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Black Holes in the Early Universe

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Cosmology textbooks typically assume that the early universe was dominated by relativistic particles. But if even a relatively small number of black holes were created after inflation, they would have constituted an increasingly large fraction of the total energy density as the universe expanded. I'll argue that it is well-motivated to scenarios in which the early universe included an era in which low-mass ($< 10^9$ grams) primordial black holes dominated the total energy density. Within this context, I'll discuss Hawking radiation as a mechanism to produce both dark radiation and dark matter. I'll also talk about the possibility that these black holes may have undergone mergers before evaporating, leading to potentially detectable gravitational waves signals, and to the production of a "hot graviton background". Such black holes could have also played an important role in the process of baryogenesis.

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