researchers to achieve this advancement compared to previous studies.

Few materials allow the manipulation of the strain and magnetic states of a multiferroic through direct application of an electric field, because the stable polarization states in most materials are antiparallel and couple similarly to the other order parameters. This is not so for rhombohedral structures, which can switch to one of four energetically equivalent up- or down-polarized states. M. Huijben, Y.H. Chu, and R. Ramesh of the University of California, Berkeley synthesized samples of rhombohedral (100) BFO to take advantage of this. The BFO was deposited atop leads composed of $SrRuO_3$ (SRO) all on a TiO_2-terminated (001) $SrTiO_3$ (STO) substrate to promote growth of BFO.

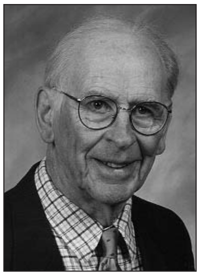
The phase field modeling of S. Choudhury and L.Q. Chen of Pennsylvania State University showed that all four polarization states of BFO can be accessed by the same switching field due to rotationally invariant symmetries in the material and the electric field using phase-field simulations. How then to manipulate the ferroelectric domains?

Balke and her co-workers at Oak Ridge, S. Jesse, A.P. Baddorf, and S.V. Kalinin, found that they could break the symmetry by applying a voltage to a moving PFM tip. They showed that they could repetitively produce domain patterns this way, including a line of closure domains.

"This work shows that it is possible to control the switching process to utilize all new possible functionalities," said Balke, "whether these are local strain sensors, multi-level resistance devices, or information storage devices that write electrically and read magnetically."

JIM RANTSCHLER

News of MRS Members/Materials Researchers



W. Conyers Herring

William Conyers Herring passed away at his home in Palo Alto, California, on July 23, 2009 at the age of 94. For over five decades he made insightful contributions in both materials science and solid-state physics—a unique example of the value of interdisciplinary research. His theories of capillary phenomena, diffusion-limited plasticity in metals, mechanical behavior of small particles, sintering, and thermionic behavior were recognized in 1980 when he received the Materials Research Society Von Hippel Award with the citation, "Demonstration that whiskers of high crystalline perfection would exhibit extraordinary mechanical properties. He is also held in esteem for his theoretical contributions to the understanding of surfaces and surface tension."

In the same year he received the James Murray Luck Award for Excellence in Scientific Reviewing by the National Academy of Sciences in recognition of his scholarly, comprehensive reviews of thermionic, magnetic, and transport phenomena that are widely cited today.

Earlier in 1959 he was awarded the Oliver E. Buckley Award of the American Physical Society for his major contributions to electronic band theory and its applications.

When Conyers started school at five years old in the small town of Parsons, Kansas he had already taught himself how to read so well that he was placed in the fifth grade. His father's death when he was 13 left the family impoverished, but the following year he was able to enroll in the University of Kansas with a four-year scholarship. He graduated with a major in astronomy and then switched his focus to solid-state physics when he went to Princeton University, where he particularly enjoyed being able to study independently with few required courses. There, a small group including Eugene Wigner and his graduate students John Bardeen, Frederick Seitz, and Conyers created the modern band theory of solids. Conyers received his degree in 1937 and spent the following two years as a National Research Council fellow at the Massachusetts Institute of Technology. There he introduced the orthogonalized plane wave (OPW) method, the first workable scheme for calculating electronic energy bands in solids, and with A.G. Hill used it to calculate the band structure of beryllium.

Conyers served in the Division of War Research at Columbia University during the second World War. In 1946, after a short time in the Applied Mathematics Department at the University of Texas, he took a position as a member of the technical staff at the Bell Telephone Laboratories, Murray Hill, New Jersey. In that same year he married Louise Preusch who had just graduated from Barnard in math and physics. They made their home in nearby Summit, where their four children Lois, Alan, Brian, and Gordon were born and raised.

Conyers created the theoretical physics department from the strong group already existing at Bell that soon was recognized to be preeminent and a mecca for visitors coming from around the world. Conyers and Louise were gracious hosts and made many friends. He kept himself and others well informed of the rapid advances being made by reading the latest journals as soon as they arrived at the extensive Bell library. He organized references he considered significant by subjects on three-by-five cards containing multi-references with terse comments all written in long hand. In order to keep current with advances in Russia during the cold war (not wanting to wait for problematic translations) Conyers simply learned to read Russian. He regularly carried his card file in a famous black suitcase, willingly serving the community as a one-man Google—actually a more useful one, because he had already filtered out the extraneous. He was not only known as a fountain of knowledge, but also for his helpful way of sharing, treating everybody with respect and quietly providing his own keen insights. Wigner once remarked [to me] that whenever there was something he wanted to know (in solid state) the first thing he did was to go to Conyers. His review of exchange among itinerant electrons that started as a chapter and turned into a book on magnetism was one of the first recognitions of the role of collective excitations in metals. John H. Van Vleck in reviewing the book (*Physics Today*, April 1967) said that "the preprint at Harvard was so bulky it was usually called the telephone book because of its origin at Murray Hill and its accuracy, attention to detail and usefulness, but it has one detail that the telephone book lacks—the quality of being critical in the best sense of the word."

Conyers moved to Stanford University as Professor of Applied Physics in 1978. He and Louise became active members in the campus community, and he continued productive research activities. Conyers had many outside interests. He was an avid tennis player and a wit who could produce a clever limerick spontaneously. He was a devout Christian who believed that theology underlies science because "science is ultimately based on leaps of intuition and aesthetic perceptions." Those who knew him cherish memories of this remarkable man.

THEODORE H. GEBALLE

https://doi.org/10.1557/mrs2009.208 Published online by Cambridge University Press