The Neutron Scattering Society of America

http:///www.neutronscattering.org

The Neutron Scattering Society of America is pleased to announce the 2024 recipients of its four major prizes.

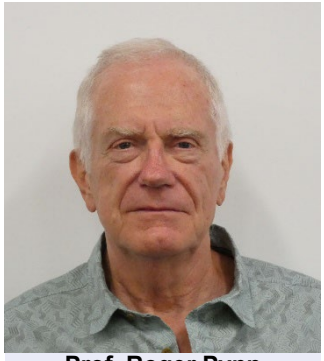
Professor Roger Pynn
Indiana University

is the recipient of the

2024 Clifford G. Shull Prize

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

"For his extraordinary contributions to science, advancing neutron scattering methodology, and educational outreach, as well as for his stewardship of neutron scattering facilities and fostering the growth of the neutron scattering community in North America through his leadership and dedication."



Prof. Roger Pynn

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 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 2024 Shull Prize is Professor Roger Pynn, of Indiana University. The prize and a $5000 honorarium will be awarded at the 2024 ACNS in Knoxville, TN, June 23-27, 2024 (https://ceramics.org/event/american-conference-on-neutron-scattering-acns-2024/).

With a career spanning over five decades, Professor Pynn has left an indelible mark on both fundamental research and methodological advancements in neutron scattering. His leadership roles at prestigious institutions such as Brookhaven National Laboratory, the Institute Laue-Langevin

in France, and the Lujan Neutron Scattering Center at Los Alamos National Laboratory attest to his significant impact in the field.

During his tenure at Brookhaven National Laboratory, Professor Pynn studied a variety of topics at the Brookhaven High Flux Beam Reactor which included the study of phonons in solid argon and phase transitions to support the work on Renormalization Group Theory. In 1975, he moved to the Institut Laue-Langevin (ILL) as a staff scientist, where he continued to work on phase transitions, magnetism, magnetic superconductors, and fractal systems. Professor Pynn is instrumental in discovering the existence of the magnetic solitons in 1-dimensional ferromagnets and discovered nonlinear excitation modes in a planar antiferromagnet. He started to explore his love of neutron instrumentation at the ILL by designing and building the world's first polarized-neutron triple axis neutron spectrometer which has enabled many studies of magnons and magnetic fluctuations in solids.

During his tenure at Los Alamos National Laboratory (LANL), Professor Pynn directed the Lujan Neutron Scattering Center. In this role, he pioneered new research programs in engineering diffraction, high pressure science and soft matter science. He was instrumental in the expansion of the Lujan Center by adding a new experimental hall, an office building, and three novel neutron spectrometers. He also wrote the quintessential Neutron Scattering Primer that has been a staple for students learning neutron scattering techniques and is used today for many of the neutron scattering schools and classes across the country. As Los Alamos Neutron Science Center (LANSCE) Division Director from 1997-2000, Pynn developed a simple implementation of the Neutron Spin Echo (NSE) technique that uses thin magnetic films that can be used to probe structural correlations in materials up to a range of 200 nm.

Professor Pynn is currently at the Indiana University where he continues to advance neutron scattering techniques. His research now focuses on novel methods for neutron scattering and developing a new beam line at the Low Energy Neutron Source (LENS) and using neutron scattering to study macromolecular systems and layered magnetic materials.

Professor Pynn received both his BA and PhD degrees from the University of Cambridge where he first started his neutron scattering career under the guidance of Dr. G. L. Squires. He is a fellow of many societies including the Neutron Scattering Society of America, American Physical Society, and American Society for the Advancement of Science. He has won the Los Alamos National Laboratory Women's Career Development Mentoring Award (2001) and the Gunnar Randers Research Prize (2009).

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Dr. Julie Borchers
NIST Center for Neutron Research

is the recipient of the

2024 Sustained Research Prize

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

"For groundbreaking contributions to understanding the structure and behavior of magnetic nanostructures using neutron techniques, and for exceptional service to the scientific community."

Dr. Julie Borchers

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 is an enduring impact on science. Preference is given to nominees 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. The NSSA is pleased to announce that the 2024 recipient of the Sustained Research Prize is Dr. Julie Borchers of the NIST Center for Neutron Research. The prize and $2500 honorarium will be awarded at the 2024 ACNS in Knoxville, TN, June 23-27, 2024 (https://ceramics.org/event/american-conference-on-neutron-scattering-acns-2024/).

