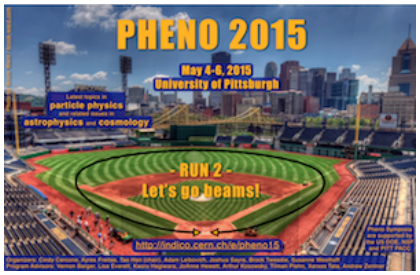

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Long-Lived Superparticles with Hadronic Decays at the LHC

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Supersymmetry searches at the LHC are both highly varied and highly constraining, but the vast majority are focused on cases where the final-stage visible decays are prompt. Scenarios featuring superparticles with detector-scale lifetimes have therefore remained a tantalizing possibility for sub-TeV SUSY, since explicit limits are relatively sparse. Nonetheless, the extremely low backgrounds of the few existing searches for collider-stable and displaced new particles facilitates recastings into powerful long-lived superparticle searches, even for models for which those searches are highly non-optimized. In this paper, we assess the status of such models in the context of baryonic R-parity violation, gauge mediation, and mini-split SUSY. We explore a number of common simplified spectra where hadronic decays can be important, employing recasts of LHC searches that utilize different detector systems and final-state objects. The LSP/NLSP possibilities considered here include generic colored superparticles such as the gluino and light-flavor squarks, as well as the lighter stop and the quasi-degenerate Higgsino multiplet motivated by naturalness. We find that complementary coverage over large swaths of mass and lifetime is achievable by superimposing limits, particularly from CMS's tracker-based displaced dijet search and heavy stable charged particle searches. Adding in prompt searches, we find many cases where a range of sparticle masses is now excluded from zero lifetime to infinite lifetime with no gaps. In other cases, the displaced searches furnish the only extant limits at any lifetime.

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