Search for Higgsinos with the ATLAS Detector

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Introduction

- SUSY predicts supersymmetric partners to the Higgs boson
- Search for higgsinos with low $m_H$, gravitino LSP
- Use $H \rightarrow h\tilde{G}$, $h \rightarrow bb$ decay channel

Background Estimation

- Difficult to estimate with MC
- Fully data-driven
- Divide into 2b, ≥4b samples
- ABCD method: final estimate $D=C*B/A$
- Train a Boosted Decision Tree to reweight kinematics $A \rightarrow B$
- Use this to correct $C \rightarrow D$

Event Selection

- Trigger on b-jets
- Require ≥4 jets, ≥2 b-jets
- Main backgrounds QCD, $t\bar{t}$
- Veto leptons, top quarks
- Define Control, Validation, and Signal Regions using reconstructed Higgs masses

Sensitivity

- 2d fit in $E_T^{miss}$, $m_{eff}$
- Expected limits
- Sensitive up to 700 GeV
- Exclude signal strengths as low as 0.2
- Complementary analyses target other possibilities
  - High-mass higgsinos
  - $H \rightarrow Z\tilde{G}$

References