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Geometry of Non-Unitary Evolutions in Open Quantum Systems

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We introduce a geometric framework for non-unitary quantum processes, in line with the unitary SU(N) geometry. We propose a Finslerian metric for our goal, which modifies the original unitary geometry by applying the restrictions from Lindblad Master Equations from the perspective of Pontryagin's Maximum Principle (PMP). We illustrate the results of the Finslerian metrics for depolarising and amplitude-damping single-qubit cases with rotation around one axis. We discuss potential insights on connecting to circuit complexity and analysing the geometrical curvatures.

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