

Department of
Materials Science and Chemical Engineering

Departmental Colloquium

Friday, November 9, 2018, 1:00 – 2:00 PM
Room 301 Engineering Bldg.

Dr. Qiang Li

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Group Leader*

*of Condensed Matter Physics and
Materials Science Division
Brookhaven National Laboratory*



Title: Chiral Materials for Efficient Charge Transport and Quantum Computing

Chiral materials, which include 3D Dirac/Weyl semimetals, are the materials hosting chiral fermions having a linear dispersion. The powerful notion of chirality – the definitive projection of spin on momentum direction – underpins a wide palette of new and useful phenomena, enabling chiral charges, provided chirality is conserved, to travel without resistance, like Cooper pairs in superconductors. In this colloquium, I will report the recent discovery of the chiral magnetic effect in 3D Dirac/Weyl semimetals, accentuate the similarities and differences between the chiral magnetic effect and conventional superconductivity. Finally, I will discuss the detection and manipulation of Weyl fermions by optical means, and the potentials of constructing chiral qubits for quantum computing.

About the Speaker:

Dr. Qiang Li received his Ph.D. in physics from Iowa State University. He then joined the Condensed Matter Physics and Materials Science Division at Brookhaven National Lab, where he is now a tenured Physicist and the Advanced Energy Materials Group Leader. His research interests range from basic physics and material sciences of quantum electronic materials to their applications. At Brookhaven, he led several US Department of Energy projects on high temperature superconductors for grid scale energy storage, wind power generation, and next generation electrical machine, as well as thermoelectric materials research and applications for waste heat recovery in vehicles. Recently, he has been interested in chiral materials and unconventional superconductivity. He is a Fellow of American Physical Society, and an adjunct professor of MSCE at Stony Brook University.

Refreshment will be served 12:15 – 1 pm outside of the colloquium room.