



Contribution ID: 3

Type: not specified

## A $W^\pm$ polarization analyzer from Deep Neural Networks

*Wednesday 7 July 2021 11:20 (20 minutes)*

We train a Convolutional Neural Network to classify longitudinally and transversely polarized hadronic  $W^\pm$  using the images of boosted  $W^\pm$  jets as input. The images capture angular and energy information from the jet constituents that is faithful to the properties of the original quark/anti-quark  $W^\pm$  decay products without the need for invasive substructure cuts. We find that the difference between the polarizations is too subtle for the network to be used as an event-by-event tagger. However, given an ensemble of  $W^\pm$  events with unknown polarization, the average network output from that ensemble can be used to extract the longitudinal fraction  $f_L$ . We test the network on Standard Model  $pp \rightarrow W^\pm Z$  events and on  $pp \rightarrow W^\pm Z$  in the presence of dimension-6 operators that perturb the polarization composition.

### Academic Rank

PhD student

### Affiliation

University of Notre Dame

**Authors:** KIM, Taegyun (University of Notre Dame); MARTIN, Adam Orion (University of Notre Dame (US))

**Presenter:** KIM, Taegyun (University of Notre Dame)

**Session Classification:** Classification