

# Signatures for SUSY with light higgsinos: from here to HL- and HE-LHC

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Upgrades in HL-LHC will allow access to unexplored domains of supersymmetry.

A highly motivated example consists of supersymmetric models with light higgsinos  $\sim 100 - 200$  GeV– as required by naturalness– which lead to four SUSY discovery channels arising from 1. gluino 2. stop 3. wino and 4. higgsino pair production.

Current searches for gluinos and stops within the context of simplified models are applicable since these channels are rich in  $b$ -jets although now a subset of cascade decay events should contain soft dilepton pairs arising from light higgsino-like neutralino decay. Wino pair production leads to clean same-sign dilepton+ $MET$  signatures which will become increasingly important with HL-LHC. Higgsino pair production generates soft dilepton+ $MET$  events which require hard initial state radiation for a trigger. A push for soft lepton identification– with  $p_T(\ell) \sim 3 - 20$  GeV– greatly advances this latter channel especially in the environment of HL-LHC.

Assessing the sensitivity of HL-LHC to such scenarios and many others requires accurately extrapolating current LHC searches to the future facilities, or implementing novel searches that take into account the capabilities of the new facilities. Consequently, an effective assessment depends on the availability of sufficient input from the collaborations, such as a reliable simulation of future detectors, or information on object performance. In this talk, I will summarize a list of signatures relevant for HL-LHC, the upgrade phenomenology efforts underway, the experimental inputs that are available and further information that would be useful to make these studies more effective.

## Presentation

Talk given in person

**Primary author:** BAER, Howard (University of Oklahoma)

**Presenter:** BAER, Howard (University of Oklahoma)