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A History of the History of Cosmology

Abstract

Like many branches of science, cosmology involves a history of conflict and controversy. Early predictions for the temperature of the cosmic microwave background involved a variety of spurious assumptions and ranged from 5K to 50 K. When the 3K background was finally detected in 1963, many of these early predictions were forgotten. Ever decreasing predictions of the strength of the small-scale structure of the background drove the creation of instruments with greater and greater sensitivity until 1992 when ripples of tens of micro-Kelvins were finally detected. However, foreground sources of very low-level thermal emission were contaminating these data, especially in the Galactic plane, forcing a more nuanced interpretation. Today our understanding of the early universe relies heavily on the existence of dark energy and dark matter to account for the motions of galaxies and clusters of galaxies, but this view ignores the possible role of magnetic fields. Everywhere we look, using magnetometers in the solar system and polarized dust in star-forming regions, the magnetic fields seem to be stronger than predicted and even rival the force of gravity. Then, just recently, a widely reported, unexpected JWST discovery found that evolved stars in the earliest galaxies formed soon after the Big Bang. This has caused confusion in cosmological circles and forced astronomers, once again, to re-think just how much we really know about the creation and formation of the universe.