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Dark Photons

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Abstract
The couplings of the Standard Model sector to the scale invariant degrees of freedom can open the possibility to study dark photons (DP). The model for the DP particle solvable in 4-dimensional space-time is presented at the lowest order of perturbative theory using canonical quantization. The model is gauge and scale invariant and the associated symmetries are spontaneously broken with the following properties: dark photons are massive and can be clarified through their final states. The Dalitz-like decay of the (Higgs-like) scalar boson into a single photon and DP is studied. The interaction between DP and quarks is mediated by the derivative of the scalar field - the dilaton. The mass of the dilaton does not enter the final solutions. The limits are set on the DP mass, the mixing strength between the standard photon and DP. This study can be used to probe the DP sector since the emitted energy of the single photon is encoded with measuring of the missing of the recoil DP.

Summary

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