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Electrodynamic phenomena induced by a dark fluid: Analogs of pyromagnetic, piezoelectric, and striction effects

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Abstract

We establish a new model of coupling between a cosmic dark fluid and electrodynamic systems, based on an analogy with effects of electric and magnetic striction, piezoelectricity and piezomagnetism, and pyroelectricity and pyromagnetism, which appear in classical electrodynamics of continuous media. Extended master equations for electromagnetic and gravitational fields are derived using Lagrange formalism. A cosmological application of the model is considered, and it is shown that a striction-type interaction between the dark energy (the main constituent of the dark fluid) and electrodynamic system provides the universe history to include the so-called unlighted epochs, during which electromagnetic waves cannot propagate and thus cannot scan the universe interior. © 2014 American Physical Society.

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