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Effect of Primordial Black Holes on the Cosmic Microwave Background and Cosmological Parameter Estimates MASSIMO RICOTTI, University of Maryland-College Park, JEREMIAH OSTRIKER, Columbia University, KATHERINE MACK, University of Melbourne — We investigate the effect of nonevaporating primordial black holes (PBHs) on the ionization and thermal history of the universe. X-rays emitted by gas accretion onto PBHs modify the cosmic recombination history, producing measurable effects on the spectrum and anisotropies of the cosmic microwave background (CMB). Using the third-year WMAP data and COBE FIRAS data we improve existing upper limits on the abundance of PBHs with masses > 0.1 $M_\odot$ by several orders of magnitude, thus ruling out PBHs in this mass range as a significant component of the dark matter. Fitting WMAP/Planck data with cosmological models that do not allow for nonstandard recombination histories, as produced by PBHs or other early energy sources, leads to underestimating the best-fit values of the amplitude of linear density fluctuations (σ_8) and the scalar spectral index (n_s). We find that a fraction $> 0.1\% - 1\%$ of the dark matter in 30 $M_\odot$ PBHs produces CMB spectral distortions at a level detectable by FIRAS. Therefore, even allowing for possible modeling uncertainties, future missions measuring CMB spectral distortions will detect the imprint of dark matter if its composed of ~ 30 $M_\odot$ PBHs, as suggested to interpret recent LIGO results.

Massimo Ricotti
University of Maryland-College Park

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