

## PHYSICS NEWS FLASH

### Professor Nazarewicz Helps Set National Nuclear Physics Agenda

February 8, 2007



Professor Witek Nazarewicz

Physics Professor Witek Nazarewicz is part of an international committee that will help set the national agenda in nuclear physics research, an endeavor that could mean a more prominent role for East Tennessee in this fundamental science with applications in medical research, national security, and energy production.

Dr. Nazarewicz spent a good part of 2006 working on the Rare Isotope Science Assessment Committee (RISAC), a group charged by the National Academy of Sciences, to define a scientific agenda for a U.S. facility for rare-isotope beams (FRIB, formerly known as RIA). The committee is part of the National

Research Council and comprises 18 members from the U.S. and abroad. The culmination of their work was the report entitled, *Scientific Opportunities with a Rare-Isotope Facility in the United States*, which was made public in December.

Rare-isotope science focuses on the study of *exotic* nuclei, which rarely occur on earth but are isotopes of the more stable atoms that make up the everyday matter around us. Most rare isotopes are *unstable*, meaning they decay spontaneously into different nuclei altogether. By observing their interactions, scientists learn a great deal about basic nuclear structure and also about the exotic environments where rare isotopes exist, such as in neutron stars or nuclear reactions in reactor fuel cycles. Gaining a foothold into these inner-most workings of the atom could influence efforts in a number of areas including astrophysics, medicine, nuclear reactors, nuclear weapons and stockpile stewardship.

The RISAC report strongly endorses this nuclear structure research—and a new advanced rare isotope facility, or FRIB—as a vital component of the overall U.S. effort in nuclear science. This firm support comes as a commendation for researchers at the Holifield Radioactive Ion Beam Facility (HRIBF) at Oak Ridge National Laboratory, where Dr. Nazarewicz is scientific director.

“Holifield is the bridge to this facility,” he explained. “The science of FRIB is the science of Holifield.”

The RISAC committee’s unflagging support for the science involved, Dr. Nazarewicz said, can mean upgrades and new opportunities for HRIBF in the pre-FRIB era.

According to the report, FRIB would produce a wide variety of high quality beams of unstable isotopes at unprecedented intensities. It would also produce abundant samples of

specific isotopes to serve as “nuclear laboratories” and train an entire new generation of scientists in nuclear physics. Current plans call for a 2011 start date.

Dr. Nazarewicz and the rest of the RISAC team were asked to define an agenda for FRIB and determined that the key drivers for the project are investigations in nuclear structure, nuclear astrophysics, and fundamental symmetries of nature—which build on the work done at HRIBF and other radioactive nuclear beam facilities worldwide. The RISAC report will provide critical input for a long-range plan formulated by the Nuclear Science Advisory Committee, a joint NSF-DOE committee.

Professor Wittek Nazarewicz joined the UT physics faculty in 1991. A specialist in nuclear theory, he is the author or co-author of more than 280 research papers in refereed journals and he is listed by ISI among the most highly cited in physics.