Do baryons trace dark matter in the early universe?

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Baryon-density perturbations of large amplitude may exist if they are compensated by dark-matter perturbations so that the total density remains unchanged. Big-bang nucleosynthesis and galaxy clusters allow the amplitudes of these compensated isocurvature perturbations (CIPs) to be as large as $\sim10%$. CIPs will modulate the power spectrum of cosmic microwave background (CMB) fluctuations---those due to the usual adiabatic perturbations---as a function of position on the sky. This leads to correlations between different spherical-harmonic coefficients of the temperature/polarization map, and it induces B modes in the CMB polarization. Here, the magnitude of these effects is calculated and techniques to measure them are introduced. While a CIP of this amplitude can be probed on the largest scales with WMAP, forthcoming CMB experiments should improve the sensitivity to CIPs by at least an order of magnitude.

Comments:	4 pages, 3 figures, updated with version published in Phys. Rev. Lett. Results unchanged. Added expanded discussion of how to disentangle compensated isocurvature perturbations from weak lensing of the CMB. Expanded discussion of early universe motivation for compensated isocurvature perturbations
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