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Observations of the Light Element Abundances and the Cosmological Baryon Density

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Three methods of measuring the mean cosmological density of baryons now agree within about 10 to 30%: the cosmic microwave background, the D/H ratio using Standard Big Bang Nucleosynthesis, and the Lyman-alpha absorption from neutral Hydrogen in the intergalactic medium. Using this baryon density, Standard Big Bang Nucleosynthesis predicts a factor 3 to 4 more 7Li than is seen in halo stars. There are theoretical models that can allow halo stars to destroy 7Li, but these models are challenged by both the amount of destruction and the lack of variation amongst stars with different mass. We do not know whether these stars did destroy their 7Li. The baryon density also predicts systematically more 4He that most measurements over the last 20 years. We review the measurements and modifications to BBN that might explain the tension between D, He and Li.