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RelExt - A New Tool for Dark Matter Parameter Searches

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We present the C++ program RelExt for Standard Model (SM) extensions that feature a Dark Matter (DM) candidate. The tool allows to efficiently scan the parameter spaces of these models to find parameter combinations that lead to relic density values which are compatible with the measured value within the uncertainty specified by the user. The code computes the relic density for freeze-out (co-)annihilation processes. The user can choose between several pre-installed models or any arbitrary other model featuring a discrete Z_2 symmetry, by solely providing the corresponding FeynRules model files. The code automatically generates the required (co-)annihilation amplitudes and thermally averaged cross sections, including the total widths in the s-channel mediators, and solves the Boltzmann equation to determine the relic density. It can easily be linked to other tools like e.g. ScannerS to check for the relevant theoretical and experimental constraints, or to BSMPT to investigate the phase history of the model and possibly related gravitational waves signals.

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