

# Search for Resonant Production of Muonic Lepton Jets

CMS Collaboration

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A signature-based search for groups of collimated muons (muonic lepton jets) is performed using  $35 \text{ pb}^{-1}$  of data collected by the CMS experiment at the LHC, at a center-of-mass energy of 7 TeV. The analysis inclusively searches for production of new low-mass states decaying into pairs of muons, and is designed to achieve high sensitivity to a broad range of models predicting muonic lepton jet signatures. With no excess observed in the data over the background expectation, upper limits on the production cross-section times branching ratio times acceptance are derived for several event topologies and range from 0.1 to 0.5 pb. In addition, the results are interpreted for several benchmark models in the context of SUSY with a low-mass dark sector, yielding limits on new physics exceeding the Tevatron reach.

## I. INTRODUCTION

### A. Motivation

### B. Model-independent strategy

### C. Benchmark dark matter models

## II. ANALYSIS SELECTION AND EFFICIENCY

### A. Dataset and trigger

### B. Offline selections and analysis

### C. Systematic uncertainty in efficiency

## III. BACKGROUND AND SIGNAL SHAPES

### A. Features of the low-mass dimuon spectrum

### B. Shape of backgrounds in $R_2^1$

### C. Shape of backgrounds in $R_4^1$

### D. Shape of backgrounds in $R_{22}^2$

### E. Shape of signals

## IV. STATISTICAL INTERPRETATION OF THE RESULTS

## V. RESULTS

### A. Model-independent limits

### B. Limits on benchmark models

## VI. CONCLUSIONS

### Appendix A: Event displays

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- [1] O. Adriani et al., Nature **458**, 607 (2009).