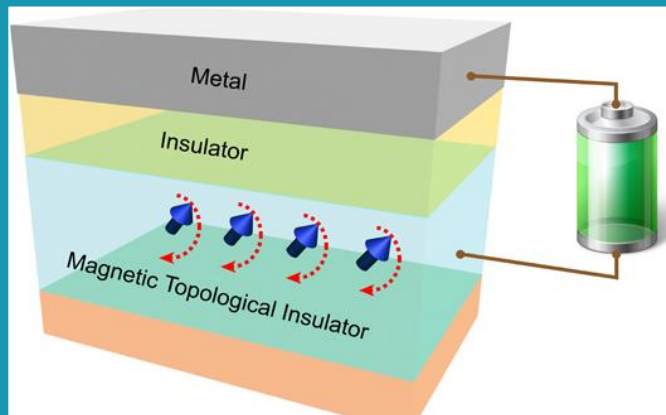


UCCS Department of Mathematics  
**Math Colloquium Series**

**JUSTIN COLE**

UNIVERSITY OF COLORADO AT BOULDER



DATE:

JANUARY 30, 2020

TIME:

12:30PM-1:30PM

(REFRESHMENTS AT 12:15PM)

LOCATION:

UC 122

## Discrete Approximation of Topological Insulators in Magneto-optical Media

**Abstract:** The field of topological insulators spans multiple physical and is characterized by the existence of topologically protected modes which are exceptionally robust to material defects. A two-dimensional periodic array of ferrite rods with an external magnetic field applied to them is studied. The formidable nature of this problem motivates a discrete reduction through an expansion in terms of exponentially localized modes known as Wannier functions. The topological aspect of the problem prevents a direct application of the Wannier modes, so a perturbative approach is developed to find a suitable basis. The discrete model produces states which have nontrivial topological invariants called Chern numbers. Modes are found that propagate unidirectionally and do not backscatter at lattice defects. The problem requires substantial computational effort; the goal of the discrete approximation is to reduce the computation to one that can be done on a laptop. This approach offers a path to modeling, analyzing, computing and solving other topological insulators systems

For More Information please contact the UCCS Math Department at  
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