ATLAS PUB Note

ATL-PHYS-PUB-2019-012

26th March 2019

SUSY March 2019 Summary Plot Update

The ATLAS Collaboration

These are summary plots, updated for the SUSY group in March 2019.

ATL-PHYS-PUB-2019-012
26 March 2019

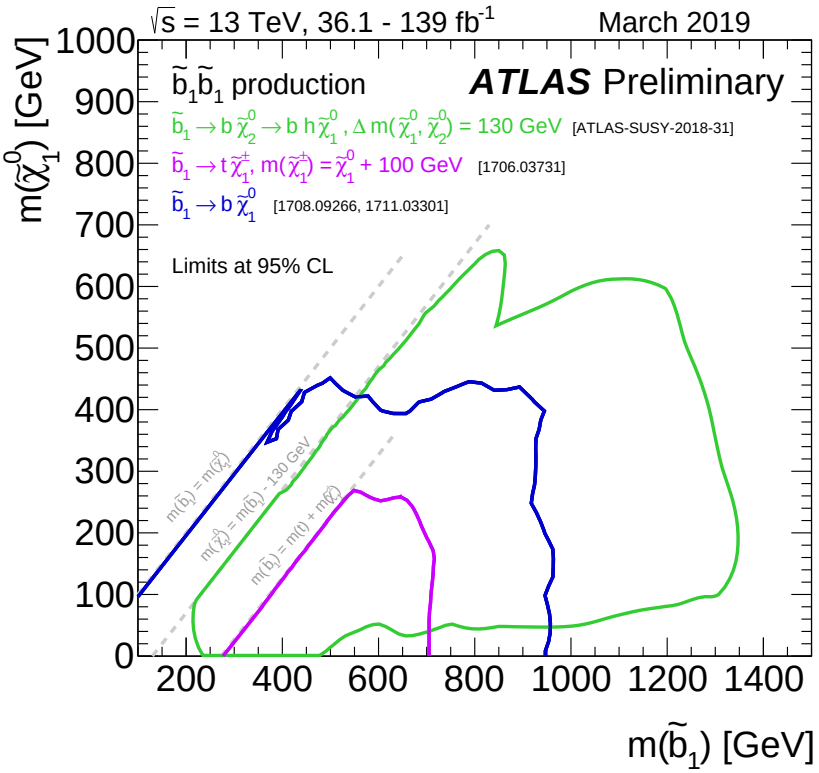

Figure 1: Exclusion limits at 95% CL in the (lightest sbottom, lightest neutralino) mass plane for direct sbottom production. The lightest neutralino (χ_1^0) is assumed to be the lightest SUSY particle (LSP). Several different decay scenarios are shown, along with different parameterizations of the intermediate particles in the models.

1 Introduction

This document presents several summary plots from the SUSY group, updated in March 2019. The captions were updated to improve clarity.

2 Third Generation

The sbottom summary plot has been updated to include the most recent results with 139 fb^{-1} of data.

3 Electroweak

Three electroweak summary plots have been updated to include the most recent results with 139 fb^{-1} of data.

