Regularised determinants and spectral invariants in Physics and Geometry (2hrs weekly)

Summer Semester 2014

This course provides an introduction to spectral invariants and their relation to anomalies in geometry and physics. It is addressed to Master students familiar with differential geometry, and can be of interest to both mathematicians and physicists.

- **Part I: Regularized determinants and related anomalies (S. Paycha)**

  (1) A brief review of pseudodifferential operators on closed manifolds
  (2) Regularized traces and zeta regularized determinants
  (3) The Quillen determinant bundle and local anomalies
  (4) Conformal anomaly in geometry and quantum field theory
  (5) The eta invariant and the spectral flow
  (6) The analytic torsion and the Chern Simons model

- **Part II: Spectral invariants and applications in geometry (S. Azzali)**

  (1) The heat kernel and the index
  (2) Geometric Dirac operators and the local index theorem
  (3) Local variation of the eta invariant
  (4) Geometric applications: the signature operator
  (5) Manifolds with boundary and the eta invariant
  (6) The rho invariant of Atiyah–Patodi–Singer

Literatur

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