The Neutron Scattering Society of America

http:///www.neutronscattering.org

Prof. Martin Mourigal
Georgia Institute of Technology

is the recipient of the

2022 Science Prize

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

"For significant and insightful use of neutron inelastic scattering in the study of quantum materials."

Prof. Martin Mourigal

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. 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. The NSSA is pleased to announce that the 2022 recipient of the Science Prize is Prof. Martin Mourigal of the Georgia Institute of Technology. The prize and $2500 honorarium will be awarded at the 2022 ACNS in Boulder, CO, which will take place June 5-9, 2022 (https://www.mrs.org/acns-2022).

Prof. Martin Mourigal is an associate professor in experimental quantum condensed matter in the School of Physics at Georgia Tech. He is widely known for his research on novel magnetic quantum materials. He uses neutron scattering to characterize the magnetic fluctuations and the short- and long-range magnetic order in these materials to gain insight into the underlying quantum behavior. His recent work has revived worldwide interest in the physics of the triangular lattice antiferromagnet. In 2016, he and his team published a detailed neutron scattering investigation of $YbMgGaO_4$ that identified the crucial role chemical disorder plays in defining the excitations on the triangular lattice. This model system was proposed theoretically by Phil Anderson in 1972 to exhibit a quantum spin liquid (QSL) ground state. Despite extensive experimental and theoretical work since this time, it wasn't until Mourigal's recent investigations that we now have appropriate boundary conditions for the triangular lattice

to determine which real materials can be considered as physical manifestations of the exotic QSL state and to what extent disorder serves to mask quantum behavior.

Mourigal's work has made it clear that while a continuum of magnetic excitations is characteristic of a QSL ground state this property alone is not sufficient to prove the existence of such a state. The use of quantum materials for applications in quantum information science requires increased understanding of entangled states and how they behave in real materials. As part of this endeavor, Mourigal and his students have focused on examining the spin dynamics of spin-1 SU(3) magnets with proposed Kitaev-like interactions. This resulted in a recent project that pushed the boundaries of both neutron scattering measurement and theoretical modeling to understand the influence of spin-orbital physics in the triangular magnet FeI_2.

Mourigal and his collaborators also observed a set of quadrupolar spin excitations that ordinarily should not be observable using neutron scattering techniques. They were able to explain that these excitations were visible due to the coupling of the spin and orbital degrees of freedom. This discovery of hybridization between dipolar and quadrupolar modes has solved a 40-year-old mystery about why these excitations exist in this compound. This work will remain a longstanding contribution in the fields of neutron scattering and quantum materials due to its high-quality data as well as the high level of sophistication used to theoretically model the results.

Mourigal received his MSc and PhD Degrees from École Polytechnique Fédérale de Lausanne (EPFL) in Switzerland for graduate work conducted at the Institut Laue Langevin in Grenoble, France. Following a postdoctoral stint at Johns Hopkins University, he joined the faculty at Georgia Tech in 2015 and was promoted to associate professor in 2020. Mourigal received the NSF CAREER award in 2018. At Georgia Tech, he received the Sigma Xi Young Faculty Award, the Cullen-Peck Faculty Scholar Award, and the Junior Faculty Teaching Excellence Award.