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A(i)DAPT Program

A(i)DAPT is a program which aims to utilize AI techniques, in particular generative modeling, to support Nuclear and High Energy Physics experiments. Its purpose is to extract physics directly from data in the most complete manner possible. Generative models such GANs are employed to capture the full correlations between particles in the final state of nuclear reactions. This many-fold program will allow us to to achieve various goals including accurately fitting data in a multidimensional space and unfolding detector effects to minimize their impact on the relevant physics. Moreover, it will enable us to store a large amount of realistic-like data in an extremely compact format and to extract reaction amplitudes in an alternative way. We aim at incorporating universality of scattering amplitudes, training networks with different kinematics of the same final state or different final states to recover the underlying physics. As of today, we've conducted a positive closure test on inclusive electron scattering, demonstrating that generative models are able to reproduce $2-\pi$ photoproduction data. We also showed that GANs are a viable tool to unfold detector smearing and acceptance, ensuring the preservation of initial correlations.

AI keywords

Generative Adversarial Networks; simulation-based inference; Multi-dimensional correlations;

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