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Dynamics of Dirac-Born-Infeld dark energy interacting with dark matter

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Abstract

We study the dynamics of Dirac-Born-Infeld (DBI) dark energy interacting with dark matter. The DBI dark energy model considered here has a scalar field with a nonstandard kinetic energy term, and has potential and brane tension that are power-law functions. The new feature considered here is an interaction between the DBI dark energy and dark matter through a phenomenological interaction between the DBI scalar field and the dark matter fluid. We analyze two different types of interactions between the DBI scalar field and the dark matter fluid. In particular we study the phase-space diagrams of and look for critical points of the phase space that are both stable and lead to accelerated, late-time expansion. In general we find that the interaction between the two dark components does not appear to give rise to late-time accelerated expansion. However, the interaction can make the critical points in the phase space of the system stable. Whether such stabilization occurs or not depends on the form of the interaction between the two dark components. © 2012 American Physical Society.

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