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Asymptotically safe dark matter with gauged baryon number

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We propose an asymptotically safe extension of the standard model with gauged baryon number that is spontaneously broken at the TeV scale. Among the new heavy fermions is a potential dark matter candidate which is rendered stable by an unbroken Z_2 subgroup of the baryon number gauge group. After taking into account gravitational effects above the Planck scale, we study the ultraviolet fixed points of this theory and determine a subset of the model's parameter space at the TeV scale which renders the theory asymptotically safe. Asymptotic safety is a framework in which theories can be validly extrapolated to infinitely high energy scales. Working within this subspace of parameters at the TeV scale, we show that the correct dark matter relic density can be calculated while also ensuring that these parameter choices are consistent with bounds placed by direct detection experiments.

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