

CHAMPP CENTER IN HAMBURG FOR ASTRO-, MATHEMATICAL AND PARTICLE PHYSICS

LECTURE COURSE IN THE QUANTUM UNIVERSE RESEARCH SCHOOL

Winter Term 2024/2025

Heegaard Floer homology and applications

Jesse Cohen

Course Description:

Heegaard Floer homology is a suite of powerful invariants of 3-manifolds, and cobordisms between them, constructed using symplectic geometric techniques. These invariants also have variations for knots in 3-manifolds — which one can think of as a highly information-rich refinement of the Alexander polynomial — and for 3-manifolds with boundary. This course will serve as an introduction to Heegaard Floer homology and its variations with an emphasis on applications and modern computational techniques. Time permitting, we will also cover a combinatorial realization of Heegaard Floer homology for manifolds with torus boundary as immersed curves in the punctured torus.

Prerequisites:

basic algebraic and differential topology. Some knowledge of Morse theory or symplectic geometry is helpful, but not required.

Literature:

No textbook required.

Date and Place: Problem Classes: Starting on: Mon, 10:15–11:45, H6, Geomatikum Mon, 14:15–15:45, 107, Sedanstr. 19 14 October 2024