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Fast Particle Cloud Generation with Flow Matching and Diffusion

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We introduce two novel techniques for the efficient generation of jets as low-level particle clouds. Firstly, we present EPiC-JeDi, which integrates the score-based diffusion model from PC-JeDI with the fast and computationally efficient equivariant point cloud (EPiC) layers used in the EPiC-GAN. Secondly, we introduce EPiC-FM, which shares the same architecture but employs a continuous normalizing flow approach trained using optimal transport flow matching (FM). Our models not only achieve competitive performance compared to the current state-of-the-art methods in terms of various metrics assessing the quality of generated jets but also maintain rapid generation speeds.

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