LHC(CMS) SUSY discovery potential for the case of nonuniversal gaugino masses[1]

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We investigate squark and gluino pair production at LHC(CMS) for the case of nonuniversal gaugino masses. Visibility of signal by an excess over SM background in $(n \geq 2)jets + E_T^{miss} + (m \geq leptons)$ events depends rather strongly on the relation between LSP, gluino and squark masses and it decreases with the increase of LSP mass. For relatively heavy LSP mass close to squark or gluino masses it is possible to detect SUSY for $(m_{\tilde{q}}, m_{\tilde{g}}) \leq (1 - 1.5)$ TeV.

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1 Introduction

One of the LHC supergoals is the discovery of the supersymmetry. In ref.[1] (see, also references [2]) the LHC(CMS) SUSY discovery potential has been investigated within the minimal SUGRA-MSSM model [3] where all sparticle masses are determined mainly by two parameters: m_0 (common squark and slepton mass at GUT scale) and $m_{\frac{1}{2}}$ (common gaugino mass at GUT scale). The signature used for the search for squarks and gluino at LHC is $(m \geq 0)$ leptons + $(n \geq 2)jets + E_T^{miss}$ events. The conclusion of ref. [1] is that LHC(CMS) is able to detect squarks and gluino with masses up to (2 - 2.5) TeV.

Despite the simplicity of the SUGRA-MSSM model it is a very particular model and we can expect that real sparticle masses can differ in a drastic way from sparticle masses pattern of SUGRA-MSSM model due to many reasons, see for instance refs. [4, 5, 6]. Therefore, it is more appropriate to investigate the LHC SUSY discovery potential in a model-independent way.

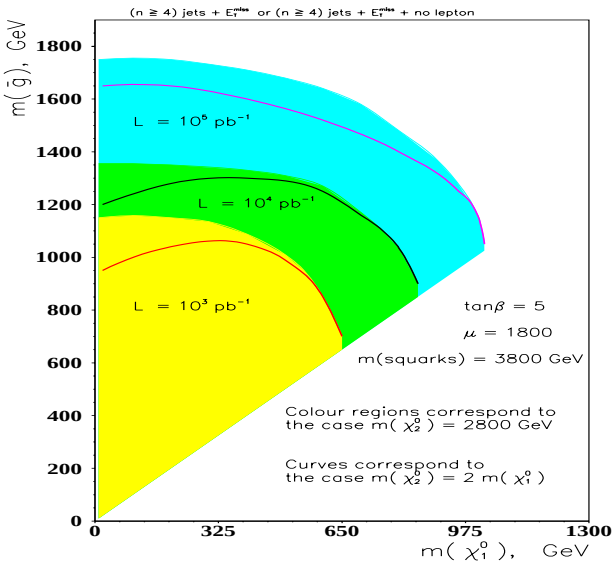

Figure 1: CMS discovery potential for different values of $m_{\tilde{\chi}_1^0}$ and $m_{\tilde{g}}$ in the case of $m_{\tilde{g}} > m_{\tilde{\chi}_1^0}$ $(m_{\tilde{q}} \gg m_{\tilde{g}})$.

2 Results

This talk is based on our papers [7] where the reader can find additional information. Our main conclusion is that LHC SUSY discovery potential depends rather strongly on the relation between squark, gluino and LSP masses and it decreases with the increase of the LSP mass. For LSP mass close to squark or gluino masses it is possible to detect SUSY at LHC for squark and gluino masses up to $(1 - 1.5)\ TeV$. Our results on LHC(CMS) SUSY discovery potential are presented in Figs.1-2.

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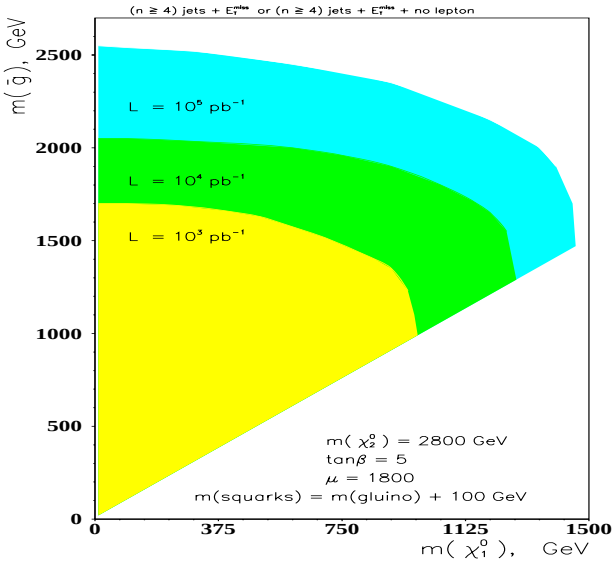

Figure 2: CMS discovery potential for different values of $m_{\tilde{\chi}_1^0}$ and $m_{\tilde{g}}$ in the case of $m_{\tilde{g}} > m_{\tilde{\chi}_1^0}$ $(m_{\tilde{q}} = m_{\tilde{g}} + 100$ GeV).

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