Abstract Submitted
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Nonlinear Dynamics from Early Dark Energy[1] ERICKA FLORIO, MARY GERHARDINGER, TOM GIBLIN, Kenyon Coll — Currently, cosmologists do not agree on how quickly the universe is expanding. This problem, called the Hubble tension, describes the fact that two independent types of measurements of the current expansion rate of the universe (called H_0) give two different values; with the newly-released Gaia measurements of H_0 (Reiss et al. 2020), the Hubble tension now stands at 4.2σ. The Early Dark Energy (EDE) theory is a proposed solution to this tension which introduces a scalar field to the ΛCDM Universe around matter-radiation equality (Poulin et al. 2019). Certain favored models of the EDE field have been shown to display nonlinear resonance, which could have left an imprint on the late Universe. My research partners and I have implemented the EDE model in GABE, a computer program which evolves scalar fields on cosmological scales and is specifically designed to study nonlinear dynamics. We have integrated the EDE field alongside matter and radiation fluids on a perturbed gravitational metric, in order to determine whether the cosmological temperate maps produced by our simulation match the Universe that we observe, and in this way falsify or support the EDE theory as a resolution to the Hubble tension.

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