

Towards a more precise prediction of the dark matter relic density

Thursday, September 15, 2016 2:00 PM (20 minutes)

Calculating the neutralino relic density is a strong possibility to identify favoured and disfavoured regions of the parameter space of a supersymmetric theory such as the MSSM. With the latest results of the Planck mission, the cosmological parameters including the dark matter abundance are determined to an unprecedented precision. In order to reduce the theoretical uncertainty in the prediction, and to keep up with the experimental improvements, we present a next-to-leading order calculation in QCD of the neutralino (co)annihilation cross-section.

We present recent results for selected annihilation and co-annihilation processes. We demonstrate that QCD corrections can have a significant impact on the cosmologically favoured parameter regions. They are thus of general interest for parameter studies and global fits.

Related recent references:

[1] J. Harz, B. Herrmann, M. Klasen, K. Kovařík and M. Meinecke, SUSY-QCD corrections to stop annihilation into electroweak final states including Coulomb enhancement effects, *Phys. Rev. D* 91: 034012 (2015), arXiv:1410.8063 [hep-ph]

[2] J. Harz, B. Herrmann, M. Klasen and K. Kovařík, Radiative corrections to neutralino-stop coannihilation revisited, *Phys. Rev. D* 91: 034028 (2015), arXiv:1409.2898 [hep-ph]

[3] B. Herrmann, M. Klasen, K. Kovařík, M. Meinecke and P. Steppeler, One-loop corrections to gaugino (co)annihilation in the MSSM, *Phys. Rev. D* 89: 114012 (2014), arXiv:1404.2931 [hep-ph]

[4] J. Harz, B. Herrmann, M. Klasen, K. Kovařík and Q. Le Boulc'h, Neutralino-stop co-annihilation into electroweak gauge and Higgs bosons at one loop, *Phys. Rev. D* 87: 054031 (2013), arXiv:1212.5241 [hep-ph]

[5] J. Harz, B. Herrmann, M. Klasen, K. Kovařík, P. Steppeler, Theoretical uncertainty of the supersymmetric dark matter relic density from scheme and scale variations, arXiv:1602.08103 [hep-ph]

Summary

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