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Condensed Matter Nuclear Physics***Jerry P. Draayer, LSU**

Department of Physics and Astronomy

Digital Media Center Theatre
May 02, 2014 - 11:00 am**Abstract:**

As the quark-gluon plasma – governed by strong interaction physics – cools, nucleon condensates form and cluster into nuclei that sit at the center of every atom, from hydrogen (single proton nucleus) to uranium (92 protons and 146 neutrons in its most abundant 238 isotope) and beyond. An ab initio symmetry-adapted no-core shell-model (SA-NCSM), with results that corroborate and are complementary to those first enabled within the framework of the no-core shell model (NCSM), facilitates high performance computing (HPC) studies of the structure of atomic nuclei. Applications of the theory show that bound states of light nuclei are dominated by high-deformation and low-spin configurations. The applicable symmetries, ferreted out using HPC tools, reveals the origin of collective modes – the emergence of simplicity within complexity – in such nuclei, and provide a framework for determining the nature of bound states of nuclei in terms of a relatively small fraction of the complete shell-model space.

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Speaker's Bio:

Jerry P. Draayer earned a Ph.D. in Physics with a minor in Mathematics (1968) and a B.S. in Physics and Electrical Engineering (1964) from Iowa State University. He held postdoctoral fellowships at the Niels Bohr Institute in Copenhagen, Denmark (1969), The University of Michigan (1970-72), and the University of Rochester (1973-1974) prior to joining the LSU faculty in 1975. His tenure at LSU includes serving as Chair of the Department of Physics and Astronomy (1985-94) and Director of the Office Federal Programs at the Louisiana Board of Regents Director (1995-1998). Since 1998 he has served as the President of the Southeastern Universities Research Association (SURA) in Washington, DC, while continuing to maintain an active research group at LSU. He has authored or co-authored 4 books, published more than 250 articles in referred journals, as well as a similar number of invited and contributed papers based on invited as well as contributed talks given worldwide. In 1998 Draayer was awarded Corresponding Member status in the Mexican National Academy of Sciences, and in 2000 was named a Fellow of American Physical Society. He is currently an LSU Roy P. Daniels Professor of Physics (2005), and was awarded the Francis G. Slack Award of the Southeastern Section of the American Physical Society (2006). In 2007 he was named an LSU Distinguished Research Master. During his tenure at LSU Draayer has hosted over 20 international visiting scholars, mentored more than a dozen postdoctoral researchers and 17 Ph.D. students. He has brought to LSU over \$25M in external funding for research in Theoretical Nuclear Physics. In his role as Chair, Draayer forged a joint degree program between Computer Science and Physics and Astronomy that ultimately grew into what has become LSU's current Center for Computation and Technology. His current research group includes 2 graduate students, 3 postdocs plus a sabbatical visitor from Mexico. He supports a joint program in Theoretical Nuclear Physics between LSU and the Liaoning Normal University in Dalian, China. In his role as President of SURA, Draayer is responsible for Management and Operations of the Department of Energy's Thomas Jefferson National Accelerator Facility, located in Newport News, VA. His personal research program remains focused on the structure of nuclei, combining algebraic (group theoretical) methods with high-performance computing methodologies to yield an ab initio (tracking first principles) theory of light and medium mass nuclei.

