

# Sommerfeld Theory Colloquium

Prof. David Nelson

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## Non-Hermitian Luttinger Liquids and Vortex Physics

As a model of two thermally excited flux liquids connected by a weak link, we describe the effect of a single line defect on vortex filaments oriented parallel to the surface of a thin planar superconductor. When the applied field is tilted relative to the line defect, the physics is described by a nonhermitian Luttinger liquid of interacting quantum bosons in one spatial dimension with a point defect. We find a delicate interplay between enhancement of pinning due to Luttinger liquid effects and depinning due to the tilted magnetic field. Interactions dramatically improve the ability of a single columnar pin to suppress vortex tilt when the Luttinger liquid parameter  $g$  is less than or equal to one. Exact results are also possible via a free fermion mapping for flux lines interacting with many columnar pins for the special case  $g = 1$ . Results inspired by magnetic force microscope experiments which tear away a flux line from various pinning structures will also be presented.

**Wednesday, 25<sup>th</sup> January 06, 11.15 h , Room 348 / 349, Theresienstr. 37 / III**