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Tagging boosted weak gauge bosons with deep learning

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We demonstrate that the classification of boosted, hadronically-decaying weak gauge bosons can be significantly improved over traditional cut-based and BDT-based methods by using deep learning and the jet charge variable. We construct binary taggers for W+ vs. W− and Z vs. W discrimination, as well as an overall ternary classifier for W+/W−/Z discrimination. We construct both ordinary and new composite CNNs. The method enhances the physics potential in SM measurements and searches for new physics that is sensitive to the electric charge of weak gauge bosons.

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