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Towards polarization fraction measurement in Vector Boson Scattering at the HL-LHC with Deep Neural Networks

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Vector boson scattering (VBS) is a pure electroweak process arising in high-energy collisions and playing a crucial role in the electroweak symmetry breaking. The analysis of VBS processes, with the measurement of the longitudinal polarization of the vector bosons, constitutes a promising way to investigate unitarity restoration with the Higgs mechanism, and search for possible new physics. This very rare process will be accessible but very difficult to observe at the HL-LHC. A new architecture of Deep Neural Networks, called "particle-based"DNN, is proposed to improve the discovery potential, and is applied to same sign WW scattering and ZZ scattering. It is also shown how the preparation of input features and post-processing can improve the significance.

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Classification de thématique: ML for analysis : Application of Machine Learning to analysis, event classification and fundamental parameters inference