

Belle II PXD background generation using generative models

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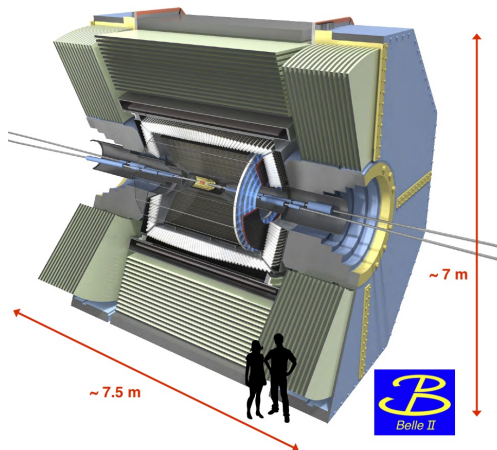
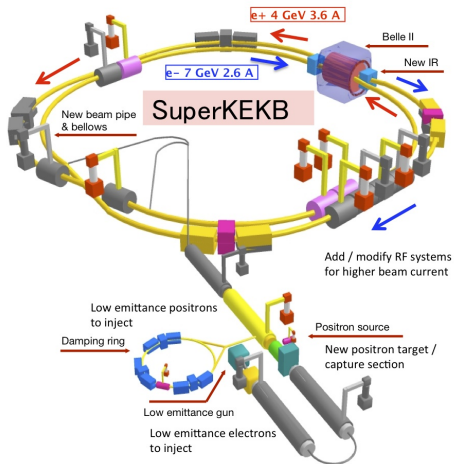
EuCAIFCon, June 17th 2025



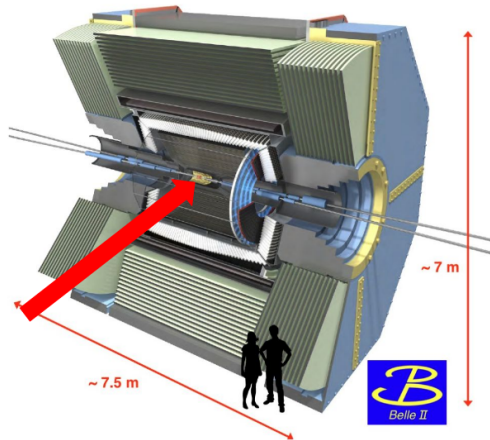
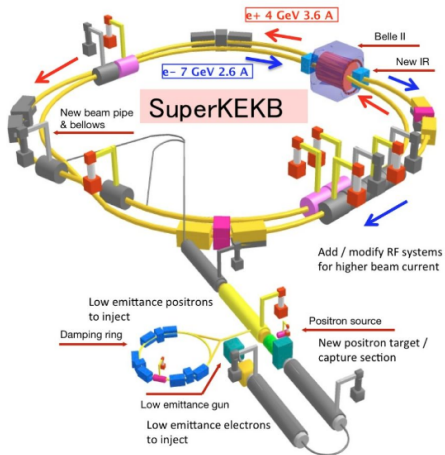
Bundesministerium
für Bildung
und Forschung



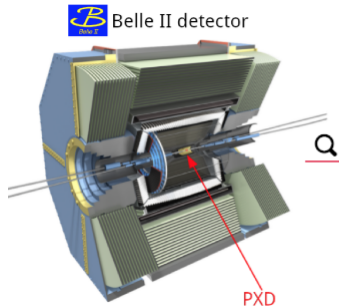
The Belle II Experiment



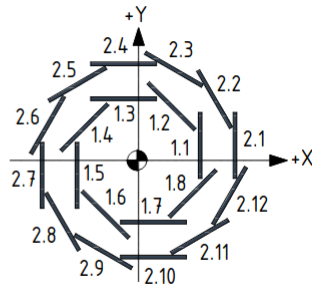
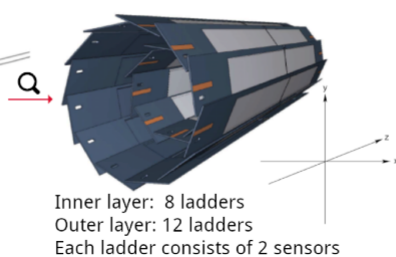
The Belle II Experiment



Pixel Vertex Detector

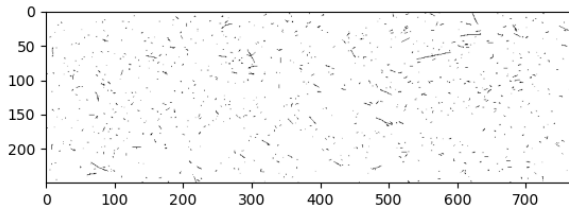


PXD sensors inside the detector
Two layers: inner & outer

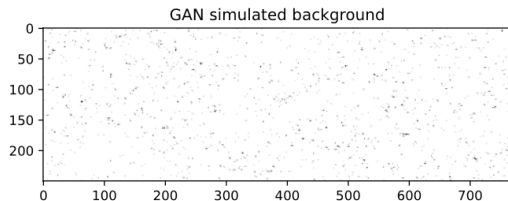




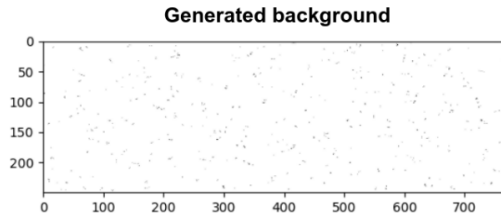
- ▶ Majority of PXD hits originates from background processes.
- ▶ We want to simulate the background:
- ▶ Monte Carlo simulation (GEANT 4)
 - ▶ Shows sizeable discrepancies with data.
- ▶ Taking random trigger events:
 - ▶ Problem: large amount of resources required to store and distribute the background data.
- ▶ Solution → Generative models!



Generative Adversarial Networks



Diffusion models



How well do these generative model perform? → come to the poster session!