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Updated Big Bang Nucleosynthesis Bounds on Long-lived Particles from Dark Sector

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As electromagnetic showers may alter the abundance of Helium, Lithium, and Deuterium, we can place severe constraints on the lifetime and amount of energy injected by long-lived particles decaying into dark matter. Considering up-to-date measurements of the light element abundances that point to Yp = 0.245 ± 0.003,(D/H) = (2.527 ± 0.03) × 10−5,(7Li/H) = 1.58+0.35 −0.28 × 10−10, (6Li/7Li) = 0.05, and the baryon-to-photon ratio obtained from the Cosmic Microwave Background data, η = 6.14 × 10−10, we derive upper limits on the fraction of electromagnetic energy produced by long-lived particles. Our findings apply to decaying dark matter models and non-thermal processes between 102 and 1010 seconds in the early universe

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