

Backreaction of scalar radiation on black holes

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The evolution of the trapping horizon of a black hole in the presence of infalling matter can be understood as a backreaction effect. Focusing on low-frequency scalar radiation and spherically symmetric black holes, I will show that a simple closed-form expression for the expansion rate of the horizon can be derived in terms of the initial data for the scalar field on past null infinity. This is achieved by solving the Einstein field equations to second order in perturbation theory in the vicinity of the horizon, and then using matched asymptotics expansions to compute the evolution of wave packets through the potential barrier. Applications of this framework to more general matter fields will be also discussed.

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