Abstract Submitted
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Development of a Novel Jet Tagging Technique for LHC Collisions[1] ELLIOTT KAUFFMAN, Duke University — The ATLAS Experiment attempts to discover new phenomena through proton collisions performed by the LHC. I present a new search method for new phenomena in LHC events with a jet + γ using the metric "Energy Movers Distance" (EMD), which quantifies the difference between jets. By tagging anomalous jets, new physics could be uncovered. EMD appears promising in that it is model-independent and involves a CWOLA (Classification without Labels) search between mass bins, instead of using simulations. This study analyzes the distribution of this metric for events with a jet and a photon, comparing events grouped by the combined jet+γ mass based on the EMD values. The sensitivity of an EMD study is tested through two methods. The first uses the average EMD value in a particular mass bin. The second uses a k-nearest neighbors approach. These are tested on simulated ATLAS data, then injecting anomalous jets into the data at various ratios to determine whether observing them is possible. I conclude that a more sensitive approach to the analysis of signal injection is needed. This will include a more in-depth statistical analysis, using different injection samples or applying these strategies to ATLAS data directly to determine how different jets need to be for them to be tagged.

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