

Abstract Submitted  
for the APR20 Meeting of  
The American Physical Society

**Computing a Yukawa-Type Coupling Between DE-DM as Fields<sup>1</sup>**

HOLSTON SEBAUGH<sup>2</sup>, LaGrange College — Within the literature, many different parameters of couplings between dark energy (DE) and dark matter (DM) as fluids in the continuity equation have been studied and examined, and observational data can further constrain these parameterizations. Instead of a fluid coupling, we present here a study of DE-DM coupling as fields, and utilize the Boltzmann transport equation. In calculating the Boltzmann transport, we required obtaining a distribution function for DE that leads to an equation of state parameter that is negative, which neither Bose-Einstein nor Fermi-Dirac statistics can supply. From quantum field theory in curved spacetime, we calculated an effective distribution function that accounted for our negative state parameter. We present and examine our results for a Yukawa-type coupling with a provided graphical figure of the interaction that is found within the continuity equation. Then, we will fit the coupling parameter to supernovae and CMB data using COSMOMC.

<sup>1</sup>LaGrange College Undergraduate Research Fund

<sup>2</sup>I would like to present right after my advisor, Kevin Ludwick, in the same session. My talk follows from his. He is chairing the FECS session, so hopefully we can be put in a session that doesn't conflict with that one.

Holston Sebaugh  
LaGrange College

Date submitted: 08 Jan 2020

Electronic form version 1.4