Dr. Borchers is a Senior Research Scientist at the NIST Center for Neutron Science (NCNR) and the associate director of CHRNS, a partnership between NIST and the National Science Foundation which develops and operates neutron scattering instruments for use of the general scientific community. For 30 plus years, she has tirelessly promoted neutron scattering and provided excellent support for magnetism and materials communities. Dr. Borchers and her team have engaged potential users, both domestic and abroad in design of neutron experiments. She has focused on materials that push the capabilities of neutron scattering instruments. Dr. Borchers has also worked tirelessly to expand and diversify the neutron scattering community in North America by attracting dozens of scientists to work with her, and as a mentor.

Dr. Borchers has pioneered innovative uses of neutron scattering techniques to unravel complex magnetic structures in thin films, layered materials, and nanoparticles. A prime example is her major contribution to the understanding of the exchange mechanism responsible for giant magnetoresistance (GMR). Dr. Borchers and her collaborators also pioneered the use of polarized small-angle neutron scattering (SANS) methods to obtain new insights into the exchange, dipolar, and surface anisotropy interactions in nanoparticles and the resulting modifications of the magnetic spin ordering and transition temperatures. They showed that magnetite nanoparticles develop a magnetic core-shell structure in the presence of a magnetic field below the Curie temperature of discrete nanoparticles and that the spins in the core align as in bulk magnetite while those in the shell are canted relative to the core spins. In recent years, Dr. Borchers has contributed to advancing magnetic skyrmions—a topologically robust class of spin configuration—from a theoretical curiosity to a technologically relevant means of information storage. In collaboration, Dr. Borchers used neutron scattering to characterize ordering in early artificial skyrmion lattices, demonstrate skyrmion order in disordered polycrystalline systems, and discover emergent long-range fractal order in a skyrmion system.

Dr. Borchers earned her Ph.D. at the University of Illinois: Urbana Champaign in 1990. She joined the staff at the National Institute of Standards and Technology (NIST) in 1989 as a research physicist. She was recognized with a Department of Commerce Bronze Medal in 2011 for her work on magnetic nanoparticles and nanowires. She has also been awarded the NIST Diversity Award for her role in the Summer High School Internship program, and the NIST Distinguished Mentor Award. She is a fellow of the Neutron Scattering Society of America, American Physical Society and was a National Research Council Fellow from 1989 through 1991.

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Professor Dustin Gilbert
University of Tennessee, Knoxville

is the recipient of the

2024 Science Prize

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

"For creative and novel neutron scattering experiments to investigate magnetic skyrmions in thin films."

Prof. Dustin Gilbert

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 2024 recipient of the Science Prize is Professor Dustin Gilbert of the University of Tennessee, Knoxville. The prize and $2500 honorarium will be awarded at the 2024 ACNS in Knoxville, TN, June 23-27, 2024 (https://ceramics.org/event/american-conference-on-neutron-scattering-acns-2024/).

Professor Gilbert is well known for his research on characterizing the skyrmions, topologically stable spin vortices, in thin films using neutron scattering toward the goal of realizing the potential of utilizing skyrmions for spintronics applications. He is one of the leading researchers probing advanced materials with a particular emphasis on advanced neutron and synchrotron scattering techniques. In a short time, he established a dynamic group at the University of Tennessee, Knoxville, which has made fundamental and important discoveries that probe spin phenomena in nanostructured materials. Professor Gilbert's research successfully combines synthesis of thin film materials and transport measurements with advanced techniques at national user facilities.

In 2019, Professor Gilbert led a research project that provided the first successful use—and by far the best demonstrated case—of neutron scattering to observe magnetic skyrmions in thin films. These films of Gd/Fe multilayers were proposed to harbor skyrmions, and small-angle neutron scattering (SANS) was used to confirm this structure. However, there is no initial long-range ordering of the skyrmions, and all the measurements revealed a ring, which can be representative of many varied systems. Gilbert's unique background—in particular his work "Precipitating Ordered Skyrmion Lattices from Helical Spaghetti" Physical Review Materials 3, 014408 (2019)—motivated him to twist their sample in a magnetic field, realizing long-range ordering of the skyrmions.

