

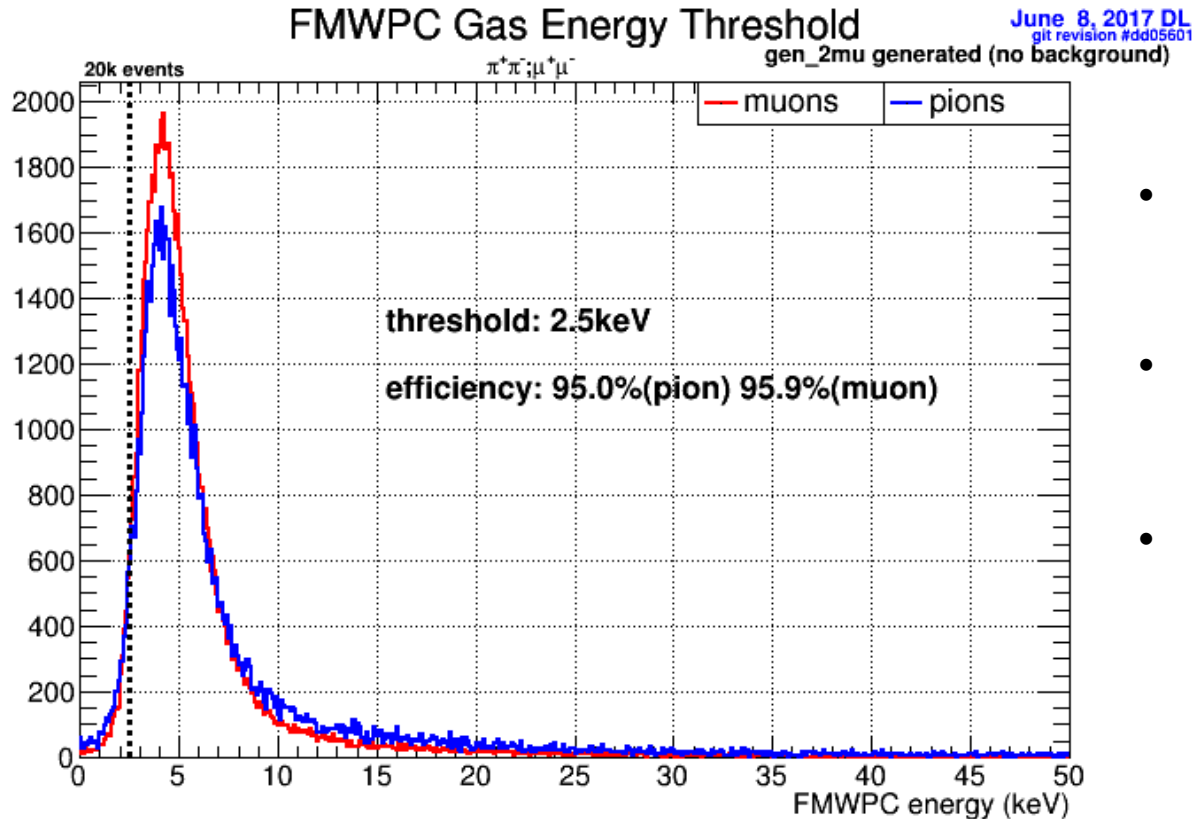
# Changes to CPPsim

David Lawrence

June 9, 2017

- FMWPC Hit Efficiency
- Beam induced background
- Target geometry
  - LH2 GlueX target replaced with 5% RL Pb disc

# FMWPC Simulated Hit Efficiency



- Pion distribution scaled to match integral of muons
- Electronic noise will likely determine the threshold
- pions have more large angle tracks than muons leading to the shape difference

