

# Randall–Sundrum brane cosmology: modification of late-time cosmic dynamics by exotic matter

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## Abstract

In this paper we show, through the study of concrete examples, that depending on the cosmic dynamics of the energy density of matter degrees of freedom living in the brane, Randall–Sundrum (RS) brane effects can be important not only at short distances (UV regime), but also at large cosmological scales (IR regime). Our first example relies on the study, by means of the dynamical system tools, of a toy model based in a nonlinear electrodynamics (NLED) Lagrangian. Then we show that other, less elaborated models, such as the inclusion of a scalar phantom field, and of a tachyon phantom field—trapped in the brane—produce similar results. The form of the RS correction seems to convert what would have been future attractors in general relativity into saddle points. The above ‘mixing of scales’ effect is distinctive only of theories that modify the right-hand side (matter part) of the Friedmann equation, so that, for instance, Dvali–Gabadadze–Porrati-brane models do not show this feature.

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## 1. Introduction

Braneworld models of the Universe, where standard model (SM) particles are trapped in a three-space, while gravity might propagate also in the extra-space, have been the focus of attention in the current decade in the search for answers to several outstanding problems in