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ν-flows: Conditional neutrino momentum regression

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We present ν-Flows, a novel method for restricting the likelihood space of neutrino kinematics in high energy collider experiments using conditional normalizing flows and deep invertible neural networks.
This method allows the recovery of the full neutrino momentum, which is usually left as a free parameter, and permits one to sample neutrino values under a learned conditional likelihood given event observations.

We demonstrate the success of ν-Flows in a case study by applying it to simulated semileptonic ttbar events and show that it can lead to more accurate momentum reconstruction, particularly of the longitudinal coordinate. We also show that this has direct benefits in a downstream task of jet association, leading to an improvement of up to a factor of 1.41 compared to conventional methods.

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