1 Introduction

Two main ideas: 1) subGeV DM 2) Improving constraints (cosmological constraints, collider constraints, indirect and direct detection) 3) Improvements

The new features include:

- Computation of relic density with kinetic decoupling - maybe not available for a generic case

- Relic density for subGeV DM including annihilation into mesons

- Low reheating temperature (with N. Bernal)

- Possibility of solving the relic density before and after EWSB

- Constraints from CMB on light DM (T. Slatyer) - with A. Belyaev

- Constraints from CMB mu and y distortions from FIRAS (see 2401.02513 p.17-20)

- Constraints from BBN and late energy injection

- Improving interface to SmodelS : here it would be nice to include monojet signatures - this part of the code is outdated.

- Direct detection : direct detection on electrons + recasting LZ + eventually new ones

- Direct detection : flag to remove automatic gg coupling (relevant to avoid double counting in models where there are new gg couplings)

- The tables for DM-annihilation-induced electron/positron production, relevant for indirect detection are extended to masses below 2 GeV. - Relevant for cosmological constraints as well as for light DM

- More tables for ID (2312.01153.pdf)

- Indirect detection limits from Dwarfs (in principle done - python problem?)

- Improvements: update Einasto profile, LHAPDF and remove quadruple precision (done)

For DM annihilation into mesons we can use chiral Lagrangians - however this depends on the type of mediator. For scalar mediator : annihilation into two pions and two kaons are extracted from chiral Lagrangian, for other contributions (e.g. 4pions) we are thinking of introducing and arbitrary constant to be fixed by matching the total width at 2 GeV with the quark contribution. Current problem is we do not reproduce results from 1809.01876.pdf for $S \rightarrow gg$, we have tried to do that in the Inert Doublet Model, is it a problem with loop corrections ??? (this was done in october 2023 - to be clarified)