

# East Carolina University®

## Department of Physics

### Colloquium

Friday, October 18th, Room N109, Howell Science Complex  
3:15 p.m. (Refreshments at 3:00 p.m.)

**Professor Joshua Socolar**  
**Duke University**

### *Quasicrystalline Structure of the Spectre and Hat Tilings*

Abstract:

Nonperiodic tilings of the plane can serve as models for quasicrystalline structures in much the same way that regularly repeating patterns of unit cells serve as models for crystal structure. The discovery (by Smith et al.) in 2023 of a single tile shape, dubbed the “hat”, and their subsequent discovery of the “spectre”, both of which can fill space only in a nonperiodic pattern, suggest the possible existence of solid materials that exhibit the exotic types of spatial structure they create. But what type of order is it, exactly? And how might such a phase of matter self-assemble? I will review the essential geometric features of these tilings, show the key features of its diffraction pattern, and discuss the nature of so-called “phason” degrees of freedom that will come into play during the formation of a material. The talk will be suitable for those with no prior knowledge of quasicrystal physics or tiling theory.

WebEx Link: <https://ecu.webex.com/ecu/j.php?MTID=m597b61dec85df5a0e1e21138fe56cd86>

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