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MAGNETIC MONOPOLES, LANDAU LEVELS, AND BOSONIC QUANTUM HALL EFFECT

Andrew Liebzig and Theja De Silva

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Magnetic Monopoles, Landau Levels, and Bosonic Quantum Hall Effect

Presenter(s): Andrew Liebig

Author(s): Andrew Liebig and Theja De Silva

Faculty Sponsor(s): Theja De Silva, PhD

Affiliation(s): Department of Chemistry and Physics (Augusta Univ.)

ABSTRACT

Magnetic monopole existence is not ruled out by theories, however unlike single charges they do not exist in free space. Recently, pairs of magnetic monopoles have been detected in spin-ice materials as quasi-particle excitations. Manipulation of magnetic monopoles in materials can have modernized technological applications. We study a possible realization of two-dimensional magnetic monopole system and show the existence of Landau levels. Even though magnetic monopoles are bosonic particles in quantum mechanical nature, we show that integer quantum Hall effect can be realized in magnetic monopole systems under the presence of a magnetic field.

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Correspondence: Andrew Liebig, Augusta University, 1120 15th St. Augusta, GA 30912, aliebig@augusta.edu