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Anomalous $U(1)$'s and dark matter

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String theory and GUTs theories suggest that anomalous extra $U(1)$'s symmetries can arise from many high energy scenarios. At low energy scale these extra symmetry groups and the interactions that they mediate can have many phenomenological consequences.

One of the most important is the presence of extra neutralinos with respect to the four of the MSSM. These particles make more viable the scenario of coannihilations, in which there are one or more particles almost degenerate in mass with the LSP that can contribute to its relic density and thus to the theoretical dark matter estimates. We have build an explicit model in which this construction is realized and we have extensively studied the coannihilation possibilities in the most general case also with the use of a modified version of the DarkSUSY package, finding zone of the parameter space in which WMAP data are satisfied.

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