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## Cosmic birefringence mediated by dark $U(1)$

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A kinetic coupling between photon and dark photon, a massless  $U(1)$  gauge boson in the dark sector, transfers the birefringence of dark photon to the observed cosmic birefringence. Regardless of the origin of the dark birefringence, the amplitude and unique frequency-dependence of the cosmic birefringence depends on the kinetic coupling constant and the temperature of dark photon. To explain the reported tantalizing  $3.6\sigma$  hint of cosmic birefringence, the dark photon temperature must exceed  $0.84\,\mathrm{K}$ , whose contribution to  $\Delta N_{\mathrm{eff}}$  might be within reach of the CMB Stage-4.

### Summary

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