The Neutron Scattering Society of America is pleased to announce the 2016 recipients of its four major prizes.

Dr. Charles F. Majkrzak

National Institute of Standards and Technology

is the recipient of the

2016 Clifford G. Shull Prize

of the Neutron Scattering Society of America (NSSA) with the citation

"For leadership in the development, application and establishment of neutron reflectometry as an essential measurement tool for nanoscale materials"


Dr. Charles Majkrzak

The Neutron Scattering Society of America (NSSA) established the Clifford G. Shull Prize in Neutron Science to recognize *outstanding research in neutron science and leadership promoting the North American neutron scattering community*. The prize is named in honor of Prof. Clifford G. Shull, who received the Nobel Prize in 1994 with Prof. Bertram Brockhouse for seminal developments in the field of neutron science. The establishment of the prize was announced at the inaugural American Conference on Neutron Scattering (ACNS) in 2002.

The nominations were reviewed by a committee of experts in the field of neutron science and the NSSA is pleased to announce that the recipient of the 2016 Shull Prize is **Dr. Charles Majkrzak,** National Institute of Standards and Technology, Gaithersburg, MD. The prize and $5000 honorarium will be awarded at the 2016 ACNS in Long Beach, CA, July 10-14, 2016 (http://www.mrs.org/acns-2016).

"*I am very grateful to receive the Clifford G. Shull Prize,*" said Chuck Majkrzak. "*which really is due to the contributions of my many colleagues and collaborators over the years*."

Dr. Majkrzak is recognized for his creativity in the development of neutron optical and polarizing devices, for the design of sophisticated instrumentation for neutron reflectometry, and for his significant contributions to the complex formalism for interpreting scattering from surfaces and interfaces. He has applied these methodologies to emerging materials of fundamental and technological importance including magnetic nanostructures, block co-polymer films, and biological membranes. In addition, his generous advice and outreach to the scientific community have greatly advanced the effective use of reflectometry methods.

Dr. Majkrzak has made significant contributions to the investigations of ternary rare earth alloys, paramagnetic nickel, amorphous ferromagnetic alloys, and magnetic nanostructures. In the mid 1980’s he led a seminal study on Gd/Y superlattices that revealed unexpected oscillatory exchange coupling across non-magnetic layers. This research provided a context for interpreting giant magnetoresistance (GMR) in transition-metal multilayers, a phenomenon that revolutionized magnetic recording.

Dr. Majkrzak has also advanced reflectometry applications in soft matter. Soon after building the first NIST reflectometer, he and his associates performed classic experiments on the surface-induced ordering of block copolymers and pioneered the use of neutron reflectivity to characterize the interactions between proteins and biological membranes. Realizing that the inherent phase ambiguity in any scattering experiment can lead to erroneous results with standard refinement techniques, Dr. Majkrzak led an effort that resulted in a straightforward method to directly invert reflectivity data into real space structure. The resulting protocol has proven to be of immense importance to neutron reflectivity studies of unknown structures.

Dr. Majkrzak’s efforts to advance reflectometry measurement technology continue to this day with his development of a new multi-wavelength reflectometer, CANDOR. This instrument will be unique in the world and promises to boost data collection rates for specular reflectivity possibly by an order of magnitude over current reflectometers at the NCNR. This concept can be readily adapted to other instrument classes and has the potential to revolutionize neutron measurements at steady state sources.

Dr. Majkzak received his PhD from the University of Rhode Island in 1978. He was a staff scientist at the HFBR at Brookhaven National Laboratory from 1978-1987 and became a staff scientist at the NIST Center for Neutron Research in 1987. Since 1997, he has served as the Leader of the Surfaces and Interface team. He received the Department of Commerce Silver Medal in 1993 and 2004, and the Gold Medal in 1999. Dr. Majkrzak was appointed a NIST Fellow in 2007, and received NIST’s highest honor for measurement science, the 2013 Allen V. Astin Award, for his “leadership in the development and application of neutron reflectometry methods.” The American Crystallographic Society recognized his accomplishments with the Bertram E. Warren Diffraction Physics Award in 2006, which is given for important contributions to the physics of solids or liquids using x-ray, neutron, or electron diffraction techniques.

Prof. Pengcheng Dai

Rice University

is the recipient of the

2016 Sustained Research Prize

of the Neutron Scattering Society of America (NSSA) with the citation

"For his sustained and foundational contributions which have elucidated the magnetic properties of iron-based superconductors, cuprates, and other correlated electron materials."

Prof. Pengcheng Dai

The Neutron Scattering Society of America (NSSA) established the Sustained Research Prize to recognize a *sustained contribution to a scientific subfield, or subfields, using neutron scattering techniques, or a sustained contribution to the development of neutron scattering techniques*. The primary consideration shall be an enduring impact on science. Preference shall be given to applicants whose work was carried out predominantly in North America.

