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The Two Hemisphere Method for Searches of Multijet BSM Signals

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A new method for identifying hints of possible *beyond the standard model* (BSM) signals with energetic high jet multiplicity final states is proposed. In particular, the QCD background is estimated in a data driven way. Based on the simplified picture where QCD multijet events are created from a 2→2 process followed by cascade branching of the outcoming partons, the proposed "Two Hemisphere Method"(THm) divides events to two hemispheres and predicts the distribution of the number of jets in a predefined high multiplicity signal region. Validation of the above-mentioned assumption was performed using LO, NLO, and NNLO simulations, showing no effect of higher order calculations on the prediction accuracy.

The sensitivity of a search based on the proposed procedure was examined on two topologically distinct scenarios: micro-Black Hole (mBH) and R-parity violating (RPV) SUSY models. The THm was not efficient on mBH due to signal contamination in the supposed signal free control region. Sensitivity for RPV SUSY showed comparable sensitivity to other methods used in previous analyses. Since the sources of the uncertainties in this new approach are very different from the current methods, the procedures complement one another.

Author: TURGEMAN, Daniel (Weizmann Institute of Science (IL))

Presenter: TURGEMAN, Daniel (Weizmann Institute of Science (IL))

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