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Mass Unspecific Supervised Tagging (MUST) for boosted jets

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Jet identification tools are crucial for new physics searches at the LHC and at future colliders. We introduce the concept of Mass Unspecific Supervised Tagging (MUST) which relies on considering both jet mass and transverse momentum varying over wide ranges as input variables - together with jet substructure observables - of a multivariate tool. This approach not only provides a single efficient tagger for arbitrary ranges of jet mass and transverse momentum, but also an optimal solution for the mass correlation problem inherent to current taggers. By training neural networks, we build MUST-inspired generic and multi-pronged jet taggers which, when tested with various new physics signals, clearly outperform the variables commonly used by experiments to discriminate signal from background. These taggers are also efficient to spot signals for which they have not been trained. Taggers can also be built to determine, with a high degree of confidence, the prongness of a jet, which would be of utmost importance in case a new physics signal is discovered.

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