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Light dark matter and its possible probes

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We consider models of light dark matter and light mediator, having mass of the order of a few MeV to a few GeV. In each case, the dark matter achieves relic density through mechanisms beyond the paradigm of typical freeze-in or freeze-out. The light mediators in these models, namely dark scalars, vectors or ALPs, couple to the SM particles. These interactions can be constrained by astrophysical measurements as well as various low-energy terrestrial probes such as proton beam-dumps measuring rare meson decays or electron beam dump experiments measuring mediator decay into leptons. Moreover, indirect searches such as cosmic ray and gamma-ray observations and low-mass direct detections also play an important role to test such models. Systematic analyses of the models are done involving the relevant latest and future constraints.

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