

Spectral functions: Techniques and Applications

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Many properties of physical systems or Riemannian manifolds are encoded in the eigenvalue spectrum of certain interesting, mostly Laplace-type, differential operators. These properties are analyzed by considering suitable functions of the spectrum. Prominent representatives of these so-called spectral functions are the zeta function and the heat kernel. New methods for their analysis will be outlined and applied to a variety of problems including

- a.) the evaluation of functional determinants,
- b.) the analysis of the heat kernel asymptotics,
- c.) the influence of conical singularities on properties of spectral functions.