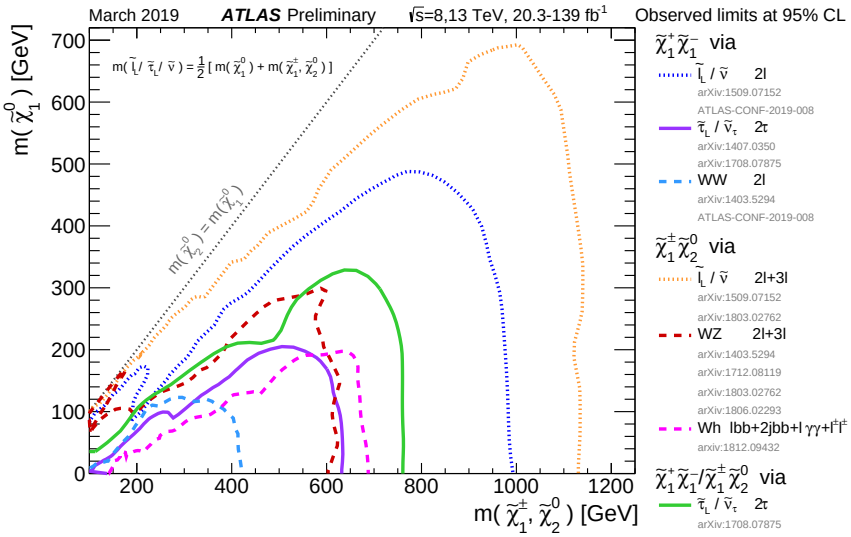

Figure 2: The 95% CL exclusion limits on $\chi_1^+\chi_1^-$ and $\chi_1^\pm\chi_2^0$ production with either SM-boson-mediated or $\tilde{\ell}$-mediated decays, as a function of the $\chi_1^\pm$, χ_2^0 and χ_1^0 masses. The production cross-section is for pure wino $\chi_1^+\chi_1^-$ and $\chi_1^\pm\chi_2^0$. Each individual exclusion contour represents a union of the excluded regions of one or more analyses.

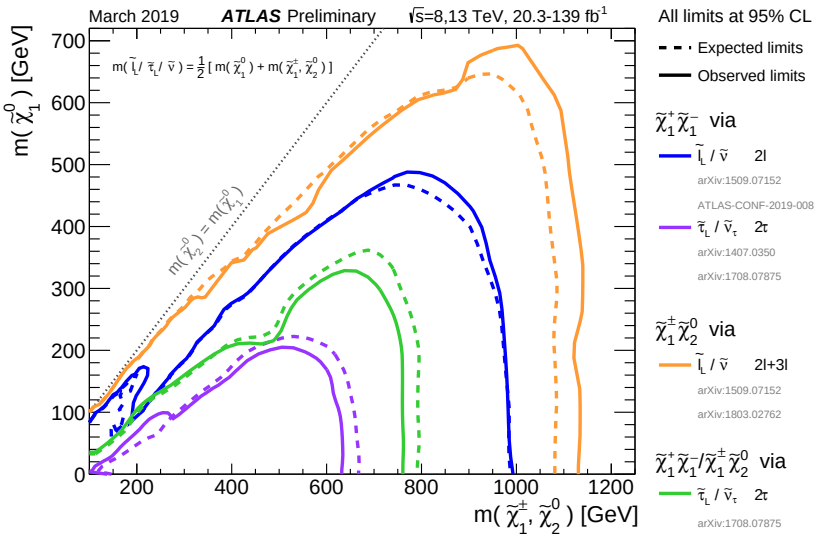

Figure 3: The 95% CL exclusion limits on $\chi_1^+\chi_1^-$ and $\chi_1^\pm\chi_2^0$ production with $\tilde{\ell}$-mediated decays, as a function of the $\chi_1^\pm$, χ_2^0 and χ_1^0 masses. The production cross-section is for pure wino $\chi_1^+\chi_1^-$ and $\chi_1^\pm\chi_2^0$. Each individual exclusion contour represents a union of the excluded regions of one or more analyses.

