

Domain-Adaptive GNNs for Λ Tagging in CLAS12

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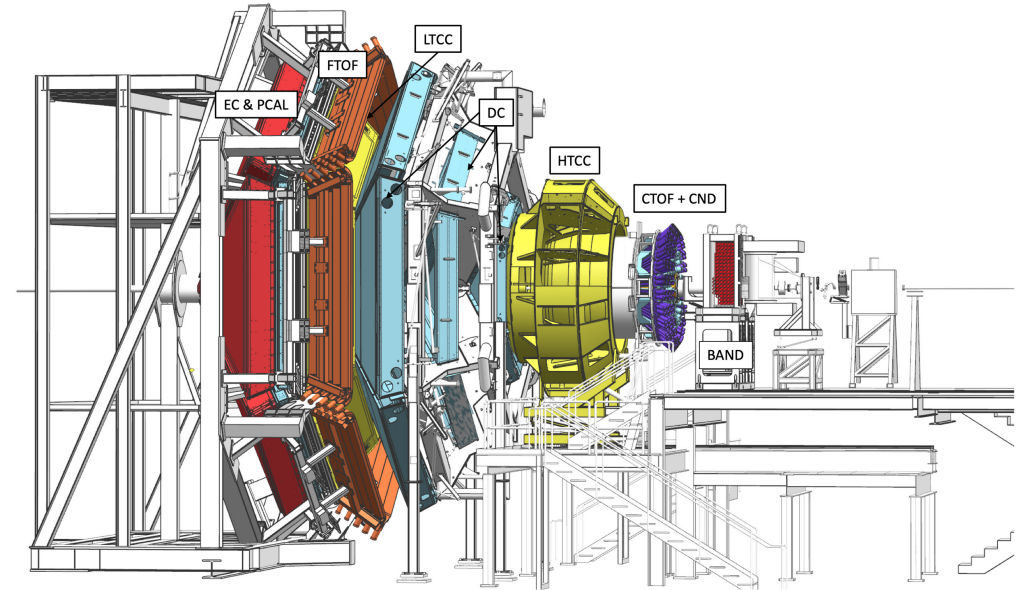
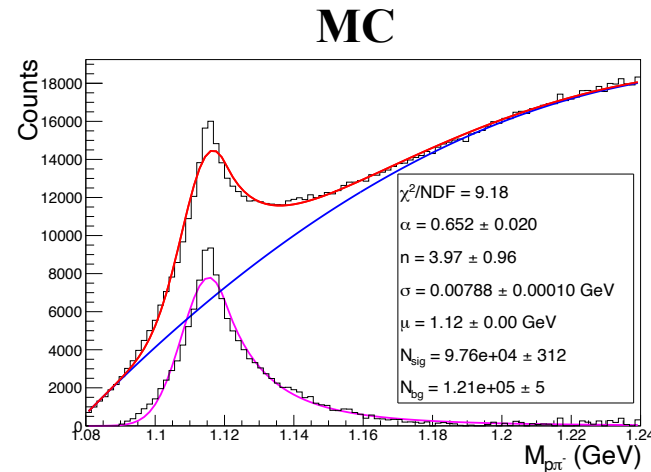
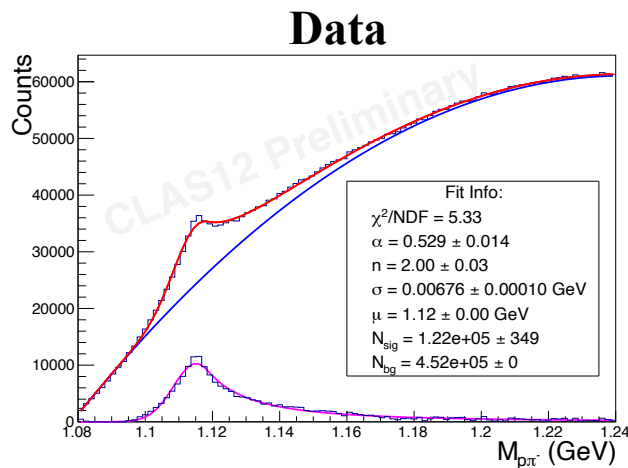
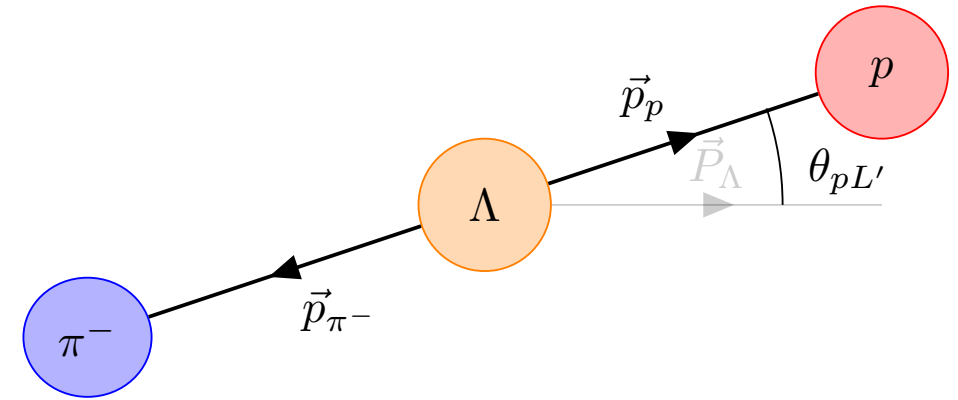
AI Townhall, August 30, 2023

