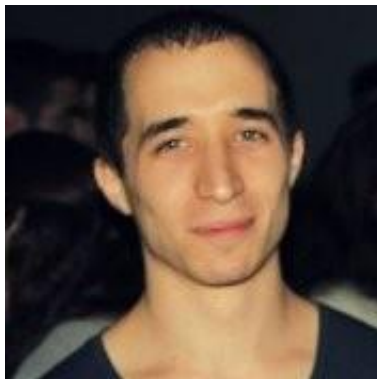


*Phase Retrieval of Vortices in Bose-Einstein Condensates***Ron Ziv***Technion- Israel Institute of Technology***Friday, May 13, 2022, BRK 1001, 1:30 p.m.**

Host: Yong Chen



Bose-Einstein condensation is a quantum state of matter where particles are trapped and cooled until they form a macroscopic population in a single quantum wavefunction. Measurements of such states are performed by imaging the particles in-situ or in the “far-field”. In these measurements, one records the atoms' density. Alas, as this is a pure quantum state, it also has a well-defined phase structure, which cannot be resolved by these measurements alone. Thus, to recover the phase structure of the BEC wavefunction, interference measurements have been used, which poses an experimental challenge. This raises a natural question: Can the phase structure be recovered without atomic interference?

In this seminar I will present a measurement scheme and algorithmic method for reconstruction of the phase of a Bose-Einstein condensate from Time-of-Flight measurements. I will give background on phase retrieval in general and show the relevance to the Bose-Einstein condensate setting. Importantly, I will show how by a simple augmentation of the Time-of-Flight measurement we can reconstruct interesting and ambiguous wavefunctions containing vortices.