DEPARTMENT OF
PHYSICS &
ASTRONOMY

Physics & Astronomy
Colloquium

Prof. Daniel Bulmash

(host: Yun Suk Eo)

United States Naval Academy

3:30 - 4:30 p.m. | Tuesday, Sept. 16

ESB Building 120

Title: Fractons: exotic new phases of matter

Abstract: Fracton phases are extremely unusual quantum phases of matter whose existence has only been recognized within the last decade or so. They host quasiparticles that, unlike electrons in metals, cannot move in all directions of space unless they move in concert with other quasiparticles which may be very far away. This movement restriction does not occur simply for energetic reasons; instead, it arises from more fundamental restrictions like exotic conservation laws or the structure of operators in the Hilbert space. I will give an overview of these bizarre and exciting phases of matter and discuss the ways in which they deeply challenge our understanding of field theory, gauge theory, and what a phase of matter even is.

Refreshments at 3:00 p.m. | ESB 120

Biography

Prof. Daniel Bulmash received his bachelor's in physics and mathematics from MIT in 2012, and his Ph.D. in physics in 2017 from Stanford University under the supervision of Prof. Xiao-Liang Qi. He then worked as a postdoc at the University of Maryland and University of Colorado Boulder. He joined the United States Naval Academy as an assistant professor of physics in 2023. Prof. Bulmash is a theoretical condensed matter physicist, with expertise in topological phases and especially anyons and fractons.