Professor Gilbert then led a series of follow-up experiments, performing grazing incidence SANS to determine the 3D structure of these materials, adding time-resolved SANS to investigate the kinetics of ordering in the skyrmion lattice, and culminating in in-situ ferromagnetic resonance SANS (FMR-SANS). While all these efforts give new insight into the skyrmion system and advance neutron scattering, the FMR-SANS work in-particular elucidates the much broader field of magnetic dynamics and spin waves and advances SANS as a technique to investigate structure in dynamic systems. Professor Gilbert and his team used SANS in combination with dynamically exciting the skyrmions with an in-situ gigahertz excitation setup. This allowed them to excite the magnetic dynamics while performing SANS, capturing the structure of the excited skyrmions and the skyrmion lattice, but also the structure of the spin waves that were emitted during this process. These spin waves form a unique fractal structure that is highly sensitive to the details of the excitation and lattice structure, qualities which allow it to be used for neuromorphic systems.

Professor Gilbert earned his Ph.D. from the University of California, Davis in 2014, and was awarded an NRC postdoctoral fellowship at the NIST Center for Neutron Research. In 2018, he joined the faculty at the University of Tennessee, Knoxville, where he remains today. He has received several awards recognizing his research, including the Department of Energy Early Career Award in 2020 and the University of Tennessee, MSE Faculty of Excellence in Research award in 2021 and MSE Faculty of Excellence in Teaching award in 2019.

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Dr. Evan Smith
McMaster University
(now ETH Zurich in Switzerland)

is the recipient of the

2024 Prize for Outstanding Student Research

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

"For outstanding, rigorous, and comprehensive studies of frustration in magnetic materials using neutron scattering, leading to the elucidation of spin ice physics in cerium-based pyrochlores."

Dr. Evan Smith

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 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 2024 Prize for Outstanding Student Research is Dr. Evan Smith from McMaster University (currently at the Swiss Federal Institute of Technology Zurich (ETH Zurich)). The prize and $1000 honorarium will be awarded at the 2024 ACNS in Knoxville, TN, June 23-27, 2024 (https://ceramics.org/event/american-conference-on-neutron-scattering-acns-2024/).

Dr. Smith performed excellent work as a student specifically in quantum and frustrated magnetism, with broad and high-level experience in neutron scattering studies of static and dynamic properties of materials with exotic magnetic ground states. Dr. Smith's research focused on experimental studies of the dipole-octupole pyrochlore magnet $Ce_2Zr_2O_7$, and the determination of its ground state as a quantum spin ice.

Dr. Smith's multiple papers describe sample preparation and single crystal growth of $Ce_2Zr_2O_7$, low temperature characterization of the single crystals of $Ce_2Zr_2O_7$ using heat capacity and magnetic susceptibility, elastic and inelastic neutron scattering from single crystals and powder

samples of $Ce_2Zr_2O_7$, and the sophisticated theoretical analysis of this data such that definite conclusions as to the quantum spin ice ground state selection of $Ce_2Zr_2O_7$ could be established. Dr. Smith played the leadership role in this overall body of work. He was the lead on the materials preparation, including participating in the single crystal growth of $Ce_2Zr_2O_7$ samples as well as performing the careful annealing of each sample in reducing atmospheres in preparation for each experimental characterization.

Dr. Smith was the lead investigator on the neutron experiments performed at Oak Ridge National Laboratory, NIST Center for Neutron Research and ISIS Neutron and Muon Source at Rutherford Appleton Laboratory. He was adept at handling instrument setup and data analysis. His meticulous attention to detail in sample preparation, including oriented cuts and precise mounting, was pivotal to the success of the experiments.

Dr. Smith obtained his Bachelor of Science from McMaster University in 2017 and his PhD from McMaster University in 2023. He is currently a postdoctoral fellow at the Swiss Federal Institute of Technology Zurich (ETH Zurich) working with Professor Andrey Zheludev, focusing on experimental condensed matter physics. Dr. Smith was awarded the 2024 APS GMAG Student Dissertation Award.