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Possible Evidence for Planck-Scale Resonant Particle Production during Inflation from the CMB Power Spectrum[1] MAYUKH GANGOPADHYAY, GRANT MATHEWS, Univ of Notre Dame, KIYOTOMO ICHIKI, National Astronomical Observatory, Japan, TOSHITAKA KAJINO, University of Tokyo, Department of Astronomy — The power spectrum of the cosmic microwave background from both the *Planck* and *WMAP* data exhibits a slight dip for multipoles in the range of $l = 10 - 30$. We show that such a dip could be the result of the resonant creation of massive particles that couple to the inflaton field. For our best-fit models, the epoch of resonant particle creation reenters the horizon at a wave number of $k_* \sim 0.00011 \pm 0.0004$ (h Mpc^{-1}). The amplitude and location of this feature corresponds to the creation of a number of degenerate fermion species of mass $\sim (8 - 11)/\lambda^{3/2}$ m_{pl} during inflation where $\lambda \sim (1.0 \pm 0.5)N^{-2/5}$ is the coupling constant between the inflaton field and the created fermion species, while N is the number of degenerate species. Although the evidence is of marginal statistical significance, this could constitute new observational hints of unexplored physics beyond the Planck scale.

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