Long-lived charginos in the MSSM and beyond

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LOI link: [Chargino LLP LOI]

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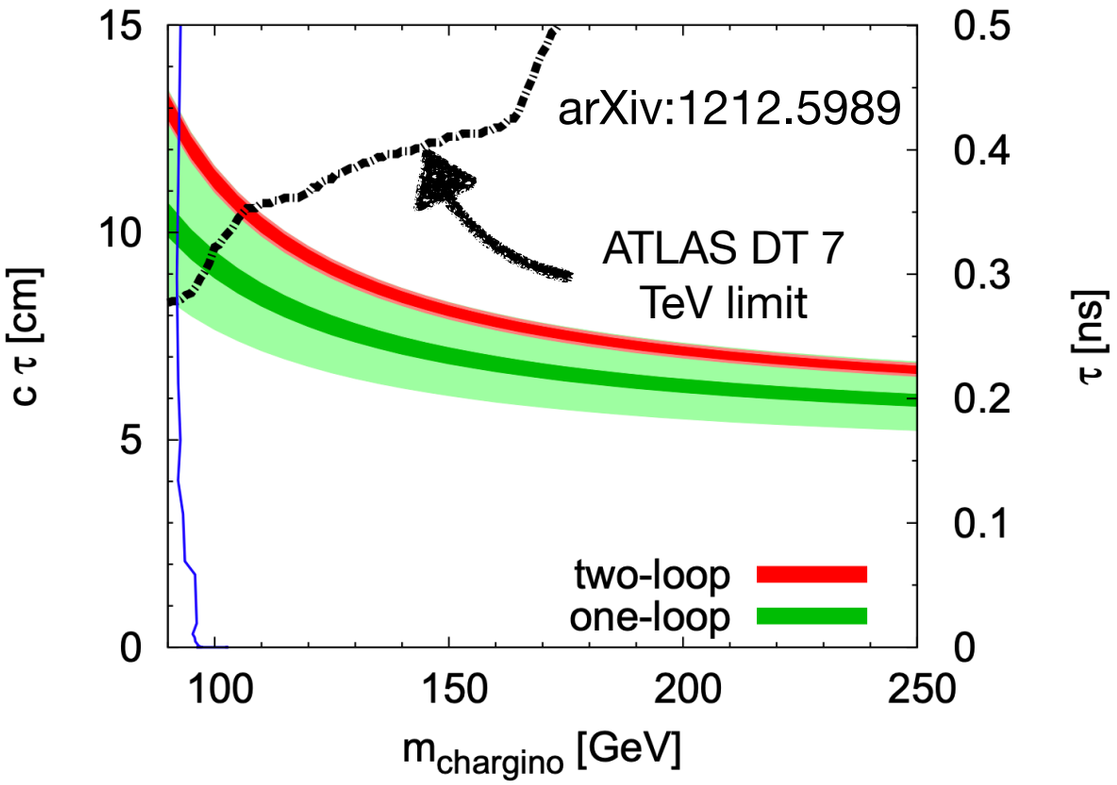
Motivation

- Long lived particles result either from small mass splitting (chargino in MSSM) or from suppressed couplings (heavy neutrino in neutrino mass models)
- Lifetime crucially depends on mass splitting $c\tau \propto \frac{1}{\Delta M}$
- For ΔM ≲ 2GeV on the treatment of the decay process, i.e. whether W*→qqbar or W*→(1,2or 3) π
- Loop corrections are very important to accurately determine chargino - LSP mass splitting, not necessarily implemented in spectrum generators
- Has implications for the reach of disappearing track searches



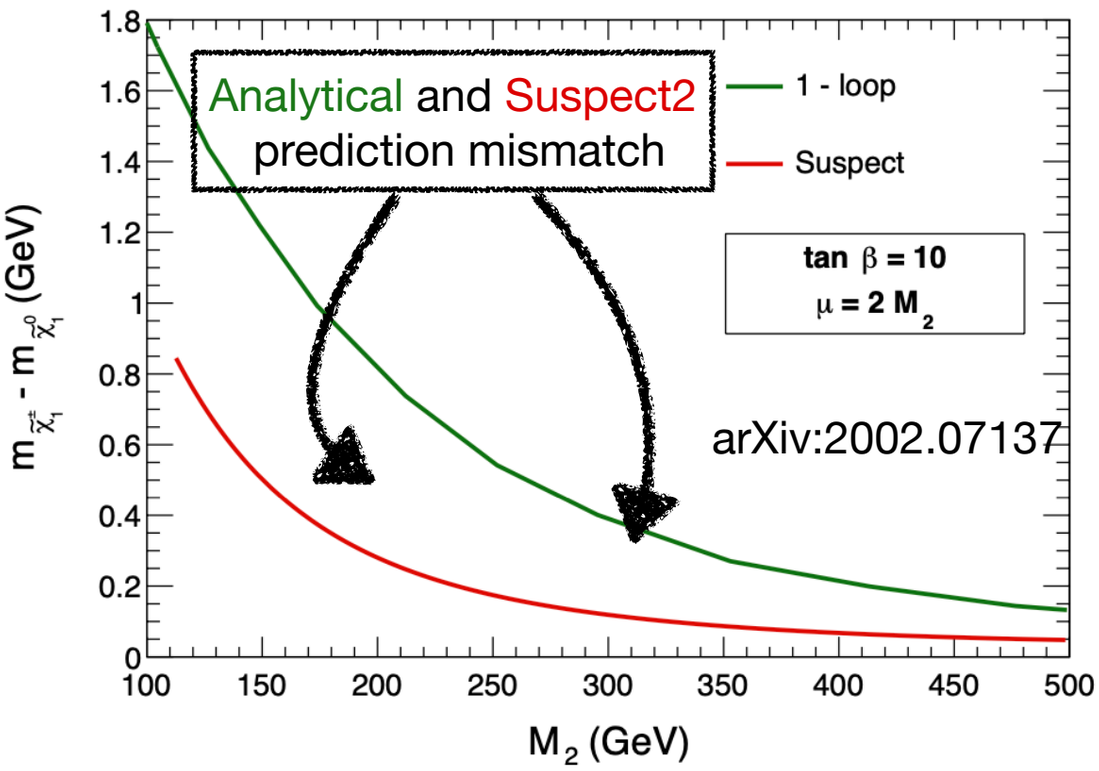
- Also important to compute correct chargino partial decay widths
- Mass splitting can affect precise calculation of the relic density', perhaps adding “(incl. coannihilation/coscattering interplay)”

See also:
hep-ph/9606211
arXiv:1712.00968
arXiv:1212.5989

Aims and relevance

Aims

- Understand current status of spectrum generators
- Demonstrate impact of disappearing track and HSCP searches for pure wino-like as well as mixed scenarios by correctly predicting chargino lifetime
- Understand correlation with relic density generation mechanisms
- Consider MSSM and beyond MSSM electroweakino multiplet examples



Relevance

- Help determine theoretical and tools developments needed in the future in order to match experimental requirements
- Help determine relationship between benchmark scenarios used at experiments and underlying concrete models
- Help achieve more precise comparison of DM limits from different frontiers