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LHC constraints on monojet signatures from electroweakino DM and coloured-superpartner decays

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We revisit LHC searches for heavy invisible particles. First recasting a dijet signal region in a general multijet plus missing transverse momentum analysis by ATLAS. We find that non-trivial mass limits can be obtained for the Wino and Higgsino LSP scenarios with the present data. We then study monojet/dijet channels as a tool for searching for squarks and gluinos with distinct mass hierarchies. In the case of large mass hierarchy between the squarks and the lightest electroweakino ($\tilde{\chi}$), the associated squark-wino production, $pp \to \tilde{q}\tilde{\chi}$ can lead to a mono-jet like signature, where the high p_T jet is originated from the squark decay, $\tilde{q} \to q + \tilde{\chi}$. This associated production, toghether with $pp \to \tilde{W}\tilde{W} +$ jets production, has a significant impact on the exclusion limit in the squark-neutralino mass plane. In the case that either either squarks or gluinos are only a few GeV heavier than the LSP, associated squark-gluino production, $pp \to \tilde{q}\tilde{g}$ can lead to a distinctive mono-jet signature, where the high p_T jet is produced from the decay of the heavier coloured particle into the lighter one and the lighter coloured particle is invisible due to the approximate mass degeneracy. We show that non-trivial exclusion limits in the squark-gluino mass plane can be obtained from existing monojet and dijet analyses.

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