Λ Baryons

- Λ polarization is easily accessible from the $\Lambda \rightarrow p\pi^-$ channel:

$$\frac{dN}{d\Omega_p} \propto 1 + \alpha P \cdot \hat{n}_p$$

- Same channel will be studied at the EIC

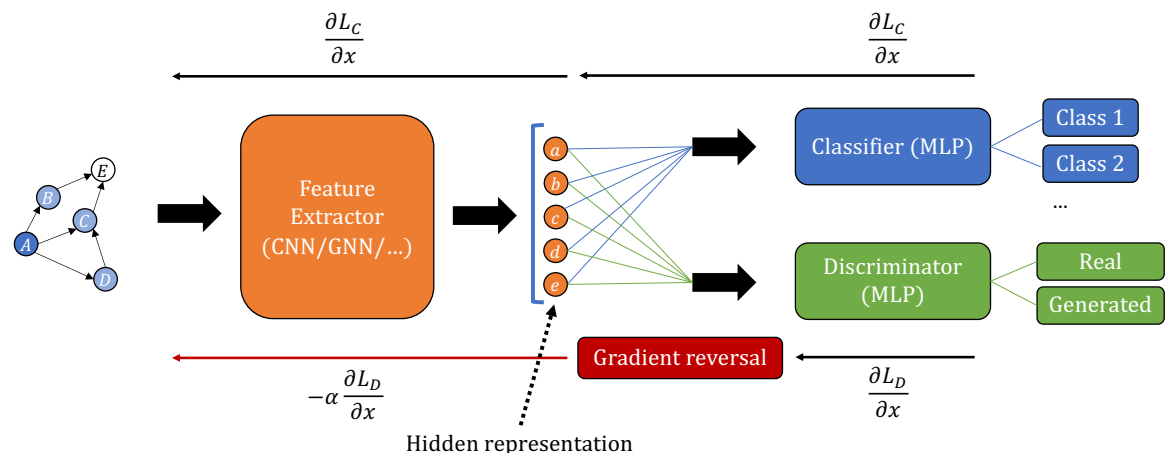


V. Burkert, et al. NIM A 2020.

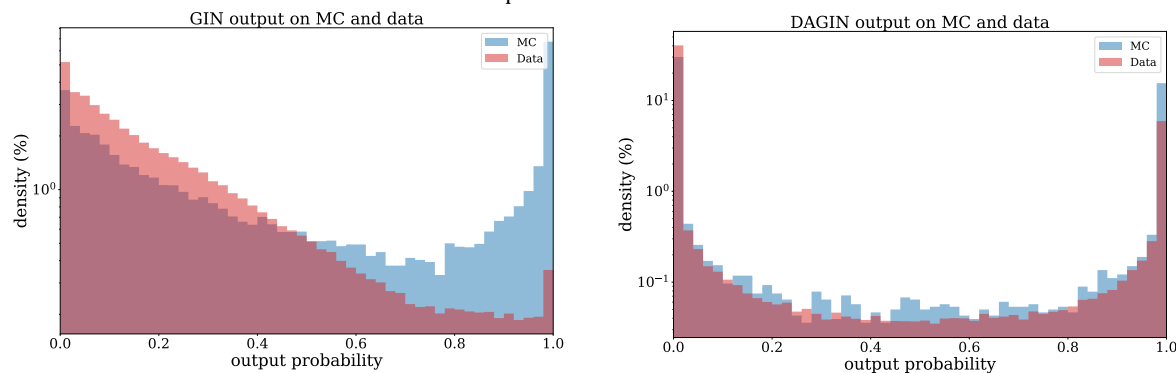
Domain-Adaptation

Domain-Adversarial Training

Penalize network for distinguishing between data and MC

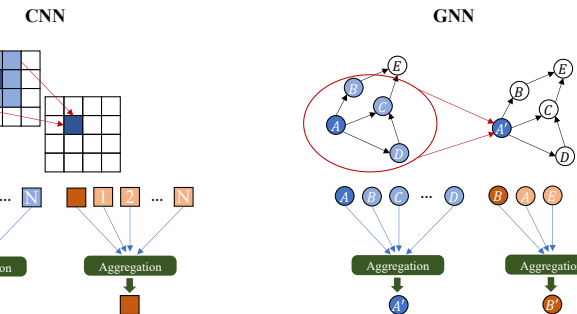


Hidden representation



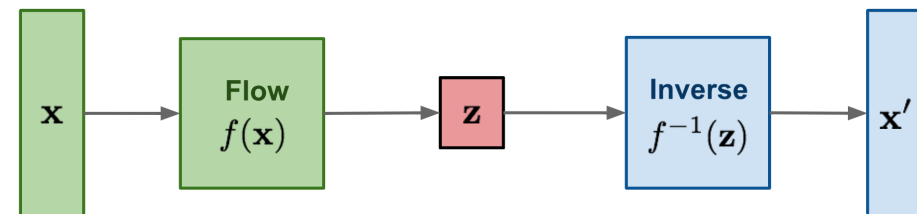
30 August 2023

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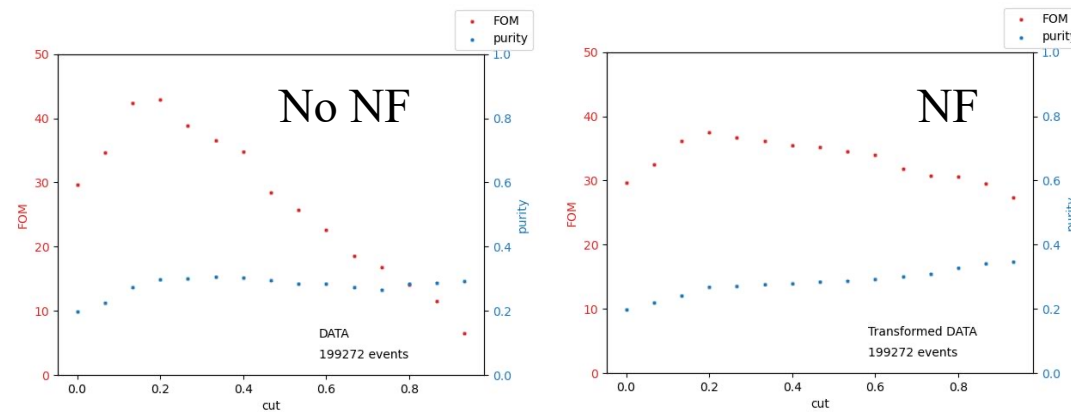


Normalizing Flows

Transform latent representation of data to an MC-like distribution



P. Lippe. UVA deep learning tutorial 11: Normalizing flows for image modeling, 2022.



NF work by Rowan Kelleher

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Thank you!

Normalizing Flows

- Normalizing flows (NFs) are generative models that can **learn the probability density function of a complex distribution**.
- NFs transform a simple probability distribution to a more complex distribution via a sequence of **invertible, differentiable functions**.
- NFs were trained to model the latent representation of simulation Lambda events (background and signal) as well as data events, allowing for a **transformation from data to an MC-like distribution**
- Classification of Lambda signal events on transformed data **flattened the figure of merit curve significantly**, improving generalizability

Slide from Rowan Kelleher

