

An index theorem for the Dirac operator on Lorentzian manifolds

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We show that the Dirac operator on a compact globally hyperbolic Lorentzian spacetime with spacelike Cauchy boundary is a Fredholm operator if appropriate boundary conditions are imposed. We prove that the index of this operator is given by the same formal expression as in the index formula of Atiyah-Patodi-Singer for Riemannian manifolds with boundary. If time permits, an application to quantum field theory (the computation of the chiral anomaly) will be sketched.

This is the first index theorem for Dirac operators on *Lorentzian* manifolds and, from an analytic perspective, the methods to obtain it are quite different from the classical Riemannian case. This is joint work with Alexander Strohmaier.

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