The nominations were reviewed by a committee of experts in the fields to which neutron scattering contributes and the NSSA is pleased to announce that the 2016 recipient of the Sustained Research Prize is **Prof. Pengcheng Dai** of Rice University. The prize and $2500 honorarium will be awarded at the 2016 ACNS in Long Beach, CA, July 10-14, 2016 (http://www.mrs.org/acns-2016/).

Over the past twenty years, Prof. Pengcheng Dai has used neutron scattering techniques to make fundamental contributions to our understanding of the magnetic properties of highly correlated electronic materials, particularly in the case of iron-based superconductors. Starting as a postdoc and later as staff scientist, working with Dr. Herb Mook at Oak Ridge National Laboratory, Prof. Dai made important discoveries in the magnetic properties of copper oxide high-temperature superconductors. He demonstrated the presence of incommensurate spin fluctuations in $YBa_2Cu_3O_{6+x}$, the "123" system, observed the resonant spin excitations, studied their response to applied magnetic fields, and provided an overall characterization of the energy and wave vector dependence of the magnetic excitations in the 123 compounds.

During this time at Oak Ridge, Prof. Dai also made important contributions elucidating the role of magnetism in other strongly correlated systems. His work on polarons and spin wave excitations and their evolutions with doping provided new insight into the spin-lattice coupling underlying colossal magnetoresistance in manganites. And his investigations of heavy Fermion compounds exhibiting non-Fermi-liquid behavior have identified the presence of a quantum critical point in several families of *f*-electron systems.

After moving to the University of Tennessee, Prof. Dai started comprehensive investigations of the electron-doped cuprates, which has resulted in a deeper understanding of the comparison between the hole- and electron doped materials. His contributions include the discovery of the resonant magnetic excitation in the electron doped compounds, a detailed microscopic explanation of the origin of the annealing process necessary to induce superconductivity in these compounds, and studies of the coupling of electronic to magnetic excitations. With this work, Prof. Dai has contributed to a comprehensive picture of the universal features of the spin excitations in different classes of copper oxide superconductors.

Most recently, Prof. Dai's investigations provided foundational insight into the interplay between magnetism and superconductivity in iron-based materials. His group was first to establish that superconductivity in these compounds emerges from an antiferromagnetic state, with many similarities to the cuprates suggesting an unconventional pairing mechanism involving spin fluctuations. This sparked enormous, ongoing research efforts world wide, including many neutron scattering studies, and making the initial article showing these result a current classic within only a year after publication. Prof. Dai then mapped out the electronic phase diagrams and determined the evolution of the spin excitations upon hole and electron doping in several families of iron pnictide and chalcogenide superconductors. Through these studies, Prof. Dai made many important contributions, including the complete determination of the effective exchange coupling in the parent compounds, discovery of the dispersion in the resonant spin excitations, and resolving the effects of magnetic fields on the resonant excitations.

Prof. Dai received his PhD form the University of Missouri in 1993. He then moved to Oak Ridge National Laboratory, first as postdoc before becoming Staff Member in the Solid State Division. He then became Associate and Full Professor of Physics at the University of Tennessee, and in 2008 was awarded the Chair of Excellence from the Joint Institute for Advanced Materials. Since July 2013, he is Professor of Physics at Rice University. Prof. Dai is elected Fellow of the American Association for the Advancement of Science and the American Physical Society. He received the U.S. Department of Energy Outstanding Scientific Accomplishment Award in 1998.

Dr. Yun Liu

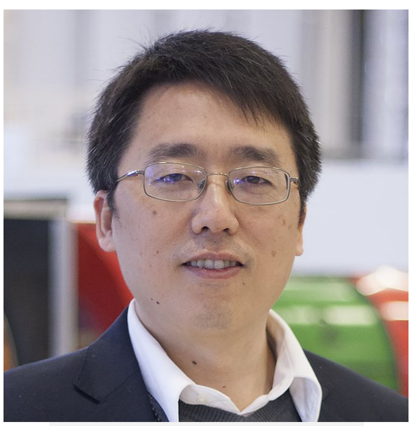
National Institute of Standards and Technology
& University of Delaware

is the recipient of the

2016 Science Prize

of the Neutron Scattering Society of America (NSSA) with the citation

"For the discovery of dynamic cluster ordering in complex colloidal systems using neutron scattering"



Dr. Yun Liu

The Neutron Scattering Society of America (NSSA) established the Science Prize to recognize a *major scientific accomplishment or important scientific contribution within the last 5 years* using neutron scattering techniques. Nominees must be within 12 years of receiving their PhD degree. Preference shall be given to applicants whose work was carried out predominantly in North America.