# Hall D Coherent Bremsstrahlung Rate Calculator

Richard Jones, University of Connecticut  
August 12, 2012

<http://zeus.phys.uconn.edu/halld/cobrems/ratetool.cgi>

update

Electron beam energy  GeV

Electron beam current   $\mu\text{A}$

Electron beam emittance  m

Radiator thickness  m

Photon spectrum peak energy  GeV

Number of bins in photon spectrum

Photon spectrum energy maximum  GeV

Photon spectrum energy minimum  GeV

Radiator-collimator distance  m

Collimator diameter  m

Low edge of primary peak window  GeV

High edge of primary peak window  GeV

Low edge of background window  GeV

High edge of background window  GeV

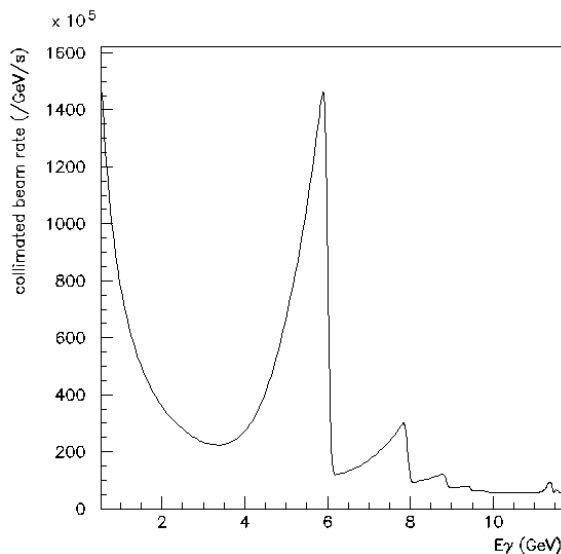
Low edge of endpoint tagging window  GeV

High edge of endpoint tagging window  GeV

**Primary peak sum is 72883816**

**Background flux sum is 304509664**

**Endpoint tagged flux sum is 459070400**



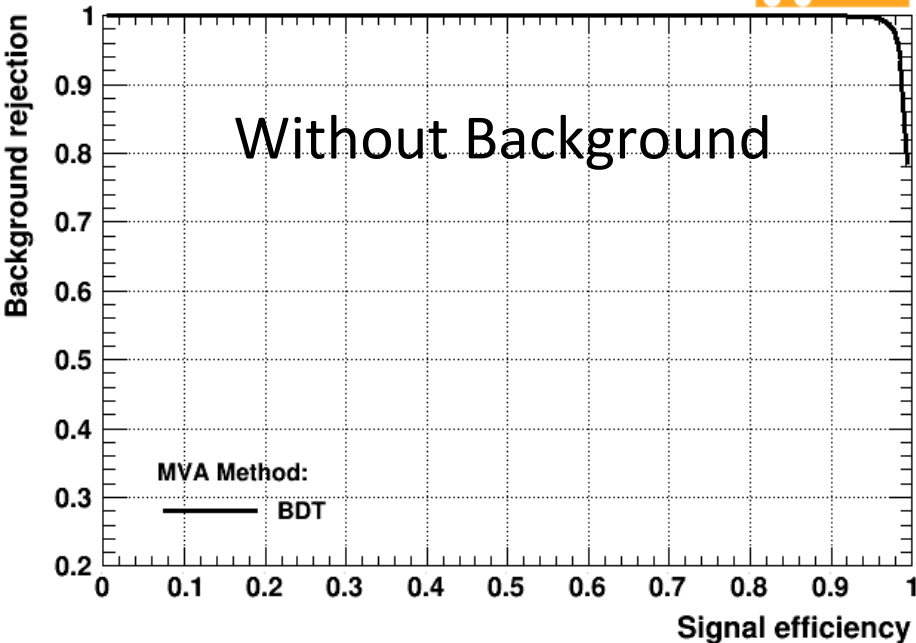
	Proposal	GlueX Spring 2017	Simulation
<b>Electron Beam Energy</b>	11.668	11.668	11.668
<b>Electron Beam Current</b>	50	100	100
<b>Radiator Thickness</b>	2.00E-05	5.80E-05	5.80E-05
<b>Photon Spectrum Peak Energy</b>	6	9	6
<b>Radiator Collimator Distance</b>	76	76	76
<b>Collimator diameter</b>	0.0034	0.005	0.005
<b>Coherent peak</b>	5.5 - 6GeV	8.4 - 9GeV	5.5 - 6GeV
<b>Primary Peak Sum</b>	9.27E+06	1.41E+07	6.26E+07
<b>Total Sum (GHz)</b>	0.048	0.318	0.451

