

Hadronic Footprint of Light Vector Mediators

Abelian $U(1)$ gauge group extensions of the Standard Model represent one of the most minimal approaches to solve some of the most urgent particle physics questions and provide a rich phenomenology in various experimental searches. Baryophilic vector mediator decays into hadronic final states in the MeV-to-GeV mass range produce a challenging zoo of light hadronic resonances. Using only very little theoretical approximations, we rigorously follow the vector meson dominance theory in our calculations and present, for the first time, vector decays into almost arbitrary hadronic final states. We study the effect on the total and partial decay widths, the branching ratios, and not least on the present (future) limits (reach) for earth-based experiments on (for) the mass and couplings of light vector particles in different models. In the context of dark matter (DM), we update Herwig7 and the python package Hazma to study the photon and positron spectra from DM annihilations through a vector mediator.

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