

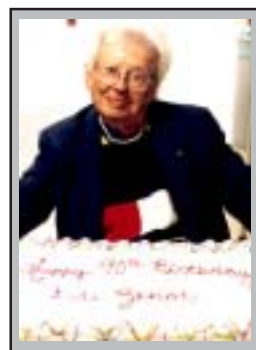
Hughes Zenor Memorial Resolution

Hughes M. Zenor was born October 4, 1908, in West Baden, Indiana. He died November 23, 2001, in Auburn, Alabama. He is survived by his sons: Hughes of Spring, Texas, Phillip of Auburn, Alabama, and John of Chico, California. He was raised in Oklahoma and graduated from Tulsa Central High School in 1926, where he showed a flair for Physics and Music. He completed his undergraduate education in 1930 at Oklahoma City University with an A.B. degree in Mathematics, with minors in Physics and Chemistry. He went on to study Physics at the University of Oklahoma, where he was inducted into Sigma Xi and Sigma Pi Sigma, obtaining his M.S. in Physics in June, 1932. He received the Ph.D. in Physics at Rice Institute under H. A. Wilson in June, 1936. His dissertation research focused on the cooling of plates due to photoelectric emission.

At Rice he met Alpha Whifenant of Temple, Texas, and they were married in 1936. Hughes and Alpha had three sons: Hughes, Phillip, and John. Hughes (Jr.) followed in his paternal grandfather's footsteps in the Methodist ministry; Phillip is a member of the Mathematics Department at Auburn University; and John teaches Computer Science at Chico State College.

After receiving his Ph.D., Hughes was employed by the Humble Oil and Refining Company where he developed gravity meters to aid in the search for oil in the Gulf of Mexico. During the war, Hughes worked on sonar instrumentation and radar bomb sights at several laboratories, receiving a number of patents.

He began his academic career in September, 1933, at Okemah Jr. College where he taught Mathematics and Chemistry for one



Hughes Zenor

semester. In 1950 he joined the faculty at the University of Houston as an Associate Professor of Physics where he taught senior and graduate courses until June, 1952. He chaired the Department of Geophysics at the University of Tulsa from September, 1955, until June, 1960.

Hughes came to MSM in September, 1960. His versatility is illustrated by the titles he held here: Professor of Geophysics, Professor of Mining Engineering, Professor of Geophysical Engineering, and finally Professor of Physics. During his tenure at MSM/UMR Hughes was Director of UMR's Geophysical Observatory and was advisor to nine students who received the Ph.D. as well as to many MS students. He authored or coauthored numerous technical reports and

published several technical papers. He also wrote an article for the Readers' Digest in 1966. While at Rolla he consulted for many technical companies, and felt particularly at home at the Naval Weapons Center at China Lake, California, where he contributed to the development of the sidewinder missile as well as smart bombs. He enjoyed the commute from Rolla to China Lake in his Cessna. He retired in September, 1979, and was awarded *emeritus* status.

After retiring, Hughes operated the best machine shop in Rolla. He made a point of employing UMR students as he felt that practical experience was important for engineering students. Almost to the day of his death, Hughes attended the Physics Department Colloquia, often asking questions which showed his knowledge was current. Hughes did not mince words and his insightful remarks and warm friendship will be missed. *John C. Carstens, Ralph W. Alexander, Jr., Jerry L. Peacher, 2002.*

Department Honors Alumnus Richart Slusher

The Physics Department was pleased to present alumnus **Richart Slusher** (BS '60) with a **Professional Degree in Physics** during the May 2002 Commencement. Richart, who heads the Solid State and Quantum Physics research department at Lucent Technologies Bell Laboratories, received his BS in physics from UMR in 1960. Slusher joined the technical staff at Bell Labs shortly after receiving his Ph.D. in physics from the University of California, Berkeley in 1965. Prior to assuming his present position in 1982, he served as head of Bell Labs Interface Electronics Research Department in the Solid State Electronics Laboratory, managing groups responsible for fundamental studies of high-speed Josephson devices, novel silicon devices, and small-scale electron beam lithography. He has also served as head of Bell Lab's Optical Physics Laboratory.

In the 1980s, Slusher's research interests focused on quantum optics and fundamental noise limits in quantum measurements. He and his colleagues were the first to demonstrate squeezed light noise reduction below the standard quantum limit, using four-wave mixing in an atomic sodium beam. For this work he received in 1989 the Einstein Prize for Laser Science. In 1995 he was awarded the Arthur L. Schawlow Prize, which recognizes outstanding contributions to laser-based basic research in the fundamental physical properties of materials and their interaction with light. Richart is a Fellow of the American Physical Society and The Optical Society of America, has published well over 100 papers and holds patents for a large number of laser based optical devices. He has served in the past on the Physics department alumni board and is a 1993 recipient of a UMR Alumni Merit Award. During his visit to the department for Spring Commencement, where he was joined by his wife and mother, Richart spoke to UMR graduate and undergraduate students about his experiences at one of the nation's premier research laboratories.



