

Dr. Witold Nazarewicz Named ORNL's Distinguished Scientist for 2012

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Physics Professor Witold (Witek) Nazarewicz will need to add another line to his CV this fall, this time to make room for the 2012 Oak Ridge National Laboratory's Distinguished Scientist Award. He will accept the honor at the annual Awards Night celebration on November 16. A nuclear theorist, Nazarewicz is being recognized "for his foundational work in developing and applying nuclear density functional theory, resulting in a comprehensive theoretical framework for the physics of exotic nuclei and tremendous advances in our understanding of them, and for his pivotal role in the promotion of radioactive beam physics in

the United States." The award is his second major accolade for 2012; in April the American Physical Society presented him with the Tom. W. Bonner Prize in Nuclear Physics, which honors outstanding research in nuclear physics, including the development of a method, technique, or device that makes significant contributions to the field.

Nazarewicz is a prominent leader in research devoted to mapping out the nuclear landscape. In June his research group including both undergraduate and graduate students published "The Limits of the Nuclear Landscape" in *Nature*, where they concluded that the chart of nuclides has theoretical limits that include 6,900 (+ 500) nuclei: more than double the number currently identified. They used an approach for which Nazarewicz is well-known and, in fact, for which he was commended in both the ORNL and Bonner award citations: density functional theory (DFT). As nuclei grow heavier across the nuclear landscape with the addition of protons and neutrons, it becomes increasingly difficult to calculate their energy based on their individual components because of the interactions and influences among those particles, a hurdle known in many fields of physics as the many-body problem. DFT works around this by describing a nuclear system at the quantum mechanical level in terms of proton and neutron densities and currents, rather than the protons and neutrons themselves. Witek has successfully used this tool throughout his career to work across the nuclear landscape and illuminate the properties of nuclei, including the rare and exotic sort that typically trace their origins to the laboratory and live for only a fleeting moment. The more data physicists gather about the nuclear big picture, the deeper their understanding of why nuclei behave the way they do, so they can put them to work in fields like energy, medicine, and national security, or even custom-design them for specific purposes.

Nazarewicz's leadership in nuclear physics goes well beyond theory work, however. He is co-director of the U.S. Department of Energy's NUCLEI (NUclear Computational Low-Energy Initiative) collaboration program and has served on three committees of the National Research Council of the National Academies of Science. He helped found and secure funding for two international institutes devoted to theory studies of exotic nucleone in Japan and one France. To expand opportunities for young scientists interested in the field, he has been involved in a number of summer schools, and is also a faculty member with UT's Bredesen Center for Interdisciplinary Research and Graduate Education. He is listed among ISI's most highly-cited physicists, and has offered his expertise to numerous national and international committees and scientific journal editorial boards. In 2009 the University of the West of Scotland awarded him a Honorary Degree of Doctor.

Nazarewicz earned a Ph.D. in physics at the Institute for Nuclear Research (Warsaw) in 1981. He served on the faculty at the Warsaw University of Technology for several years and has held numerous visiting positions all over the world. He joined the UT physics faculty in 1995 and has been part of the ORNL Physics Division since 1996. He also holds an appointment as a Professor at Warsaw University.