PHENO #15 to CMS

PRD 97 (2018) 092005 (May 2018); CMS PAS EXO-16-048 (May 2017)

Search for new physics in final states with an energetic jet or a hadronically decaying W or Z boson and transverse momentum imbalance at $\sqrt{s} = 13$ TeV

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(CMS Collaboration)

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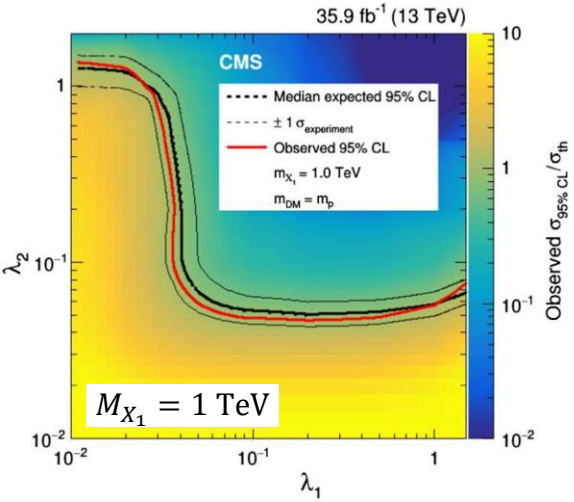
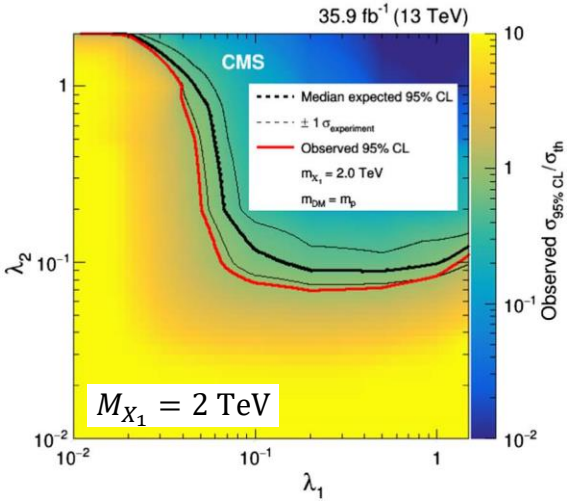
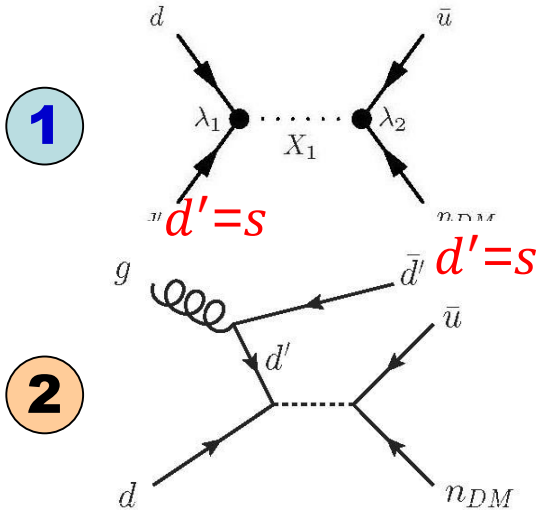
A search for new physics using events containing an imbalance in transverse momentum and one or more energetic jets arising from initial-state radiation or the hadronic decay of W or Z bosons is presented. A data sample of proton-proton collisions at $\sqrt{s} = 13$ TeV, collected with the CMS detector at the LHC and corresponding to an integrated luminosity of 35.9 fb^{-1}, is used. The observed data are found to be in agreement with the expectation from standard model processes. The results are interpreted as limits on the dark matter production cross section in simplified models with vector, axial-vector, scalar, and pseudoscalar mediators. Interpretations in the context of fermion portal and nonthermal dark matter models are also provided. In addition, the results are interpreted in terms of invisible decays of the Higgs boson and set stringent limits on the fundamental Planck scale in the Arkani-Hamed, Dimopoulos, and Dvali model with large extra spatial dimensions.

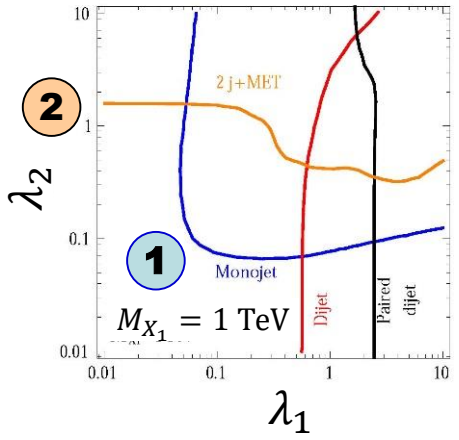
DOI: 10.1103/PhysRevD.97.092005





[21] B. Dutta, Y. Gao, and T. Kamon, Probing light nonthermal dark matter at the LHC, Phys. Rev. D **89**, 096009 (2014).
[22] R. Allahverdi and B. Dutta, Natural GeV dark matter and the baryon-dark matter coincidence puzzle, Phys. Rev. D **88**, 023525 (2013).

