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## Jet Flavour Tagging at FCC-ee with a Transformer-based Neural Network: DeepJetTransformer

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Jet flavour tagging is crucial in experimental high-energy physics. A tagging algorithm, DeepJetTransformer, is presented, which exploits a transformer-based neural network that is substantially faster to train.

The DeepJetTransformer network uses information from particle flow-style objects and secondary vertex reconstruction as is standard for  $b$ - and  $c$ -jet identification supplemented by additional information, such as reconstructed  $V^0$ s and  $K^\pm/\pi^\pm$  discrimination, typically not included in tagging algorithms at the LHC. The model is trained as a multiclassifier to identify all quark flavours separately and performs excellently in identifying  $b$ - and  $c$ -jets. An  $s$ -tagging efficiency of 40% can be achieved with a 10%  $ud$ -jet background efficiency. The impact of including  $V^0$ s and  $K^\pm/\pi^\pm$  discrimination is presented.

The network is applied on exclusive  $Z \rightarrow q\bar{q}$  samples to examine the physics potential and is shown to isolate  $Z \rightarrow s\bar{s}$  events. Assuming all other backgrounds can be efficiently rejected, a  $5\sigma$  discovery significance for  $Z \rightarrow s\bar{s}$  can be achieved with an integrated luminosity of  $60 \text{ nb}^{-1}$ , corresponding to less than a second of the FCC-ee run plan at the  $Z$  resonance.

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