



# University of Miami, Physics Department Colloquium

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**Date:** Wednesday, Apr 02, 2025  
**Time:** 4:00 pm – 5:00 pm  
**Location:** Wilder Auditorium – Rm 112, Knight Physics Building

## Nonequilibrium Dynamics in Ultracold Atomic Systems

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### **Abstract**

The field of ultracold atoms is among the fastest expanding fields in physics today. Experimentally, scientist can use optical techniques to trap the atoms at a temperature close to zero. Because of the cleanness and easy tunability of the system, physicists have used it to study many intriguing problems including the nonequilibrium dynamics. When a system is in equilibrium, particles stay in a state that doesn't change with time. For a nonequilibrium system, the state of the particles will evolve with time and display exotic behaviors during the dynamical process. The rich physics discovered here is found to be universal and has attracted enormous interest from a broad community including atomic, condensed matter, and high energy physics.

In this talk, I will discuss my recent works on this topic using the Gross-Pitaevskii numerical simulation tool. When applying an oscillating magnetic field to the system, the interactions between Bose atoms will periodically change with time. We find that this leads to the formation of 'Bose fireworks' which has a rich and informative structure. When the trap potential confining the atoms is modulated, an effective band structure will occur and we discover that Bose atoms will evolve towards the 'ground state' through a highly nontrivial pathway. These findings not only lead to our proposal of a new imaging method to probe the Bose system, but also reveal the mechanisms behind various interesting phenomena such as thermalization of many-body systems which is of central interest in the current physics field.

### **Biography**

Han Fu currently is an assistant professor of physics at the Florida Atlantic University. She got her BS from Peking University in 2012 and did her PhD with Boris Shklovskii at University of Minnesota from 2012 to 2017. After then she did her first postdoc with Kathryn Levin at UChicago and second postdoc with Enrico Rossi at William and Mary. Her research fields include transport in disordered semiconductor systems, planar Josephson junctions, and dynamics of cold Bose atoms.