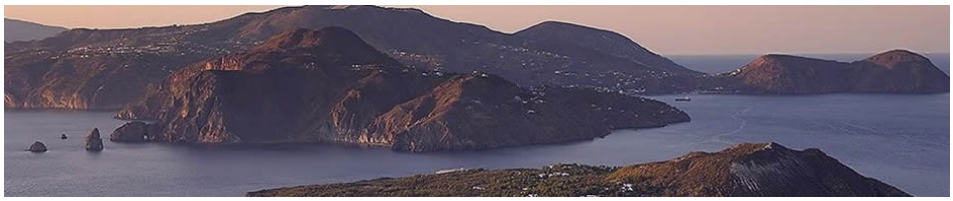

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The MIssing Baryon in a Warm-Hot Intergalactic Medium

It has been known for decades that the observed number of baryons in the local Universe falls about 30-40% short of the total number of baryons predicted by Big-Bang Nucleosynthesis and inferred by density fluctuations of the Cosmic Microwave Background. While theory provides a reasonable solution to this paradox, by locating the missing baryons in hot and tenuous filamentary gas connecting galaxies, it also sanctions the difficulty of detecting them because their by far largest constituent, hydrogen, is mostly ionized and therefore virtually invisible in ordinary signal-to-noise Far-Ultraviolet (FUV) spectra. Indeed, despite the large observational efforts, only a few marginal claims of detection have been made so far. Here we show that the missing baryons are indeed found in a tenuous warm-hot and moderately enriched medium that traces large concentrations of galaxies and permeates the space between and around them. We detect two highly ionized oxygen (OVII) intervening absorbers in the exceptionally high signal to noise X-ray spectrum of a quasar at redshift >0.4. These absorbers lie in regions characterized by large galaxy over-densities. We show that the number of OVII systems detected down to the sensitivity threshold of our data, agrees well with numerical simulation predictions for the long-sought hot intergalactic medium, and its detection adds a fundamental tile to the long-standing missing baryon puzzle.

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