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Causal Space-Time Structure and non-Hausdorff Extension of Schwarzschild Black Hole Interior

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Cones of future and past are rigorously constructed under the horizon of black hole by completions of geodesics continued from causally connected space-time regions outside the black hole interior. Treating the Schwarzschild black hole as a zero charge limit of Reissner—Nordsrom black hole reforms the Penrose—Carter diagram into the infinite band that excludes the closed proper-time cycles under the geodesic motion. The marginal trajectories between the cones of future and past compose paths common with a compact non-Hausdorff spherical extension of black hole interior forming the thermal bath for particles fallen to the black hole.

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