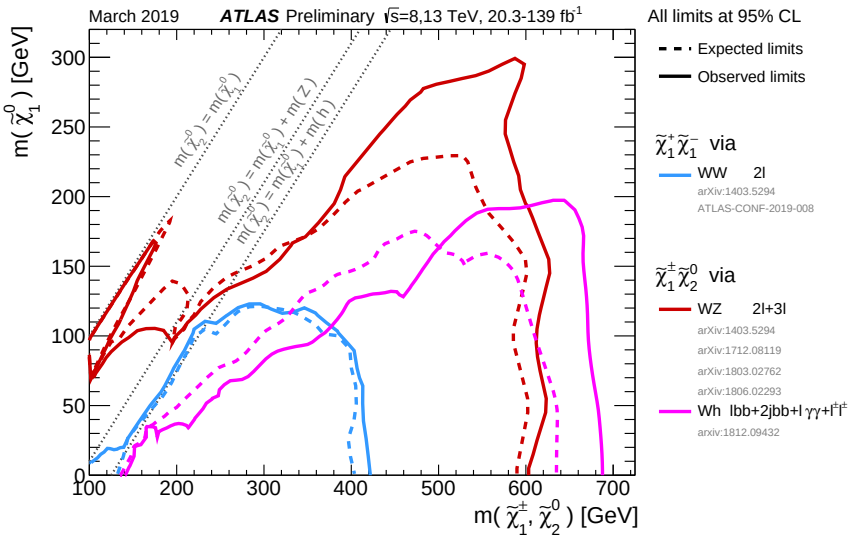

Figure 4: The 95% CL exclusion limits on $\chi_1^+\chi_1^-$ and $\chi_1^\pm\chi_2^0$ production with SM-boson-mediated decays, as a function of the $\chi_1^\pm$, χ_2^0 and χ_1^0 masses. The production cross-section is for pure wino $\chi_1^+\chi_1^-$ and $\chi_1^\pm\chi_2^0$. Each individual exclusion contour represents a union of the excluded regions of one or more analyses.

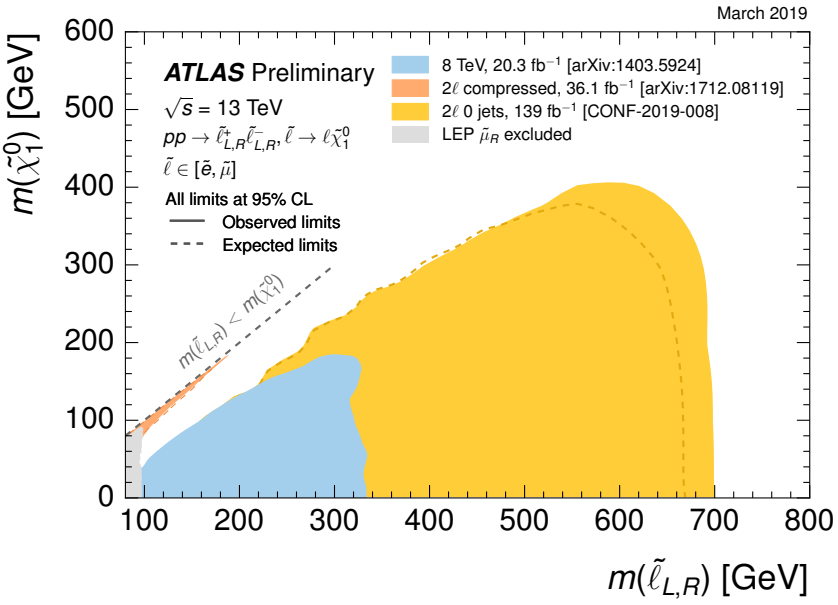

Figure 5: Exclusion limits at 95% CL based on 13 TeV data in the (slepton, lightest neutralino) mass plane for different analyses probing the direct production of sleptons with decays to lepton neutralino. The types of sleptons (flavor and coupling) included in each search is specified in the legend.

4 Long-lived Particles

Two long-lived particle summary plots has been updated following the result of the 36.1 fb^{-1} stable massive particle analysis.

