# Departmental Colloquium

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4 p.m.

HH3017

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## Controlling The Transverse Instability of Dark Solitons and Nucleation of Vortices by A Potential Barrier

Abstract:

We study possibilities to suppress the transverse modulational instability of dark-soliton stripes in two-dimensional Bose-Einstein condensates (BECs) and self-defocusing bulk optical waveguides by means of quasi-1D structures. Adding an external repulsive barrier potential (which can be induced in BEC by a laser sheet, or by an embedded plate in optics), we demonstrate that it is possible to reduce the MI wavenumber band, and even render the dark-soliton stripe completely stable. Using this method, we demonstrate the control of the number of vortex pairs nucleated by each spatial period of the modulational perturbation. By means of the perturbation theory, we predict the number of the nucleated vortices per unit length. The analytical results are corroborated by the numerical computation of eigenmodes of small perturbations, as well as by direct simulations of the underlying GrossPitaevskii/nonlinear Schrodinger equation.