# Addition of Beam Background

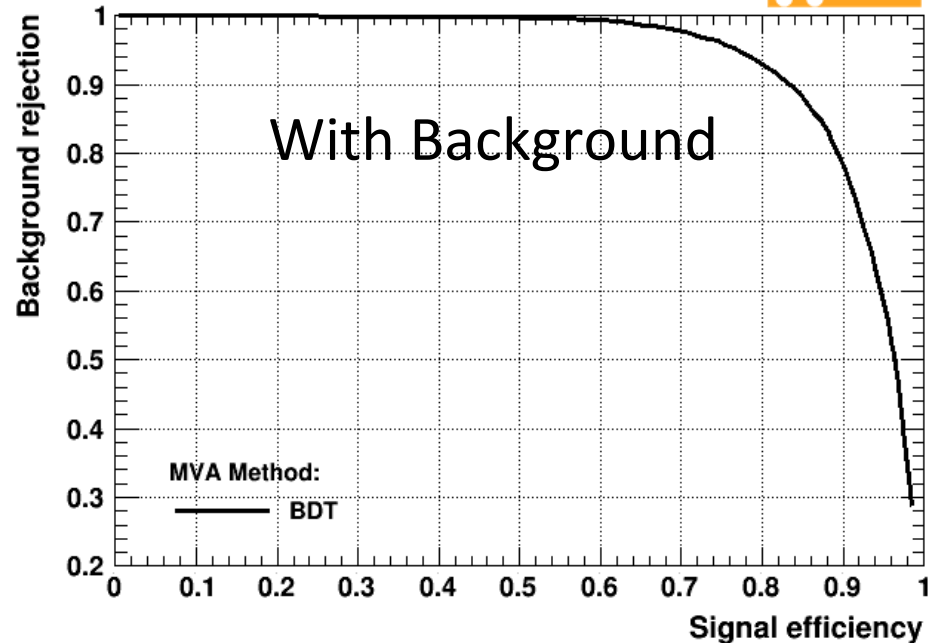
7 x 20cm Iron absorbers with 8 chambers interleaved

*(FMWPC Hit Efficiency and CPP Pb target included)*

Background rejection versus Signal efficiency



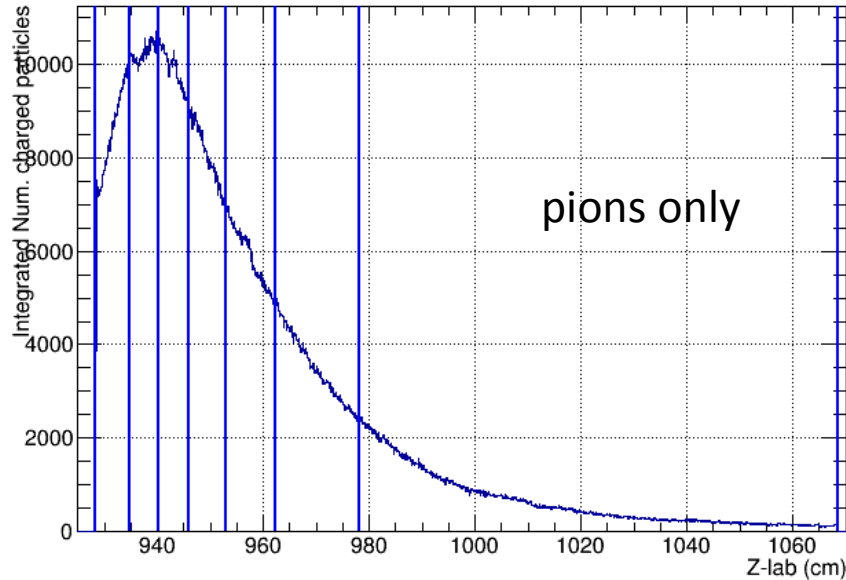
Background rejection versus Signal efficiency



