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Dark photon searches with the ATLAS detector at the LHC

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Many extensions to the Standard Model (SM) introduce a hidden or dark sector (DS) to provide candidates for dark matter in the universe and an explanation to astrophysical observations such as the positron excess observed in the cosmic radiation flux. This hidden sector could arise from an additional $U(1)_d$ gauge symmetry. ATLAS has searched for the gauge boson of the DS, which could be a massless or massive dark photon that either kinetically mixes with the SM photon or couples to the Higgs sector via some mediators. If dark photons decay in turn to SM particles with a significant branching ratio, we could either observe measurable deviations in some particular Higgs boson decay channels or new exotic signatures that would be accessible at the Large Hadron Collider (LHC) energies. An overview of searches of dark photon signals with the ATLAS detector, with a particular emphasis on some SM Higgs decay channels will be presented.

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