Einstein-Aether Inflation[1] WILLIAM DONNELLY, TED JACOBSON, University of Maryland — Einstein-aether theory is a Lorentz-violating theory of gravity with a timelike vector field that plays the role of a preferred frame or "aether". Although Lorentz-violating couplings to standard model particles are tightly constrained observationally, much less is known about Lorentz-violating couplings of the inflaton. The aether allows us to consider terms in the action that depend explicitly on the rate of expansion, which would not be possible in a Lorentz-invariant theory. We therefore consider the unique aether-inflaton coupling of mass dimension two: the time derivative of the inflaton in the aether frame. The effect of this term is proportional to the Hubble factor, making it irrelevant today but important during inflation. We first show that the theory is viable by deriving conditions for stability of linearized perturbations about flat spacetime, and conclude by showing how the new coupling changes the homogeneous dynamics of the cosmology during inflation.

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