

# Progress Update

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# TMVA Weights – Revisited

- Updated TMVA to most recent stand-alone version
  - Stand-alone versions are no longer supported – now updates are only applied with ROOT releases
  - Version of ROOT on neut cluster is quite old (5.28)
- With newer version of TMVA, performance is much less dependent on NormMode

Old TMVA

2Repi	MLP		BDT	
	Cuts	Notes	FOM	Notes
p_low	HiddenLayers= N+5,N,N	0.494	MaxDepth=5	0.683
p_e		0.700		0.842
p_pi		0.650		0.842
2Repi vs 2Rpie nll		0.722		0.843
2Rpie vs 2Ree nll				
m_epi				
cos(theta)				
towall e				
towall pi				

New TMVA

2Repi	MLP		BDT	
	Cuts	Notes	FOM	Notes
p_low	HiddenLayers= N+5,N,N	0.650	MaxDepth=5	0.848
p_e		0.699		0.848
p_pi		0.650		0.848
2Repi vs 2Rpie nll		0.718		0.848
2Rpie vs 2Ree nll				
m_epi				
cos(theta)				
towall e				
towall pi				

FOM	
NormMode=None	, Weight=1
NormMode=None	, Weight=1000
NormMode=None	, Weight=10000
NormMode=NumEvents	, Weight=1

baseline: 0.652  
grid: 0.710

# 2-ring $\nu_e$ CC1 $\pi$ Efficiency

- Wanted to take a closer look at the selection efficiency
  - Counted  $\nu_e$  CC events with true e and charged  $\pi$  (above detectable threshold)
- Largest efficiency loss comes from 2-ring cut
  - Currently looking at plotting `fqmrnrng` for these “true” 2-ring events
    - where are they going?

Cut	nue CC1pi	nue CCQE	nue CCother	numu CC1pi	numu CCQE	numu CCother	NC 1pi+	NC 1pi-	NC 1pi0	NC Npi	NC 0pi
FCFV	24.22	108.70	18.24	87.56	231.41	124.27	19.97	15.57	86.99	35.92	34.32
2 rings	9.26	9.15	3.88	29.71	26.20	15.81	5.43	4.10	65.02	5.89	13.32
$e\pi$ -like	6.79	2.83	0.37	1.34	0.99	5.03	1.12	0.85	1.86	1.34	1.14

# Other Things

- Model dependency of TMVA selection
  - Recommended: plot efficiency vs.  $\pi^0$  momentum (very model-dependent)
  - Still have to figure out how to pass variables through TMVA selection
- Start looking at CNNs in TensorFlow!