

Cosmological tests of modified gravity

Friday 29 July 2016 11:00 (30 minutes)

I review recent progress in the construction of modified gravity models as alternatives to dark energy as well as the development of cosmological tests of gravity. Einstein's theory of General Relativity (GR) has been tested accurately within the local universe i.e. the Solar System, but this leaves the possibility open that it is not a good description of gravity at the largest scales in the Universe. In 1998, astronomers made the surprising discovery that the expansion of the Universe is accelerating, not slowing down. Within the framework of GR, the acceleration would originate from an unknown dark energy. Alternatively, it could be that there is no dark energy and GR itself is in error on cosmological scales.

In this talk, I first give an overview of recent developments in modified gravity theories. I then focus on common properties these models share, such as screening mechanisms they use to evade the stringent Solar System tests. Once armed with a theoretical knowledge of modified gravity models, I move on to discuss how we can test modifications of gravity on cosmological scales. Since screening mechanisms leave distinct signatures in the non-linear structure formation, I review novel astrophysical tests of gravity using clusters, dwarf galaxies and stars.

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Summary

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Track Classification: Dark Energy and Modified Gravity