# Asymmetric Iron Absorbers

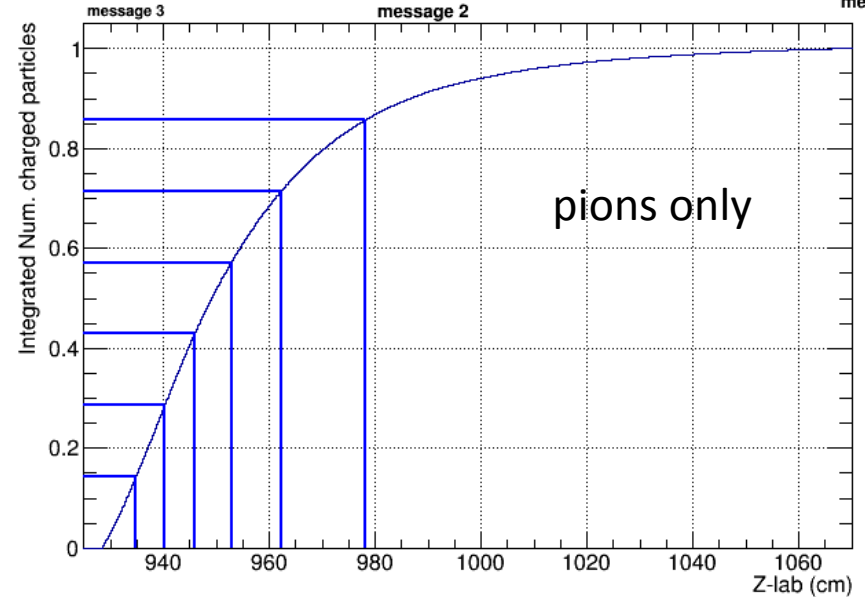
Num. charged particles

May 29, 2017 DL  
git revision #2a0d897



Integrated Num. charged particles

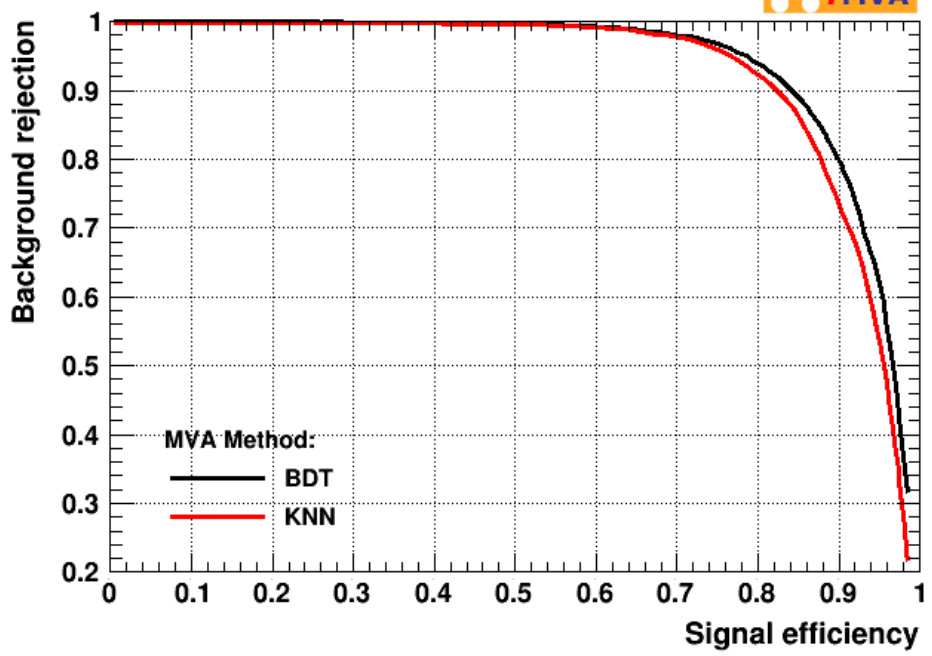
May 29, 2017 DL  
git revision #2a0d897



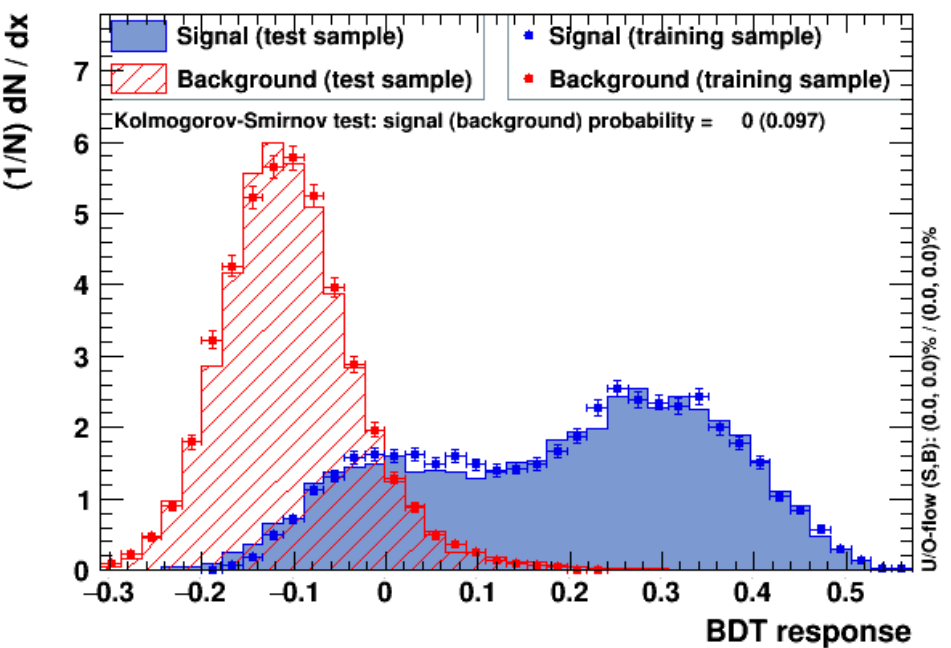
## Absorber Thicknesses:

- 6.15 cm