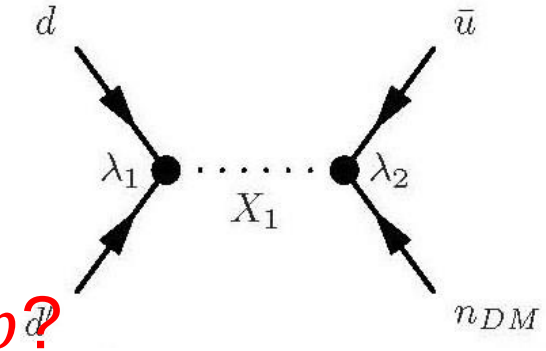




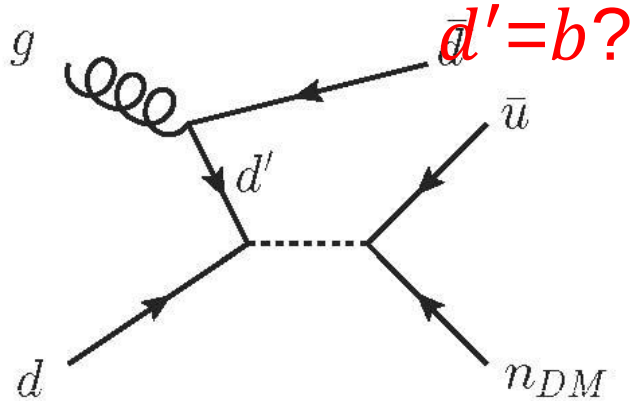
"monojet" + soft jet

Qatar PHENO

Reference: A Simple Testable Model of Baryon Number Violation: Baryogenesis, Dark Matter, Neutron-Antineutron Oscillation and Collider Signals
Rouzbeh Allahverdi, P. S. Bhupal Dev, Bhaskar Dutta,
https://arxiv.org/abs/1712.02713; Phys. Lett. B 02, 019 (2018)



$d'=b$?



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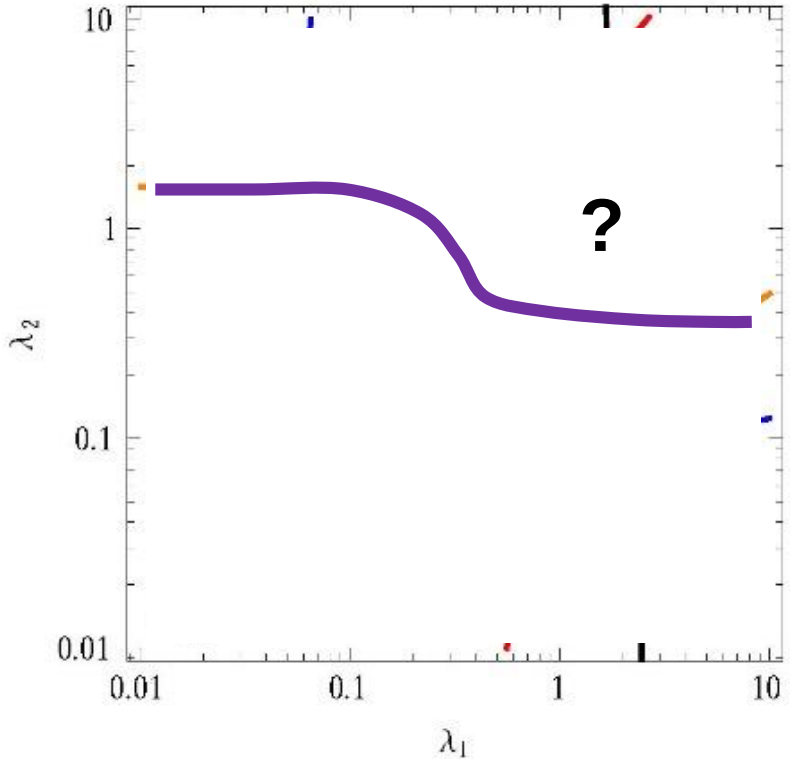


