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Magnetic Moments of Dark Baryons

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Dark matter could be dark baryons made from underlying vector-like quarks which interact with the standard model as an electroweak multiplet. If the lightest dark baryon is electrically neutral with vanishing hypercharge, the leading interaction with the SM is anticipated to be through its magnetic dipole (for fermionic dark baryons). Using the non-relativistic quark model, which becomes exact in the large N_c limit, we calculate the spin-flavor wave functions and magnetic moments of spin-½ baryons arising from a confined $SU(N_c)$ gauge group with N_f flavors. For every N_c and N_f considered, we find that the magnetic moment vanishes for most baryons that are the potential dark matter candidates. This suggests bounds from direct detection experiments lead to considerably weaker constraints on strongly-coupled baryonic dark matter, opening up new possibilities for dark matter at TeV and higher scales.

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