

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

LECTURE COURSE IN THE QUANTUM UNIVERSE RESEARCH SCHOOL

Winter Term 2024/2025

Elliptic differential operators on compact manifolds

Markus Röser

Course Description:

The aim of this course is to give some insight into the mathematical tools that are used in the study of (gauge-theoretic) moduli spaces from a differential geometric point of view. First we will study Sobolev spaces and elliptic operators on compact manifolds in order to prove the Hodge decomposition theorem. We will then apply the theory to study (gauge-theoretic) moduli spaces and deformation problems.

Prerequisites:

Good knowledge of the foundations of differential geometry (manifolds, vector bundles, connections). Some familiarity with operators on Hilbert spaces is desirable but not strictly necessary.

Literature:

- Donaldson, Kronheimer *The Geometry of Four-Manifolds*, Oxford Mathematical Monographs, 1990
- Kobayashi, *Differential Geometry of complex vector bundles*, Princeton University Press, 1987
- Lübke, Teleman, *The Kobayashi-Hitchin Correspondence*, World Scientific, 1995
- Warner, Foundations of Differentiable Manifolds and Lie Groups, Springer 1983

Date and Place:	Wed, 10:15–11:45, 208, Sedanstr. 19
Problem Classes:	Biweekly on Tue, 16:15–17:45, 217, Sedanstr. 19
Starting on:	16 October 2024