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Gravitational Collapse in the Primordial Plasma JOLYON BLOOMFIELD, MIT — Given sufficiently large inflationary perturbations, primordial black holes can form from the plasma of the very early universe. Such large perturbations tend towards spherical symmetry. Naive theoretical estimates suggest that for a black hole to form, when a perturbation enters the horizon, it requires approximately 30% more energy than one would expect for the background FRW evolution, although this has been shown to depend on the profile of the perturbation. We present an overview of a comprehensive formalism for the description of primordial black hole formation under spherical symmetry, which has been optimized for numerical evolution. Numerically, we demonstrate how perturbations can grow and form black holes in the early universe. We suggest a better estimator for whether or not a black hole will form from a given inflationary configuration.

Jolyon Bloomfield
MIT

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