

# Dr. Viktoriia Savchuk

*Cornell University / JILA*

**Friday, October 17, 11:00 am. Osborne A204**

## **Topological surface waves in magnetized graphene**



Graphene exhibits unique optical properties under an external magnetic field. It supports optical modes known as magnetoplasmons which are transversally confined to the graphene layer. Unlike conventional graphene plasmons, these surface waves are topological and characterized by a band gap that corresponds to the cyclotron frequency. Previous studies have primarily focused on the topological characteristics of bulk and edge graphene magnetoplasmons within the semiclassical regime (Drude model), where only intraband transitions are considered. The quantum regime—where both intraband and interband transitions are significant—remains largely unexplored. In this talk, I will discuss the topologically protected edge modes in gated magnetized graphene in the presence of one high-frequency interband transition at the interface between two magnetic domains. I will show that in the quantum regime, the system exhibits two band gaps, each supporting a pair of topologically protected edge states, in agreement with the bulk-boundary correspondence.

### **Short Bio**

Viktoriia Savchuk received her BSc in Applied Physics from Taras Shevchenko National University of Kyiv in 2017 and earned her PhD in 2022 from the University of Colorado Colorado Springs, where she worked in Prof. Pinchuk's group on the theoretical and experimental study of the hybrid plasmonic nanoparticles for biomedical applications. In Spring 2023, she joined Prof. Shvets' group at Cornell University as a postdoctoral associate, focusing on the topological properties of plasmonic surface waves in magnetized graphene. In July 2025, Viktoriia began a new postdoctoral position at JILA, where her research centers on developing and applying single-molecule microscopy to investigate the folding and hybridization kinetics of RNA and DNA under extreme conditions.