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Searching for Vector Dark Matter at Beam Dump Experiments

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Beam dump experiments place strong constraints on the parameter space of interesting sub-GeV dark matter (DM) models. We extend the current literature, which mainly focuses on the predicted signals of scalar and fermionic DM at beam dump experiments, by considering simplified DM models where the Standard Model is extended by one vector DM candidate along with one spin-1 or spin-0 mediator. In this analysis, we determine the parameter space which gives rise to the observed thermal relic abundance and predict the sensitivity of current and future beam dump experiments (such as LDMX) in addition to other complimentary experiments on these models. We explore the effect of the DM mass, mediator mass, and couplings on these constraints, considering both on-shell and off-shell DM production.

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