Introduction

Supersymmetry (SUSY) is one of the most promising Beyond the Standard Model (BSM) paradigms. It has been thoroughly studied theoretically and experimentally at the LHC energy scales.

The lightest neutralino, \( \tilde{\chi}_1^0 \), as the lightest SUSY particle (LSP). Models parameterized in terms of SUSY masses with \( m_{\tilde{\chi}_1^0} = m_{\tilde{\chi}_2^0} > m_{\tilde{\chi}_3^0} \).


Multileptonic search optimization

Search focused on SUSY processes with kinematics nearly equal to SM WZ production (\( m_{\tilde{\chi}_1^0} + m_{\tilde{\chi}_2^0} \approx m_W \)).

Selection

- WZ-like* 3 lepton selection
- 3 light leptons (electrons or muons).
- Same flavor, opposite sign lepton pair.
- Missing transverse energy: \( p_T^{miss} > 30 \text{ GeV} \).
- No low-mass resonances: \( m_W > 2 \text{ GeV} \).
- Photon conversion veto: \( |m_{\tilde{\chi}_1^0} - m_{\tilde{\chi}_2^0}| > 3 \text{ GeV} \).

Background processes

- WZ: dominant background. Normalized to data in specific control region.
- Non-prompt leptons: data-driven estimation.
- Photon conversions (\( \chi \rightarrow \gamma \cdot \text{Jet} \)) Monte Carlo validated in control region.
- Others (minor): from Monte Carlo.

Signal extraction

- Multiple search regions, 58, defined to control SM behavior and be sensitive to different SUSY scenarios based on:
  - Closest to the Z mass dilepton invariant mass from an OSSF pair.
  - Transverse mass computed with the remaining lepton.
  - Total hadronic transverse momentum (sum of jet \( p_T \)).
  - Missing transverse energy.

No significant excess over SM prediction is observed

Combined search for electroweak production of charginos and neutralinos at 13 TeV with the CMS experiment

Carlos Francisco Erice Cid on behalf of the CMS Collaboration

2018 winter LHCC meeting, 28 Feb 2018, CERN, Geneva (Switzerland)

References

Combined search for electroweak production of charginos and neutralinos in proton-proton collisions at \( \sqrt{s} = 13 \text{ TeV} \)


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