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Self-interacting Inelastic Dark Matter in the Light of XENON1T Excess

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We propose a self-interacting inelastic dark matter (DM) scenario as a possible origin of the recently reported excess of electron recoil events by the XENON1T experiment. Two quasi-degenerate Majorana fermion DM interact within themselves via a light hidden sector massive gauge boson and with the standard model particles via gauge kinetic mixing. We also consider an additional long-lived singlet scalar which helps in realising correct dark matter relic abundance via a hybrid setup comprising of both freeze-in and freeze-out mechanisms. While being consistent with the required DM phenomenology along with sufficient self-interactions to address the small scale issues of cold dark matter, the model with GeV scale DM can explain the XENON1T excess via inelastic down scattering of heavier DM component into the lighter one. All these requirements leave a very tiny parameter space keeping the model very predictive for near future experiments.

Summary

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