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Two Invertible Networks for the Matrix Element Method (10+5)

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The matrix element method is widely considered the ultimate LHC inference tool for small event numbers, but computationally expensive. We show how a combination of two conditional generative neural networks encodes the QCD radiation and detector effects without any simplifying assumptions, and allows us to efficiently compute likelihoods for individual events. We illustrate our approach for the CP-violating phase of the top Yukawa coupling in associated Higgs and single-top production. Currently, the limiting factor for the precision of our approach is jet combinatorics.

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