

Confronting muon $g-2$ in SUSY GUTs with LHC-Run3 and Dark Matter Experiments

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We explore the implications of supersymmetric grand unified theories about the muon anomalous magnetic moment (muon $g-2$). The discrepancy between the Standard Model (SM) prediction and the experiments in muon $g-2$ can be resolved by the contributions from the supersymmetric particles, and the fundamental parameter space of the muon $g-2$ resolution typically favors light sleptons ($< \sim 800$ GeV), charginos ($< \sim 900$ GeV) and LSP neutralino ($< \sim 600$ GeV). On the other hand, the current LHC experiments can probe the mass scales for the mentioned particles, and it is expected to have a stronger impact from LHC-Run3. We find that the chargino mass can be probed up to about 600 GeV, and LHC-Run3 is expected to test chargino masses up to about 700 GeV. Even though there is no direct impact on the slepton masses, these experiments are able to probe the sleptons up to about 350 GeV. However, these scales depend on the chirality of lighter slepton states, and one can still realize solutions with lighter charginos when the lighter slepton is mostly right-handed.

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