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Identity Theft: The Story of How Dark Energy Masqueraded as Matter and Radiation BATIA FRIEDMAN-SHAW, Brown University, MORGANE KONIG, Dartmouth, MIT — The universe has gone through three main stages in its history: the radiation dominated era, the matter dominated era, and the dark energy dominated era. It is composed of about 68% Dark Energy (DE), 5% baryonic matter, while about 27% is Dark Matter (DM). Though cosmologists understand the makeup of baryonic matter and radiation of the universe, the jury is still out on which substances make up the DE and DM. In recent years, a beyond the standard model pseudoscalar called an axion has emerged as a candidate for DE and DM. Our project is focused on examining if this axion could be a compelling DE candidate. Axions are created at the time of inflation. If DE is indeed an elementary particle, we need to explain how it remained undetected during the previous stages of the history of the universe. One possible mechanism, known as a tracker behavior, describes a field that behaves like the dominating component of the universe. In this scenario, this axion would have stayed under the radar during the radiation and matter era. Only later would this particle start behaving as DE signaling the beginning of the DE era. This scenario is known as DE Quintessence. We also investigated attractor behavior of our model: Attractors are states to which a system is naturally drawn to regardless of the initial conditions. Putting these behaviors together, we are examining if the proposed pseudoscalar axion can be a candidate for DE Quintessence.

Batia Friedman-Shaw
Brown University

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