Constraining Supersymmetric Particles within the phenomenological Minimal Supersymmetric Standard Model

Supersymmetry (SUSY) is explored to uncover new physics beyond the Standard Model that can explain unresolved issues, such as the existence of dark matter. Numerous searches for SUSY were conducted by the ATLAS and CMS experiments during the LHC Run 2 period. Although no conclusive evidence for SUSY has been found, but these analyses have set stringent limits on the parameter space of supersymmetric models, particularly through interpretations based on Simplified Models. In this study, we reinterpret the full suite of ATLAS Run 2 SUSY search results within the 19-parameter phenomenological Minimal Supersymmetric Standard Model (pMSSM), enabling a broader and more realistic exploration of SUSY. The particle-level results will be presented, while the detector-level results are still in progress to make an accurate conclusion. This work represents a step forward in guiding experimental efforts toward uncovering possible supersymmetric signals.