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Remark on the synergy between the heat kernel and the parity anomaly

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In this paper, we demonstrate that not only the heat kernel techniques are useful for the computation of the parity anomaly, but also the parity anomaly turns out to be a powerful mean in studying the heat kernel. We show that the gravitational parity anomaly on 4D manifolds with boundaries can be calculated using the general structure of the heat kernel coefficient a5 for mixed boundary conditions, keeping all the weights of various geometric invariants as unknown numbers. The symmetry properties of the η-invariant allow to fix all the relevant unknowns. As a byproduct of this calculation we get an efficient and independent crosscheck (and confirmation) of the correction of the general structure of a5 for mixed boundary conditions.

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