  - 5.55 cm
  - 5.55 cm
  - 6.9 cm
  - 9.4 cm
  - 16 cm
  - 90.45 cm
- ← chambers

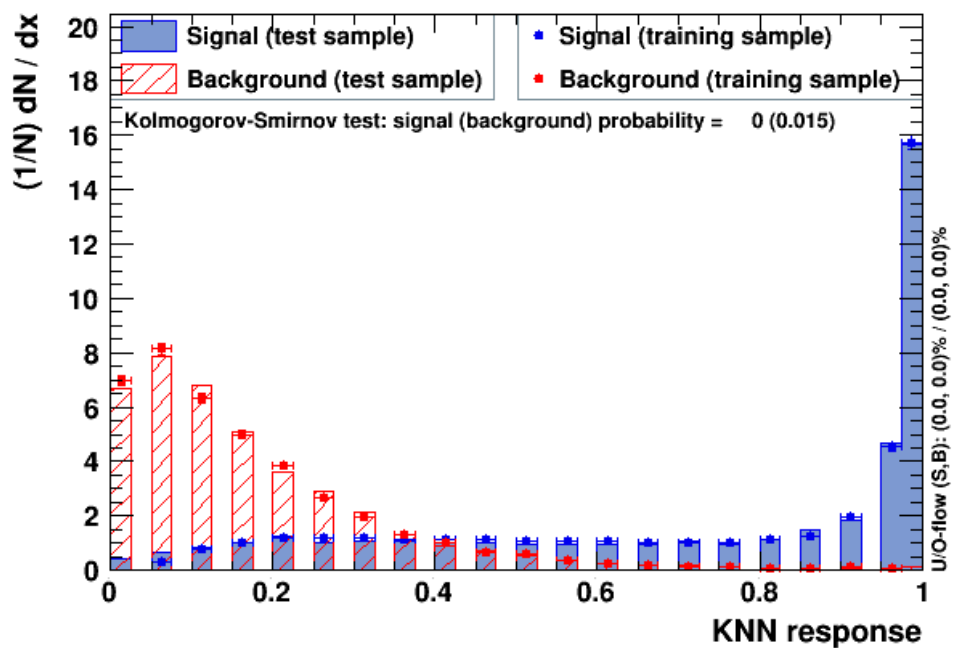
### Background rejection versus Signal efficiency

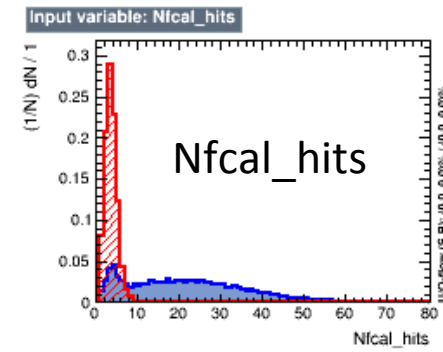
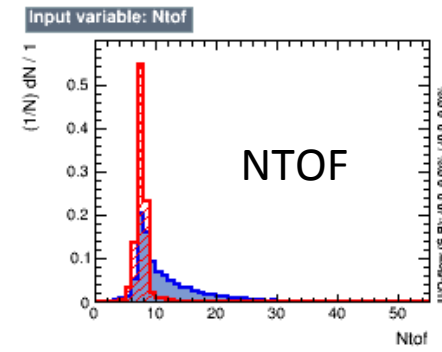
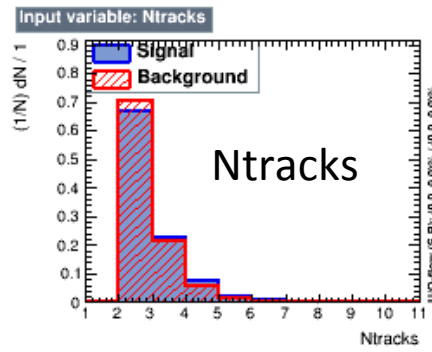


