

Pixel Detector Background Generation using Generative Adversarial Networks at Belle II

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The pixel vertex detector (PXD) is an essential part of the Belle II detector recording particle positions. Data from the PXD and other sensors allow us to reconstruct particle tracks and decay vertices. The effect of background hits on track reconstruction is simulated by adding measured or simulated background hit patterns to the hits produced by simulated signal particles. This model requires a large set of statistically independent PXD background noise samples to avoid a systematic bias of reconstructed tracks. However, data from the fine-grained PXD requires a substantial amount of storage. As an efficient way of producing background noise, we explore the idea of an on-demand PXD background generator using conditional Generative Adversarial Networks (GANs), adapted by the number of PXD sensors in order to both increase the image fidelity and produce sensor-dependent PXD hitmaps.

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