

Phantom energy as a transient phenomenon avoiding Cosmic Doomsday in $f(R)$ Gravity

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Abstract: The $f(R)$ theories of gravity are the most popular, simple and well-succeed extension of Einstein's General Theory of Relativity. They can account for some observational issues of standard cosmology with no need for evoking the dark sector of the universe, namely dark matter and dark energy. In the present article we will investigate LRS Bianchi type-I homogeneous and anisotropic space-time in different $f(R)$ gravitational models within the phantom energy dominated era, with equation of state $\omega < -1$. We show that this formalism allows the Universe to evade the "Cosmic Doomsday" since phantom energy era naturally appears to be transient and the further stage of the universe dynamics is dominated, once again, by dark energy. Such an important feature is obtained from the model, rather than imposed to it. We also apply the energy conditions to our cosmological solutions.

Keywords:LRS Bianchi type-I space-time; $f(R)$ gravity; Big Rip singularity

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