

STRUCTURES
CLUSTER OF
EXCELLENCE



UNIVERSITÄT
HEIDELBERG
ZUKUNFT
SEIT 1386

STRUCTURES JOUR FIXE

Robert L. Jerrard

Toronto

TALK HELD JOINTLY WITH THE 5TH "ANGEL" MEETING:

Vortex filament reconnection in 3D critical Abelian Higgs models

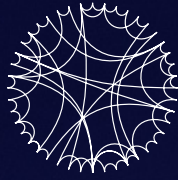
OCTOBER 16, 2026. 1:30 PM

Note the unusual venue:

Mathematikon INF 205 (Conference Room 5/100)

COFFEE & SNACKS IN ROOM 5/303

The event will not be streamed via Zoom.



STRUCTURES
CLUSTER OF
EXCELLENCE



**UNIVERSITÄT
HEIDELBERG**
ZUKUNFT
SEIT 1386

ABSTRACT

The critical Abelian Higgs model (AHM) is a system of nonlinear wave equations arising in particle physics. We construct solutions of this system in $3+1$ dimensions that exhibit a number of slowly-moving nearly parallel vortex filaments. The leading-order dynamics of this ensemble of filaments are described by a wave map into the moduli space, a manifold carrying a natural Riemannian structure that parametrizes stationary 2D solutions of the AHM. These results allow for the study of the poorly-understood phenomenon of vortex reconnection in this setting. In particular, it is shown that in the regime studied, reconnection is the generic outcome of collisions of pairs of vortex filaments. Extremely similar results are also proved for the critical Abelian Higgs heat flow, modeling certain superconductors, near-critical versions of these equations, and in higher dimensions. This work is joint with Masoud Geevechi.

Upcoming talks in this semester's STRUCTURES Jour Fixe

Visit our website for regular updates:



https://structures.uni-heidelberg.de/jour_fixe.php

