Quantum Science & Engineering Center

QSEC Colloquium Seminar Series

Dr. Steven Rayan

Department of Mathematics and Statistics

University of Saskatchewan

New approaches to quantum matter from hyperbolic geometry

Tuesday, April 13, 2021 | 12 – 1 PM | Zoom

Abstract

While a new quantum revolution is rapidly taking shape, a lack of next-generation materials threatens to halt the realization of various new quantum technologies. One source of inspiration for new materials is geometry. In our everyday lives, geometry is inseparable from the visual world. We have come to understand, however, that nature leverages geometry at other length scales. In particular, the last few decades have seen the dawn of a new age of "quantum matter" in which topology and geometry play a key role at microscopic scales. A good understanding of how geometry manifests here leads to the potential for new materials and physical systems that leverage more exotic, hyperbolic geometries. This is not only an opportunity for pure mathematicians to interact with physics, material science, and quantum technology in new ways, but also to reconsider how we engineer and print materials at nanoscales.

Speaker's Bio

Steven Rayan is an Associate Professor of Mathematics at the University of Saskatchewan, having received his doctoral degree from the University of Oxford in 2011. He is principally a geometer but is also interested in algebra and representation theory and how all of these areas connect to physics. He is the founding director of the Centre for Quantum Topology and Its Applications (quanTA), which is based at several universities in the west of Canada. The centre is a Pacific Institute for the Mathematical Sciences Collaborative Research Group and a member of the NSF-supported Geometry Labs United network. He holds a Natural Sciences and Engineering Research Council of Canada Discovery Grant (2017), a New Frontiers in Research – Exploration Grant (2018), and a Canada Foundation for Innovation John R. Evans Leaders Fund award (2020). Currently, he and his collaborators are trying to understand the role of algebraic geometry in condensed matter physics.

Meeting Information

Join Zoom Meeting ID:609 431 5466 https://gmu.zoom.us/j/6094315466

About the Seminar Series

The QSEC Colloquium Seminar Series is a series of working seminars organized and hosted by QSEC's Quantum Computing Group every Tuesday. These events are free and open to the public. For any questions, contact qsec@gmu.edu.