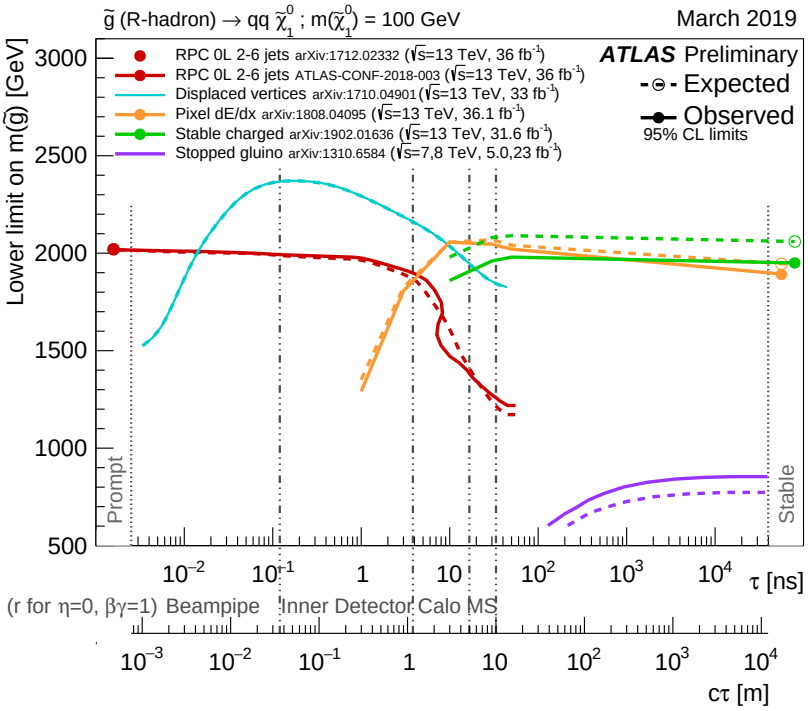

Figure 6: Constraints on the gluino mass-vs-lifetime plane for a split-supersymmetry model with the gluino R-hadron decaying into a gluon or light quarks and a neutralino with mass of 100 GeV. The solid lines indicate the observed limits, while the dashed lines indicate the expected limits. The area below the curves is excluded. For the displaced vertices result the expected and observed limits are identical. For the stopped gluino result the limit extends to larger lifetimes (not quoted here, see reference). The analyses have sensitivity at lifetimes other than those shown, but only the limits at tested lifetimes are shown. The dots represent results for which the particle is assumed to be prompt or stable. In this context, stable means escaping the detector.

