equation," Phys. Letters *111A*, 171 (1985) with A. K. Fung.

Professor Zeller and **Dr. Dreschhoff** (Adjunct), "Detection of Sulfide Mineral Deposits by Remote Sensing in the Antarctic Peninsula," Antarctic J. of the U.S., *19*, No. 5 (1984).

Professor Zhu (visiting), "Several Theories about the Interference of Particle Beams and the Theoretical Interpretation of Collalu-Overhauser-Werner and Marton Experiments," Phys. Rev. *D32*, 368 (1985) with Zhong Jun Shen and You Shi Wu.

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