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Heat kernel and Revelations

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Heat-kernel techniques provide a standard toolkit for calculating functional determinants of Laplace-type operators, facilitating the evaluation of contributions at one loop to the vacuum effective action. While typically perturbative, the coincidence limit of the heat-kernel expansion in proper-time enjoys in some cases a resummed version, paving the way for the analysis of various nonperturbative aspects of quantum field theories. I will discuss some recent results in this direction, in curved and flat spaces, and present several physically relevant applications.

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