Plasma Physics Division Colloquium

Discovery of New Nuclear Phenomena in the Condensed Matter State

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Abstract: Recently there have been a renaissance of new discoveries of novel nuclear phenomena in condensed matter systems. These discoveries fall into two general classes: First, verified nuclear reactions have been facilitated in condensed matter systems that utilize generally known physics to accelerate ions to the point where the nuclear reactions occur. Examples of this include new small 'bench top' devices that induce deuterium fusion at very low rates, and the recent discovery of nonlinear dynamics in thunderstorms that permit the acceleration of electrons and positrons to levels where pair production occurs. The second class of phenomena is still unexplained by physics, and it involves the liberation of large amounts of 'excess heat' without the particle emission that would be expected in conventional nuclear reactions. This second class of phenomena is now under intense study within many laboratories around the world, including within the Sidney Kimmel Institute for Nuclear Renaissance at MU, using a full suite of experimental techniques in an attempt to elucidate the origin of these unexplained phenomena.

Robert Duncan joined the University of Missouri as the Vice Chancellor for Research in August, 2008, accepting responsibility for MU's research enterprise, including $235 million+ per year in contracts and grants, and over $200M in research-related and fee-for-service activities. He supervises MU's research administration and its major research facilities, including the largest research reactor in academia that supplies more radioisotopes for medical applications than any other reactor in the USA, multiple interdisciplinary research centers, and associated economic development and technology licensing and incubation efforts.

Duncan received his bachelor's degree in physics from MIT in 1982 and his doctorate in physics from the University of California-Santa Barbara in 1988. He has served as a professor of physics and astronomy at the University of New Mexico (UNM), as a visiting associate on the physics faculty at Caltech, as a joint associate professor of electrical and computer engineering at UNM, and as the associate dean for research in the College of Arts and Sciences at UNM.

R. V. Duncan has published extensively in experimental low-temperature physics, including the observation of new phenomena near the superfluid transition in helium, and in new instrumentation development. Previously, Dr. Duncan has served as principal investigator on a fundamental physics research program for NASA. As the former Director of the New Mexico Consortium's Institute at Los Alamos National Laboratory, he has worked to fund major conferences and summer schools in quantitative biology, information science and technology, energy and environment, and astrophysics and cosmology. In 2012, Duncan formed the Sidney Kimmel Institute for Nuclear Renaissance at MU empowered by a major gift from Sidney Kimmel. Duncan has received more than $8 million in federal funding on research efforts that he has led as Principal Investigator.

Dr. Duncan is a Fellow and a life member of the American Physical Society. He was named the Gordon and Betty Moore Distinguished Scholar in the Division of Physics, Mathematics, and Astronomy at Caltech in 2004, and he chaired the Instrumentation and Measurement Topical Group for the American Physical Society in 2002, and the International Symposium on Quantum Fluids and Solids in 2003. He has consulted extensively to industry, and co-invented and assisted in the formation of companies. Duncan chaired the Decadel Survey Panel of the National Academy of Sciences on Fundamental Physical Sciences in Space, which has been released as Chapter 8 within Recapturing a Future for Space Exploration: Life and Physical Sciences Research for a New Era through the National Research Council. Currently Duncan serves on the National Academy of Sciences Panel to evaluate the effectiveness of the nation-wide Experimental Program to Stimulate Competitive Research, which spans many government research funding agencies.

Wednesday, April 10, 2013

Building 60 Auditorium 11:00 AM

Light refreshments