

Graph Neural Network for event classification of four-top process in the fully hadronic channel

GOH Junghwan ^{*1}, YOO ChangHyun ¹, MOON Chang-Seong ², AN Soyun ², KIM Jiwoong ², WOO SeungHyeon ², KIM SungWon ³, KIM Tongil ³, YOO Hwidong ³

¹*Department of Physics, Kyung Hee University, 26 Kyungheedaero, Dongdaemun-gu, Seoul 02447, Republic of Korea*

²*Department of Physics, Kyungpook National University, 80 Daehakro, Bukgu, Daegu 41566, Republic of Korea*

³*Department of Physics, Yonsei University, 50 Yonsei-ro Seodaemun-gu, Seoul, 03722, Republic of Korea*

Corresponding author (Electronic mail: jhgoh@khu.ac.kr, csmoon@knu.ac.kr)

Deep Learning is a powerful tool to analyze the big data of high-energy physics. Typical problems in the high energy hadron collision are classifying events that consist of feature variables of multiple physics objects such as Jet's four-momentum, flavor tagging information. Convolutional Neural Network (CNN) can be used for event classification, although CNN has limitations with irregular geometry of detectors or sparse data. In this study, we adopt an advanced Deep Learning architecture, Graph Neural Network (GNN) to discriminate between four-top, $t\bar{t}$, and QCD events.