"monojet" + soft b

Q-PHENO: MadGraph

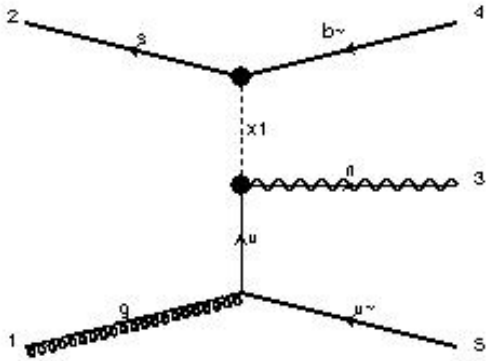


diagram 1 NP=4, QCD=1, QED=0

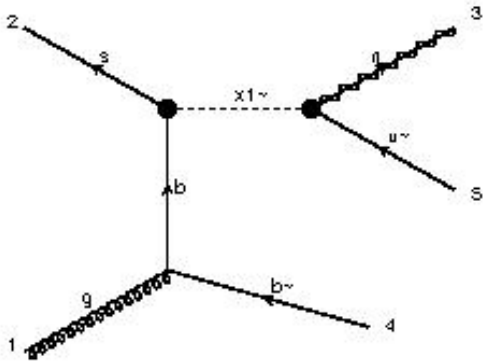


diagram 3 NP=4, QCD=1, QED=0

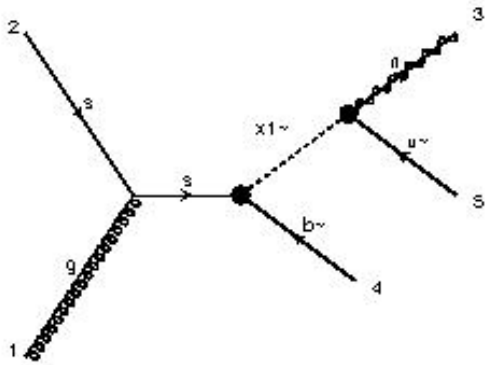
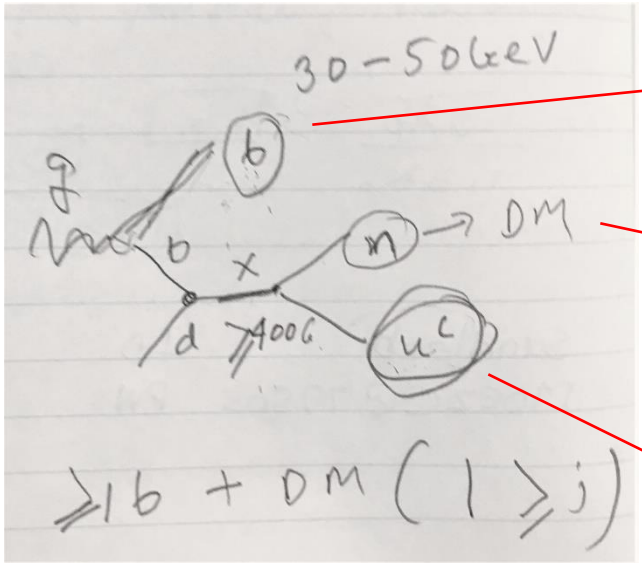
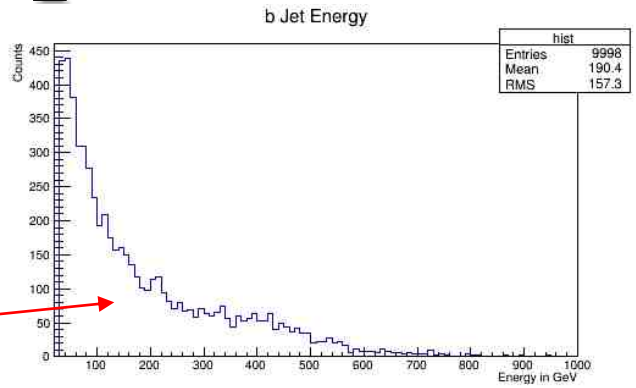
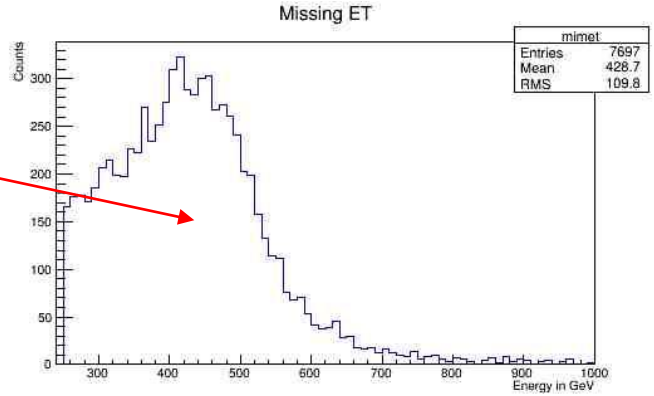


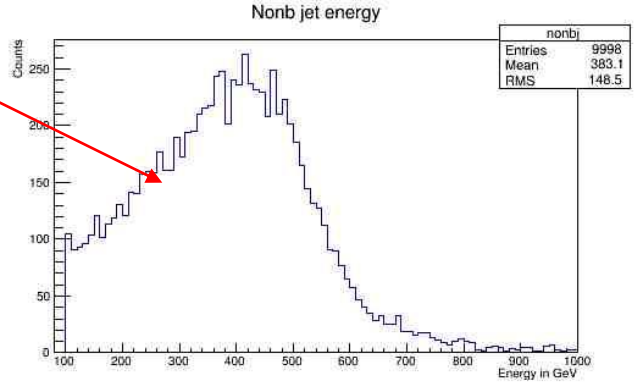
diagram 5 NP=4, QCD=1, QED=0

Q-PHENO: Delphes









Q-PHENO: Physics Results