

**DARK MATTER AND DARK ENERGY:
GASES THAT DOMINATE THE UNIVERSE**

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Abstract. Over the past century, scientists have developed an excellent understanding of the history of the universe from a fraction of a second after the Big Bang when the universe was small, hot and nearly uniformly filled with matter, until the present time when it is filled with galaxies surrounded by empty space. I will discuss the three principal findings that serve as the "pillars" of modern cosmology, establishing the standard Big Bang model of the early universe. These pillars are: the expansion of the universe; the agreement between theory and prediction of primordial abundances of lightest elements produced in the early universe; and the remnant radiation from the early epoch (the cosmic microwave background radiation). I will then discuss two famous modern-day puzzles in the field of cosmology. The first of them is dark matter, which contributes five times more mass/energy as the usual baryonic matter (i.e. particle made of quarks) and for which there is excellent evidence from many observational probes, but whose particle-physics properties have not yet been identified. The second great modern-day mystery is that of dark energy, which makes the universe expand faster and faster, but whose physical origin has not yet been established.