

Abstract Submitted
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Evidence for Planck-Scale Resonant Particle Production during Inflation from the CMB Power Spectrum¹ GRANT MATHEWS, MAYUKH GANGOPADHYAY, University of Notre Dame, KIYOTOMO ICHIKI, Nagoya University, TOSHITAKA KAJINO, NAOJ — The power spectrum of the cosmic microwave background from both the Planck and WMAP data exhibits a slight dip in for multipoles in the range of $l = 10 - 30$. We show that such a dip could be the result of resonant creation of a massive particle that couples to the inflaton field. For our best-fit models, epochs of resonant particle creation reenters the horizon at wave numbers of $k_* \sim 0.00011 \pm 0.0004$ ($h \text{ Mpc}^{-1}$). The amplitude and location of these features correspond to the creation of a number of degenerate fermion species of mass $\sim 15/\lambda^{3/2} m_{pl}$ during inflation where λ is the coupling constant between the inflaton field and the created fermion species. Although the evidence is marginal, if this interpretation is correct, this could be one of the first observational hints of new physics beyond the Planck scale.

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