

# A bound on the unparticle-photon cross section from the CMB temperature

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Unparticles are the low energy phase of Banks-Zaks fields, potentially capable of explaining late-time universe. The model is described by breaking the conformal symmetry at finite temperature giving rise to a non-radiative term with an unknown sign in energy density. This sign ambiguity makes the corrections around the IR fixed point to be either normal or tachyonic. The contribution of the first in late-time universe is ruled out in a recent study. The second is associated with  $T_C \simeq 4T_{CMB}$  at late-times corresponding to  $\Omega_{\mathcal{U}} = 1$ . Therefore the CMB is exposed to an enormous heat bath. As the age of the Universe is constrained independently by the globular clusters, it puts serious constraints on any heat exchange between unparticles and the CMB in  $\Lambda$ CDM. This leads us to estimate the cross section of unparticles with CMB photons to be  $\sigma_{\gamma\mathcal{U}} < 10^{-40} m^2 = 10^{-3} nb$ , preserving the consistency between the age of the universe from CMB with that of the globular clusters. This bound puts unparticles in late-time cosmology, if present, at the edge of the standard model.

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