

New Directions in Cosmology

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The Planck space mission has released exquisite observations of the early universe, providing the strongest evidence yet that the universe we live in is very dark indeed. Its precise results show that our universe is composed of 26.6% dark matter and 68.4% dark energy, while less than 5% is made up of the baryonic material that we are familiar with on Earth. With their long-standing quest to make these precision measurements essentially now concluded, cosmologists are rapidly turning their attention to a much bigger and further-reaching question: what is the exact nature of this dark universe? I will introduce the new directions being taken in Cosmology to map out the invisible dark matter and confront theories on the origins of dark energy. Interestingly the increasing precision recently reported in these late-time cosmological measurements reveals tension with Planck's initial conclusions. Is this a sign that new data challenges lie ahead, or is it our first hint that the universe is truly exotic and that in order to understand the dark universe we will need some new physics that will forever change our cosmic view.