

Phenomenological MSSM interpretation of CMS searches in pp collisions at $\sqrt{s} = 7$ and 8 TeV



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ABSTRACT: Searches for new physics by the CMS collaboration are interpreted in the framework of the phenomenological minimal supersymmetric standard model (pMSSM). The data samples used in this study were collected at $\sqrt{s} = 7$ and 8 TeV and have integrated luminosities of 5.0 fb^{-1} and 19.5 fb^{-1} , respectively. A global Bayesian analysis is performed, incorporating results from a broad range of CMS supersymmetry searches, as well as constraints from other experiments. Because the pMSSM incorporates several well-motivated assumptions that reduce the 120 parameters of the MSSM to just 19 parameters defined at the electroweak scale, it is possible to assess the results of the study in a relatively straightforward way. Approximately half of the model points in a potentially accessible subspace of the pMSSM are excluded, including all pMSSM model points with a gluino mass below 500 GeV, as well as models with a squark mass less than 300 GeV. Models with chargino and neutralino masses below 200 GeV are disfavored, but no mass range of model points can be ruled out based on the analyses considered. The nonexcluded regions in the pMSSM parameter space are characterized in terms of physical processes and key observables, and implications for future searches are discussed.

KEYWORDS: Hadron-Hadron scattering (experiments), Supersymmetry

ARXIV EPRINT: [1606.03577](https://arxiv.org/abs/1606.03577)

Individuals have received support from the Marie-Curie program and the European Research Council and EPLANET (European Union); the Leventis Foundation; the A. P. Sloan Foundation; the Alexander von Humboldt Foundation; the Belgian Federal Science Policy Office; the Fonds pour la Formation à la Recherche dans l'Industrie et dans l'Agriculture (FRIA-Belgium); the Agentschap voor Innovatie door Wetenschap en Technologie (IWT-Belgium); the Ministry of Education, Youth and Sports (MEYS) of the Czech Republic; the Council of Science and Industrial Research, India; the HOMING PLUS program of the Foundation for Polish Science, cofinanced from European Union, Regional Development Fund; the Mobility Plus program of the Ministry of Science and Higher Education (Poland); the OPUS program, contract Sonata-bis DEC-2012/07/E/ST2/01406 of the National Science Center (Poland); the Thalís and Aristeia programs cofinanced by EU-ESF and the Greek NSRF; the National Priorities Research Program by Qatar National Research Fund; the Programa Clarín-COFUND del Principado de Asturias; the Rachadapisek Sompot Fund for Postdoctoral Fellowship, Chulalongkorn University (Thailand); the Chulalongkorn Academic into Its 2nd Century Project Advancement Project (Thailand); and the Welch Foundation, contract C-1845.

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