

Nonlinear wave dynamics of cold quantum matter near atom chips

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Abstract:

In this talk, I will consider the nonlinear dynamics of ultracold atoms near atom-chip structures that are designed to enable near-surface ($< 1\mu\text{m}$) trapping and thereby offer fine spatial control of the potential landscape and atom density profile.

Firstly, I will consider the properties of the chips themselves and show, for example, how opening and closing a single quantized conductance channel in a quantum wire can split and remerge an atomic condensate.

Next, I will focus on the spatial and spin dynamics of the ultracold atom clouds and highlight the importance of the interplay between these two degrees of freedom, which can trigger the formation of complex spin textures.