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Loop-induced contributions to the dark matter annihilation cross section in a simplified model of dark matter with colored mediator

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We consider a simplified model of dark matter which contains a scalar dark matter candidate χ and a coloured scalar mediator ϕ. The model parameter space contains dark matter mass m_χ, mediator mass m_ϕ, the dark matter coupling with the mediator λ_d and the color representation r of the mediator ϕ. In this model, we investigate the phenomenology of loop-induced contributions to dark matter annihilation into gluons and quarks. At leading order, the dark matter annihilation in gluon channel is a one-loop process whereas in quark channel, it is a two-loop process. By calculating next-to-leading order QCD corrections in the gluon channel and leading order contribution in quark channel for dark matter annihilation, we study the dependence of annihilation cross section on the model parameters. The obvious constraints on the parameters of the model are from the relic density measurements. Taking into account the running of the strong coupling parameter α_s, we scan the model parameter space and derive bounds on the masses and couplings of dark matter and mediator particles.

Mini Symposia (Invited Talks Only)

Plenary (Invited talks only)

Authors: Dr SHIVAJI, Ambresh (IISER Mohali); VINZE, Radhika (Indian Institute of Science Education and Research, Mohali, India); Mr KATAPUR, Warsimakram (Indian Institute of Science Education and Research Mohali)

Presenter: VINZE, Radhika (Indian Institute of Science Education and Research, Mohali, India)

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