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Muon and Electron ($g-2$) Anomalies with Non-Holomorphic Interactions in MSSM

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The recent Fermilab muon $g - 2$ result and the same for electron due to fine-structure constant measurement through ^{133}Cs matter-wave interferometry are probed in relation to MSSM with non-holomorphic (NH) trilinear soft SUSY breaking terms, referred to as NHSSM. Supersymmetric contributions to charged lepton $(g - 2)_l$ can be enhanced via the new trilinear terms involving a wrong Higgs coupling with left and right-handed scalars. Bino-slepton loop is used to enhance the SUSY contribution to $g - 2$ where wino mass stays at 1.5 TeV and the left and right slepton mass parameters for the first two generations are considered to be the same. Unlike many MSSM-based analyses, the model does not require a light electroweakino, or light sleptons, or unequal left and right slepton masses, or a very large higgsino mass parameter. In our analysis large Yukawa threshold correction (an outcome of NHSSM) and opposite signs of trilinear NH coefficients associated with μ and e fields are used to satisfy the dual limits of Δa_μ and Δa_e (where the latter comes with negative sign) along with the limits from Higgs mass, B-physics, collider data, direct detection of dark matter (DM), while focusing on a higgsino DM which is underabundant in nature. Varying Yukawa threshold corrections provide the necessary flavor-dependent enhancement of $\Delta a_e/m_e^2$ compared to that of $\Delta a_\mu/m_\mu^2$. A larger Yukawa threshold correction through A'_e for y_e also takes away the direct proportionality of a_e with respect to $\tan \beta$. With a finite intercept, a_e becomes only an increasing function of $\tan \beta$. We identified the available parameter space in the two cases while also satisfying the ATLAS data from slepton pair production searches in the plane of slepton mass parameter and the mass of the lightest neutralino.

Session

Beyond the Standard Model

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