### TMVA overtraining check for classifier: BDT



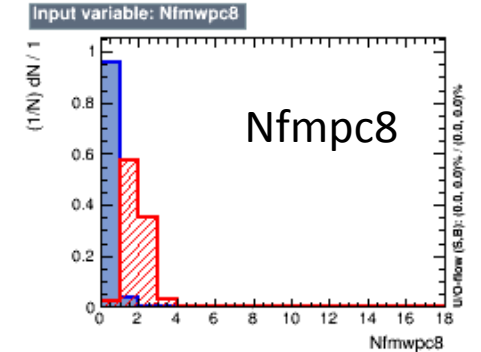
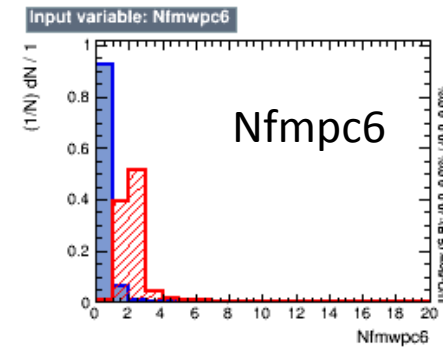
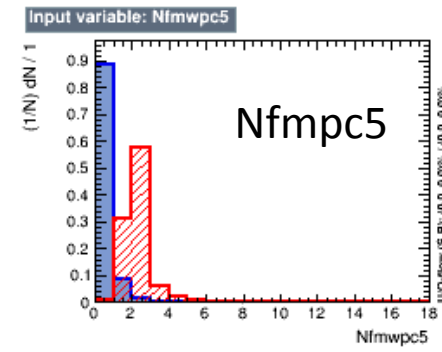
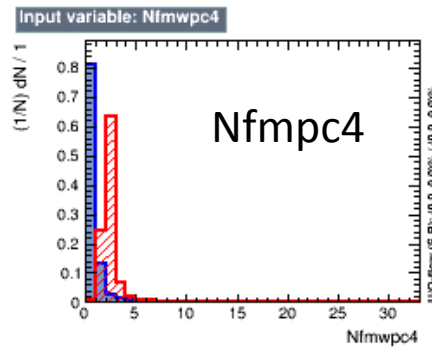
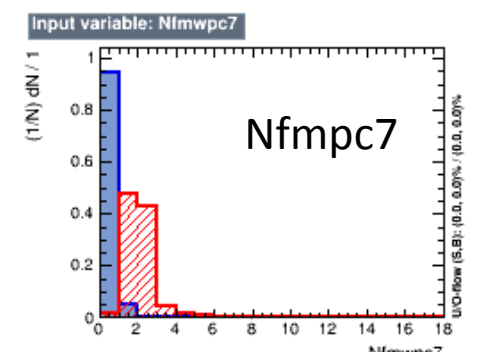
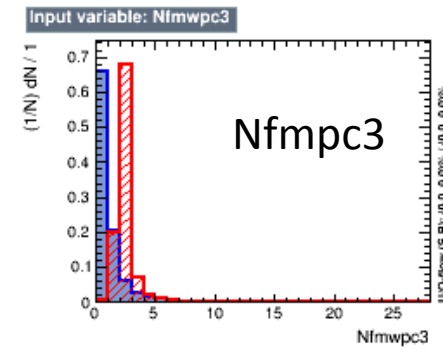
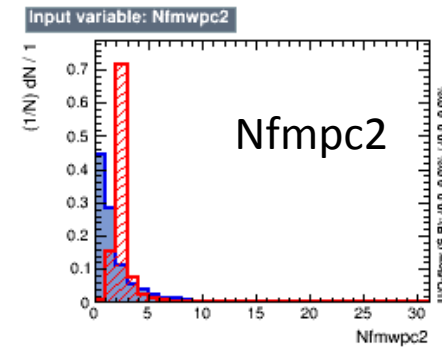
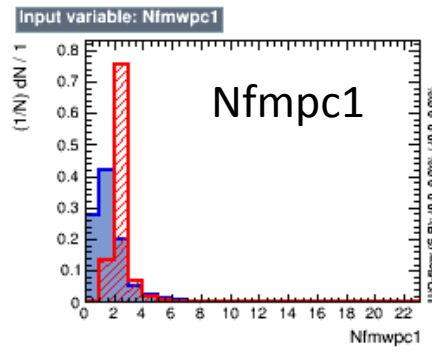
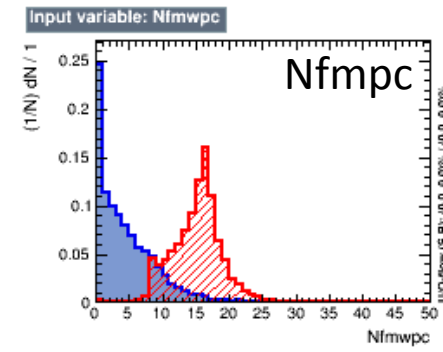
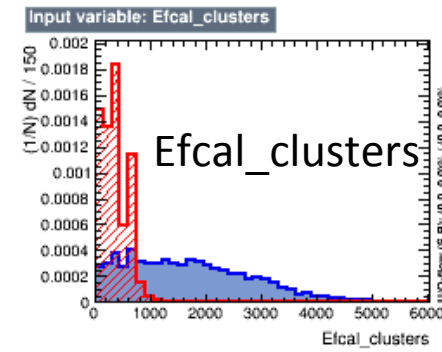
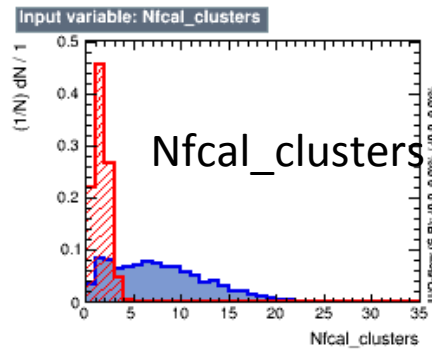
### TMVA overtraining check for classifier: KNN

