

3D Simulations of the Ekpyrotic Cosmological Scenario

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In this work, we perform the first fully three-dimensional simulations of the ekpyrotic cosmological scenario. Our numerical relativity code is based on previous work that assumed some symmetry. In particular, we use a tetrad formulation of the Einstein-scalar field equations, but in this case using the parallel infrastructure PAMR. Our goal is to test the robustness of the ekpyrotic (slowly contracting) phase in smoothing and flattening the universe from highly inhomogeneous and anisotropic conditions. Our preliminary results suggest that in the fully generic case, the negative exponential potential of the ekpyrotic scenario is an efficient mechanism for homogenization and isotropization.

Author: TYLER, Zachary (Oakland University)

Co-author: GARFINKLE, David (Oakland University)

Presenter: TYLER, Zachary (Oakland University)

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