



Contribution ID: 10

Type: Plenary

## Application of the Deep Sets architecture to track-based flavour tagging with the ATLAS detector

*Tuesday 21 April 2020 19:00 (25 minutes)*

Flavour Tagging is a major client for tracking in particle physics experiments at high energy colliders, where it is used to identify the experimental signatures of heavy flavour production. Among other features, charm and beauty hadron decays produce jets containing several tracks with large impact parameter. This work introduces a new architecture for Flavour Tagging, based on Deep Sets, which models the jet as a set of tracks. Such approach is an evolution with respect to the Recurrent Neural Network (RNN) currently adopted in the ATLAS experiment, which treats track collections as a sequence. The Deep Sets algorithm uses track impact parameters and kinematics within a permutation-invariant architecture, leading to a significant decrease in training and evaluation time, thus allowing for much faster turn-around times for optimisation. We compare the Deep Sets algorithm with current ATLAS Flavour Tagging benchmarks, provide an outlook on novel methods to explore and interpret the information the network has actually learnt in the training process.

### Consider for young scientist forum (Student or postdoc speaker)

Yes

### Second most appropriate track (if necessary)

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**Session Classification:** Recording sessions