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# Asymmetric dark matter with a spontaneously broken U(1)': self-interaction and gravitational waves

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Motivated by the collisionless cold dark matter small scale structure problem, we propose an asymmetric dark matter model where dark matter particle interact with each other via a massive dark gauge boson. This model easily avoid the strong limits from cosmic microwave background (CMB) observation, and have a large parameter space to be consistent with small scale structure data. We focus on a special scenario where portals between dark sector and visible sector are too weak to be detected by traditional methods. We find that this scenario can increase the effective number of neutrinos ($N_{eff}$).In addition, the spontaneous $U(1)$ symmetry breaking process, which makes dark gauge boson massive, can generate stochastic gravitational waves with peak frequency around $10^{-6}$—$10^{-7}$ Hz.

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