Contribution ID: **18** Type: **not specified**

Optimal Mass Variables for Semivisible Jets

Friday 4 November 2022 14:20 (20 minutes)

We apply the artificial event variable technique, a deep neural network with an information bottleneck, to strongly coupled hidden sector models. These models of physics beyond the standard model predict collider production of invisible, composite dark matter candidates mixed with regular hadrons in the form of semivisible jets. We explore different resonant production mechanisms to determine in which cases the machine learning approach provides an advantage over classical mass reconstruction. The results show that this technique is quite general and can be successfully applied even to very complicated physical models. We further demonstrate the viability of conducting an actual search for new physics using this method.

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Session Classification: Anomaly Detection