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Cosmological Dark Photon Oscillations in Non-Minimal Dark Sectors

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As many of us know, the cosmic microwave background has a black-body spectrum. This is confirmed by COBE-FIRAS data three decades ago with exact measurement and tiny error bars.

However, the existence of new physics, such as the photon-dark photon oscillation with non-zero kinetic mixing, will distort the black body spectrum. Based on this character, and the fact that the deviation of CMB from the black body spectrum is highly constrained, we can give strict constraints on the new physics, for example, the dark photon parameter space.

In our work, we extend the discussion to the non-minimal dark sector and strongly constrain the millicharged particles(MCPs) parameter space. We will also discuss how the existence of MCPs will change the FIRAS bound of the minimal dark photon model.

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