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An Analysis of the LUX First WIMP Search Run Using Effective Field Theory Techniques NICOLE LARSEN, Yale University, LUX COLLABORATION — The LUX (Large Underground Xenon) experiment is a dark matter direct detection experiment located 4850 feet underground at the Sanford Underground Research Facility in Lead, SD. During Summer 2013, LUX collected 10065 kg-days of WIMP search data, ultimately reporting a minimum cross-section limit for spin-independent WIMP-nucleon elastic scattering of 7.6×10^{-46} cm^2 for 33 GeV-mass WIMPs. Direct detection experiments typically characterize WIMP-nucleon interactions in terms of spin-independent (SI) and spin-dependent (SD) couplings. However, Fitzpatrick et al.[1] show that the total set of effective field theory operators allowed by basic symmetry considerations result in additional qualitatively distinct nuclear responses for WIMP-nucleon interactions. These new operators can also interfere with the standard SI and SD operators, potentially enhancing or suppressing them, and should therefore be taken into consideration to ensure that direct detection experiments do not leave any gaps in the theoretical parameter space being probed. Here I discuss recent work toward using the LUX 2013 WIMP search dataset to set limits on these new operators.

[1]Fitzpatrick et al., JCAP 1302 (2013) 004 arXiv:1203.3542.

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