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Pixel Vertex Detector background generation with Generative Adversarial Network

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The Pixel Vertex Detector (PXD) is the innermost detector of the Belle II experiment. Information from the PXD, together with data from other detectors, allows to have a very precise vertex reconstruction. The effect of beam background on reconstruction is studied by adding measured or simulated background hit patterns to hits produced by simulated signal particles. This requires a huge sample of statistically independent PXD background noise hit patterns to avoid systematic biases, resulting in a huge amount of storage due to the high granularity of the PXD sensors. As an efficient way of producing background noise, we explore the idea of an on-demand PXD background generator realised using Generative Adversarial Networks (GANs). In order to evaluate the quality of generated background we measure physical quantities which are sensitive to the background in the PXD.

Primary authors: NOVISSIMO, Fabio (BELLE (BELLE II Experiment)); HARTMANN, Nikolai (BELLE (BELLE II Experiment)); KUHR, Thomas (BELLE (BELLE II Experiment))

Presenter: NOVISSIMO, Fabio (BELLE (BELLE II Experiment))