Richart Slusher

Frontiers in Physics Colloquium Series

The 2002 *Frontiers in Physics Colloquium Series* featured a wide spectrum of interesting topics from scientists from around



Nitant Kenkre

the country. This year the series opened with a visit from Prof. **V.M. Kenkre** of The University of New Mexico, who discussed the relation between polarons and Bose condensates in a talk entitled *Transitions in the Tunneling of Bose Condensates in Traps and the Relation to Polaron Physics*. The remainder of the spring semester featured talks from a variety of disciplines, highlighted by contributions from two UMR alumni. In February, Professor **Charley Myles** (BS '69) from Texas Tech University discussed the properties of a new crystalline phase of silicon, germanium, and tin in a talk entitled *Clathrate Materials: "New" Open Framework, Crystalline Phases of the Group IV Elements*. In April Dr. **Fred Baganoff** (BS '85) of the MIT Center for Space Research discussed very exciting recent results detailing the observation, using the Chandra X-ray telescope, of violent activity from the massive black hole at the center of the Milky Way galaxy.

The fall semester brought a change of colloquium organizer, with new faculty member **Thomas Vojta** taking over the duties as chair of the colloquia series. The fall semester colloquia started with a visit from Prof. **Giovanni Vignale** of the University of Missouri –

Columbia, who talked about spin transport, a very topical area in current studies in condensed matter and solid state physics. Further talks on condensed matter physics were given by Prof. **Joerg Schmalian** of Iowa State University, Prof. **James Heyman** of Macalester College, and Dr. **Matthias Vojta** of University of Augsburg (Germany). The fall semester series also included talks on atomic physics by Prof. **Brett Esry** of Kansas State University, Prof. **Andrew Kortyna** of Lafayette College, and Prof. **Louis Bruch** of University of Wisconsin. Dr. **Dan Neumann** of NIST Center for Neutron Research addressed the dynamics of biomolecules, and Prof. **Brad Stone** (San Jose State University) talked about astrochemistry research at NASA Ames Research Center.

Dr. **Agnes Vojta**, who had joined the department earlier in 2002, introduced her research in a talk on *Cracks or holes? Failure of varistor*

ceramics. Another highlight of the fall semester series

was the talk given by UMR alum Dr. **David R. Schultz** (PhD '89) of Oak Ridge National Laboratory who gave the Homecoming Colloquium this year. Dave gave a great talk on x-ray emission from Jupiter and comets, and the role atomic



David Schultz

collisions play in understanding these phenomena. The series closed with a stimulating talk on *Complexity in Statistical Physics and Computer Science* by Prof. **Jon Machta** of the University of Massachusetts.

UMR Students & Alumni: In Press

The following journal articles which appeared over the last year feature work by UMR undergraduate students¹, graduate students², or UMR alumni³ under the supervision of UMR faculty.

Low Energy Valence Ionization of the Rare Gases, M.A. Haynes, B. Lohmann, D.A. Biava^{1,3}, H.P. Saha, R.P. McEachran, C.T. Whelan, and D.H. Madison, in *Correlations, Polarization, and Ionization in Atomic Systems*, ed. By D.H. Madison and M. Schulz (American Institute of Physics, New York, 2002), pp. 18-23.

Triply Differential Single Ionization Cross Sections in Fast Ion-Atom Collisions: Large versus Small Perturbation, M. Schulz, R. Moshhammer, A.N. Perumal, D.H. Madison, R.E. Olson, S. Jones³, M. Foster^{1,3}, and J. Ullrich, in *Correlations, Polarization, and Ionization in Atomic Systems*, ed. By D.H. Madison and M. Schulz (American Institute of Physics, New York, 2002), pp. 127-132.

Exchange effects in low energy electron impact ionization of the inner and outer shells of argon, D A Biava^{1,3}, H P Saha, E Engel, R M Dreizler, R P McEachran, M A Haynes, B Lohmann, C T Whelan, and D H Madison, *Journal of Physics B*. 35, 293-307 (2002).

Electron-Cadmium Ionization for Energies near Overlapping Autoionizing Resonances, M.M. Tabanli^{2,3}, J.L. Peacher, and D.H. Madison, *Physical Review A* 65, 042718 (2002).

Electron-Impact Excitation from the (3p54s) Metastable States of Krypton, A. Dasgupta, K. Bartschat, D. Vaid¹, A.N. Grum-Grzhimailo, D.H. Madison, M. Blaha, and J.L. Giuliani, *Physical Review A* 65, 042724 (2002).

Comparison of theoretical and absolute experimental fully differential cross sections for ion-atom impact ionization, D H Madison, M Schulz, S Jones³, M Foster^{1,3}, R Moshhammer, and J Ullrich, *Journal of Physics B* 35, 3297-3314 (2002).

Recent Advances in the Theoretical Treatment of Atomic Ionization by Charged Particle Impact, D.H. Madison, A. Prideaux², M. Foster^{1,3}, S. Jones³ and M. Schulz, in *Photonic and Electronic Atomic Collisions*, ed. by J. Burgdörfer, J.S. Cohen, S. Datz and C.R. Vane (Rinton Press, Princeton, New Jersey, 2002), pp. 429-436.