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Radiative corrections to dark matter annihilation (and the relic density)

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Calculating the relic density of dark matter and comparing to current cosmological data is a powerful tool to constrain the parameter space of new physics and to obtain complementary information with respect to collider and precision data. However, this calculation is affected by several uncertainties. On the particle physics side, this concerns the calculation of the annihilation cross-section, that governs the relic density. In public tools, however, it is implemented only at the tree-level.

After an introduction to the calculation of the relic density, I will review the recent progress that has been made concerning radiative corrections to the annihilation cross-section of the neutralino in the MSSM. I will in particular discuss strong and electroweak corrections and comment on technical details. I will then demonstrate their impact on the relic density and, in consequence, on the cosmologically favoured regions of parameter space. I will thus show that radiative corrections are necessary in this context in order to keep up with current and future cosmological measurements.

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