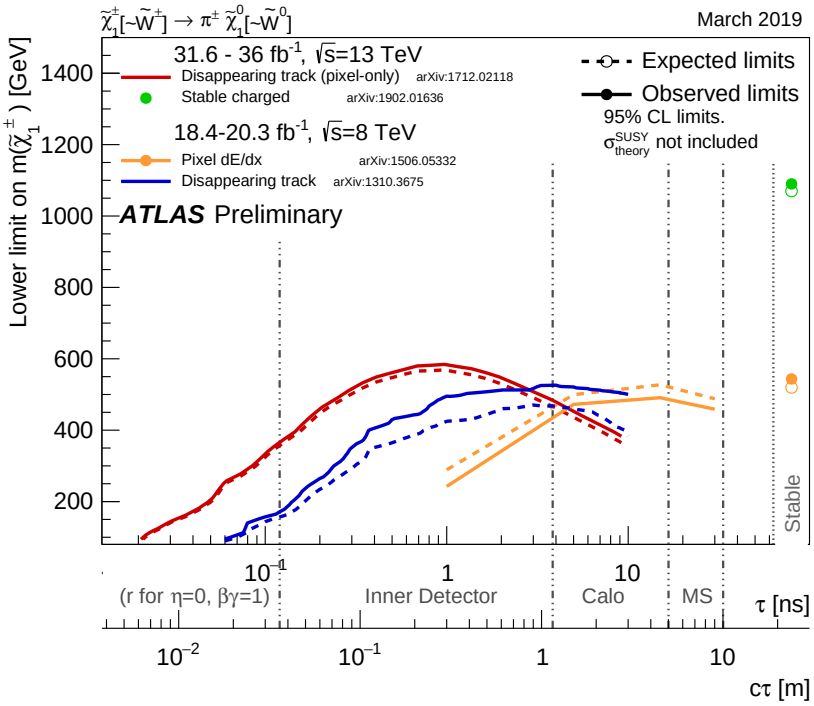

Figure 7: Constraints on the chargino mass-vs-lifetime plane for an AMSB model with $\tan(\beta) = 5$ and $\mu > 0$. The wino-like chargino is pair-produced and decays to the wino-like neutralino and a very soft charged pion. The solid lines indicate the observed limits, while the dashed lines indicate the expected limits. The area below the curves is excluded. The analyses have sensitivity at lifetimes other than those shown, but only the limits at tested lifetimes are shown. The dots represent results for which the particle is assumed to be stable. In this context, stable means escaping the detector.

5 Grand Summary

The grand summary SUSY plot has been updated to include the most recent results with 139 fb^{-1} of data.

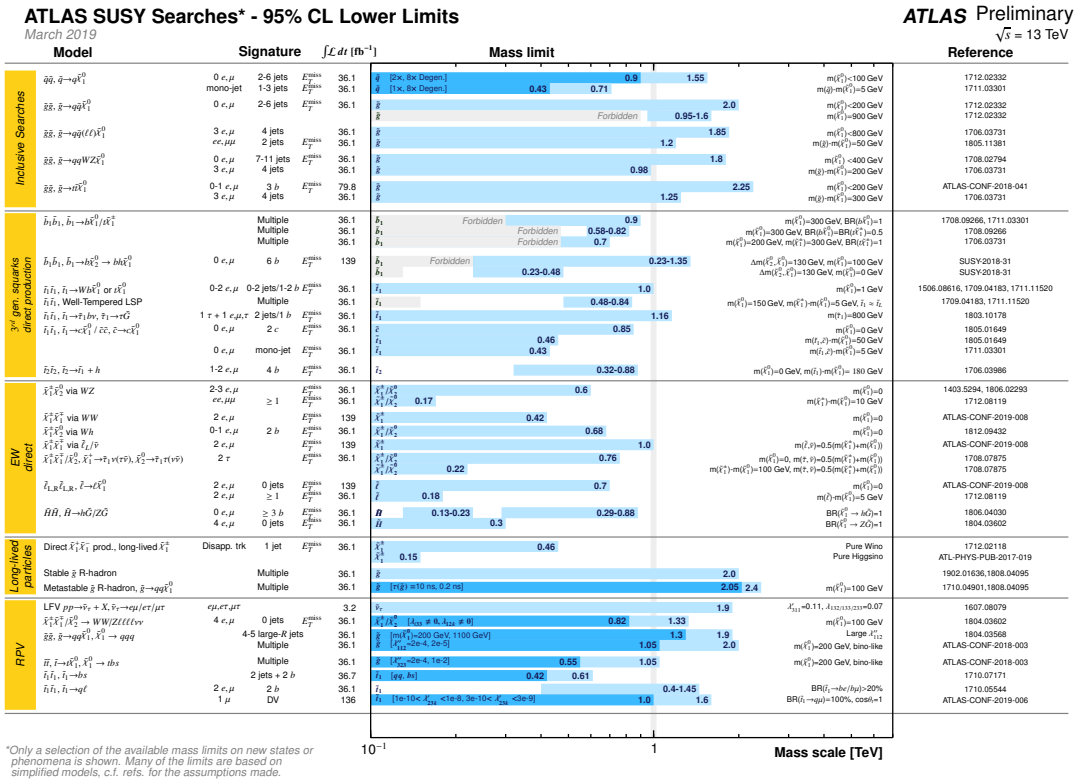

Figure 8: Mass reach of the ATLAS searches for Supersymmetry. A representative selection of the available search results is shown. Results are quoted for the nominal cross section in both a region of near-maximal mass reach and a demonstrative alternative scenario, in order to display the range in model space of search sensitivity. Some limits depend on additional assumptions on the mass of the intermediate states, as described in the references provided in the plot. In some cases these additional dependencies are indicated by darker bands showing different model parameters.