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Quantum Heat Traces

We study new invariants of elliptic partial differential operators acting on sections of a vector bundle over a closed Riemannian manifold that we call the relativistic heat trace and the quantum heat traces. We obtain some reduction formulas expressing these new invariants in terms of some integral transforms of the usual classical heat trace and compute the asymptotics of these invariants. The coefficients of these asymptotic expansion are determined by the usual heat trace coefficients (which are locally computable) as well as by some new global invariants.