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Hunting All the Hidden Photons - and more?

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I want to shed some light on the full constraining power of experimental bounds derived for hidden photons by applying them to gauge bosons of a weakly coupled $U(1)_{B-L}$, $U(1)_{L_\mu - L_e}$, $U(1)_{L_e - L_\tau}$ and $U(1)_{L_\mu - L_\tau}$. In contrast to a hidden photon that acquires universal couplings to charged SM particles through kinetic mixing with the photon, several SM particles are uncharged under these gauge groups. Also taking into account loop-induced kinetic mixing the hidden photon bounds are drastically altered for the different gauge groups. As the associated gauge bosons of these anomaly-free groups are well-motivated mediators to a dark sector I further want to discuss some interesting dark matter phenomenology of a light thermal relic charged under the new symmetry.

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