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Searches for Dark Sector States with ATLAS

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Hidden sector or dark sector states appear in many extensions to the Standard Model, to provide a candidate for the dark matter in the universe or to explain astrophysical observations of positron excesses. A hidden or dark sector can be introduced with an additional $U(1)_d$ dark gauge symmetry. The presence of the dark sector could be inferred either from deviations from the SM-predicted rates of Drell-Yan (DY) events or from Higgs boson decays through exotic intermediate states. The discovery of the Higgs boson during Run 1 of the Large Hadron Collider opens a new and rich experimental program that includes the search for exotic decays $H \rightarrow Z Z_{\text{dark}} \rightarrow 4l$ and $H \rightarrow Z_{\text{dark}} Z_{\text{dark}} \rightarrow 4l$, where Z_{dark} is a dark vector boson.

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