The nominations were reviewed by a committee of experts in the scientific areas to which neutron scattering contributes, and the NSSA is pleased to announce that the 2016 recipient of the Science Prize is **Dr. Yun Liu** of the University of Delaware and the National Institute of Standards and Technology Center for Neutron Research. The prize and $2500 honorarium will be awarded at the 2016 ACNS in Long Beach, CA, July 10-14, 2016 (http://www.mrs.org/acns-2016/).

Colloidal systems are found throughout nature and pervade our daily lives. They are used in foods, paints, personal-care products, biological systems such as blood or cellular components, and modern composite materials. The physics of these systems is typically dominated by very large surface areas, which amplify the importance of surface forces and thermal fluctuations. In the concentrated systems typical of most real-world applications, the underlying interactions usually exhibit many-body effects. Moreover, the geometry of the constituent "particles" can differ markedly from that of the uniform spheres that are usually invoked to model these systems. Dr. Yun Liu has performed ground-breaking research that greatly expands our understanding of colloidal systems well beyond those that can be described by simple models to complex fluids that are far more representative of those found in nature or used in industrial processes. In the process, he discovered dynamic clusters in concentrated protein solutions and related these to previously unexplained changes in viscosity that have profound implications for the production, purification, and administration of biopharmaceutical formulations.

Dr. Liu received his PhD in 2005 from Massachusetts Institute of Technology and is a Research Associate Professor at the University of Delaware in the Department of Chemical & Biomolecular Engineering since 2014, where he also holds an affiliated Research Professorship in the Department of Physics and Astronomy. Dr. Liu is currently a Staff Scientist in the SANS/uSANS team, NIST Center for Neutron Research.

Dr. P. Douglas Godfrin

University of Delaware

is the recipient of the

2016 Prize for Outstanding Student Research

of the Neutron Scattering Society of America (NSSA) with the citation

"For seminal neutron scattering studies of concentrated protein solutions and protein dynamics with application to biopharmaceutical engineering."

Dr. P. Douglas Godfrin

The Neutron Scattering Society of America (NSSA) established the Prize for Outstanding Student Research to recognize *outstanding accomplishments in the general area of neutron scattering by graduate or undergraduate students who have performed much of their work at North American neutron facilities.* Nominees must be either current graduate students or scientists within two years of receiving their PhD.

The nominations were reviewed by a committee of experts in the field of neutron science and the NSSA is pleased to announce that the recipient of the 2016 Prize for Outstanding Student Research is **Dr. P. Douglas Godfrin,** PhD from the University of Delaware, and currently a postdoctoral associate at MIT. The prize and $1000 honorarium will be awarded at the 2016 ACNS in Long Beach, CA, July 10-14, 2016 (http://www.mrs.org/acns-2016/).

Concentrated protein solutions present challenges for formulators of biopharmaceuticals as well as scientists investigating the cellular environment. A key scientific question in modern protein science concerns protein structuring in concentrated solutions and how this organization arises from molecular association to lead to anomalous transport properties. A signature feature of Dr. Godfrin's investigations into concentrated protein solutions is the combination of SANS/USANS to determine solution microstructure, with complementary measurement of the dynamics in these concentrated solutions by neutron spin echo. Combined with theory and simulation, Dr.

Godfrin was able to directly probe a new liquid state of matter, the clustered fluid, discovered both experimentally and theoretically within the past 20 years, and showed how this is relevant to our understanding of the stability and transport properties of concentrated protein solutions. Furthermore, Dr. Godfrin performed these experiments on globular protein solutions, which can be successfully used to test and validate our theoretical understanding of cluster liquids, as well as on model monoclonal antibodies provided by Genentech, which are directly relevant for biopharmaceuticals used for oncology treatment. In achieving these results, Dr. Godfrin collaborated with experts in simulation methods and fundamental theory to develop a new, universal state diagram that extends the Noro-Frenkel law of corresponding states to systems with competing short-range attraction and long-range repulsive interactions. In his doctoral research, which was conducted in part at the NIST Center for Neutron Research, Dr. Godfrin also contributed to the development of the novel 1-2 plane flow SANS sample environment commissioned both at the NCNR and ILL, Grenoble France. This unique sample environment enables directly probing the microstructure via SANS in shearing samples in the plane of shear.

Dr. Godfrin graduated from the University of Delaware in June of 2015, and is currently a Postdoctoral Associate at the Massachusetts Institute of Technology. His current interests include developing pharmaceutical formulations for encapsulation of monoclonal antibodies and hydrophobic small molecule drugs in hydrogel beads to control crystal size and bead morphology in order to engineer a specific drug release profile.