

# Search for compressed mass Higgsino production with soft lepton tracks with the CMS experiment in proton-proton collision data at $\sqrt{s} = 13$ TeV

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DER FORSCHUNG | DER LEHRE | DER BILDUNG



**Abstract** This is the abstract

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# Chapter 1

## Introduction

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# Chapter 2

## Quantum Field Theory and The Standard Model

### 2.1 Quantum Field Theory

### 2.2 The Standard Model of particle physics

#### 2.2.1 The particle content





# Chapter 3

## Supersymmetry

### 3.0.1 Phenomenology of Higgsino production



# Chapter 4

## Multivariate Statistics

### 4.1 Decision Trees



# Chapter 5

## Experimental setup: Collider, detector, and algorithms

5.1 The Large Hadron Collider

5.2 The CMS detector

5.3 Event reconstruction and particle identification

5.4 Simulation of events







# Chapter 6

## Search for compressed mass Higgsino production with soft lepton tracks at CMS

### 6.1 Motivation

### 6.2 Previous Searches

### 6.3 Search Strategy

### 6.4 Simulated Samples

#### 6.4.1 Standard Model Simulated Samples

#### 6.4.2 Signall Simulated Samples

### 6.5 Object Selection

#### 6.5.1 Electrons

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#### Scale Factors

#### 6.5.3 Isolation

### 6.6 Trigger

### 6.7 Event Selection

#### 6.7.1 Boosted Decision Trees

### 6.8 Characterisation and Estimation of the Standard Model Backgrounds

### 6.9 Optimisation of Sensitivity

### 6.10 Results

# Chapter 7

## Jet Isolation and Non-Isolated Background Estimation

### 7.1 Jet Isolation

#### 7.1.1 Optimisation

### 7.2 Non-Isolated Background



# Chapter 8

## Summary



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