Contribution ID: **52** Type: **Poster**

An updated hybrid deep learning algorithm for identifying and locating primary vertices

Monday, April 20, 2020 3:15 PM (10 minutes)

In the transition to Run 3 in 2021, LHCb will undergo a major luminosity upgrade, going from 1.1 to 5.6 expected visible Primary Vertices (PVs) per event, and it will adopt a purely software trigger. We present an improved hybrid algorithm for vertexing in the upgrade conditions. We use a custom kernel to transform the sparse 3D space of hits and tracks into a dense 1D dataset, and then apply Deep Learning techniques to find PV locations using proxy distributions to encode the truth in training data. Last year we reported that training networks on our kernels using several Convolutional Neural Network layers yielded better than 90% efficiency with no more than 0.2 False Positives (FPs) per event. Modifying several elements of the algorithm, we now achieve better than 94% efficiency with a significantly lower FP rate. Where our studies to date have been made using toy Monte Carlo (MC), we are just now beginning to study KDEs produced from complete LHCb Run 3 MC data, including full tracking in the vertex locator rather than proto-tracking. We anticipate showing results from these studies as well.

Consider for young scientist forum (Student or postdoc speaker)

No

Second most appropriate track (if necessary)

Advanced usage of tracks

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