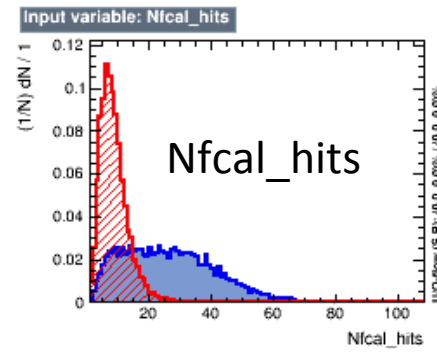
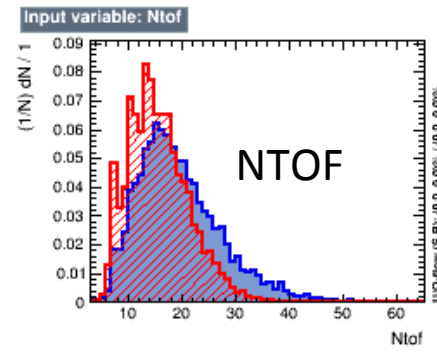
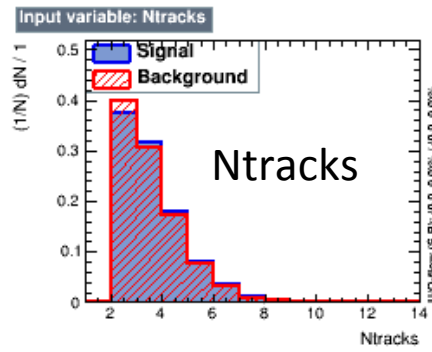




NO Beam  
Background

Most probable  
value for total hits  
in FMWPC is 16





WITH Beam Background

Most probable value for total hits in FMWPC is ~86

