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Dark matter relic density at one loop level - effective coupling approach

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The lightest neutralino as a cold dark matter candidate has been widely studied. Generally, tree-level calculations of its (co-)annihilation cross sections are used to predict the relic density, which leads to constraints on the parameter space. It has been known that these cross sections can change by order 10% at one loop level. However, calculating these one loop corrections is computationally demanding and time consuming due to large number of diagrams. On the other hand, with the launch of the Planck satellite the relic density of dark matter will be experimentally determined at a percent accuracy. Matching this accuracy requires the inclusion of at least leading radiative corrections. We use the approach of effective couplings in order to reduce the computational stress. In this work, we estimate the resulting corrections to the predicted neutralino relic density, and investigate the available parameter space at one loop level.

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