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**Christian Bär\*** ([baer@math.uni-potsdam.de](mailto:baer@math.uni-potsdam.de)), Univ. of Potsdam, Inst. f. Mathematics, Am Neuen Palais 10, 14469 Potsdam, Germany. *Renormalized Integrals and a Path Integral Formula for the Heat Kernel on a Manifold.*

We introduce renormalized integrals which generalize conventional measure theoretic integrals. One approximates the integration domain by measure spaces and defines the integral as the limit of integrals over the approximating spaces. This concept is implicitly present in many mathematical contexts such as Cauchy's principal value, the determinant of operators on a Hilbert space and the Fourier transform of an  $L^p$ -function.

We use renormalized integrals to define a path integral on manifolds by approximation via geodesic polygons. We derive a path integral formula for the heat kernel of any self-adjoint generalized Laplace operator acting on sections of a vector bundle over a compact Riemannian manifold. (Received September 24, 2012)