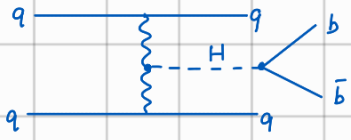
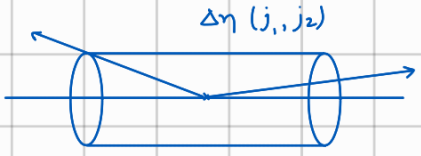
PHY654

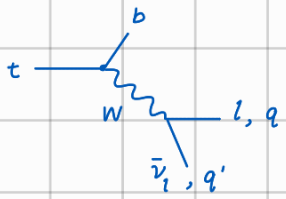
Machine Learning in Particle Physics

Monday, 30 September, 2024

Theory level	Detector Level	Features (X)
$y = 1$ 	2 b-jets	X_1 = njets (no. of jets) $X_2 = p_T$ (jet 1) $X_3 = p_T$ (jet 2) $X_4 = \Delta\eta(j_1, j_2)$
$y = 0$ 	2 b-jets 2 other jets	



- $t\bar{t}$ production (SM):



t t t t
bW bW bW bW
bqq' bqq' bqq' blν

2 bjets + 4 jets → fully hadronic (a decay mode) (y=0)

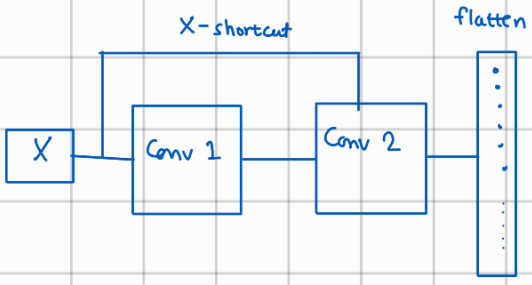
2 bjets + 2 jets + 1 lepton + ME_T → Semi-leptonic (a decay mode) (y=1)

t t
bW bW
blν blν

2 bjets + 2 leptons + ME_T → fully leptonic (a decay mode) (y=3)

Features (X)

	FH	SL	FL
X_1 (# of jets)			
X_2 (# of leptons)			
X_3 (ME_T)			
X_4 (p_T j1)			



Kaggle website

thispersondoesnotexist.com

Generative Model 1: Autoencoder.