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Secluded dark matter in gauged $B - L$ model

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We consider the gauged $B - L$ model which is extended with a secluded dark sector, comprising of two dark sector particles. In this framework the lightest Z_2 -odd particle is the dark matter candidate, having a feeble interaction with all other SM and BSM states. The next-to-lightest Z_2 -odd particle in the dark sector is a super-wimp, with large interaction strength with the SM and BSM states. We analyse all the relevant production processes that contribute to the dark matter relic abundance, and broadly classify them in two different scenarios, a) dark matter is primarily produced via the non-thermal production process, b) dark matter is produced mostly from the late decay of the next-to-lightest-odd particle. We discuss the dependency of the relic abundance of the dark matter on various model parameters. Furthermore, we also analyse the discovery prospect of the BSM Higgs via invisible Higgs decay searches.

Primary authors: Mr ROY, Abhishek; Prof. MITRA, Manimala; Prof. SPANNOWSKY, Michael; Prof. BANDYOPADHYAY, Priyotosh; Ms PADHAN, ROJALIN (Institute of Physics, Bhubaneswar)

Presenter: Ms PADHAN, ROJALIN (Institute of Physics, Bhubaneswar)

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