

Dimuon Properties for Perfect Events

Dinupa

NMSU Update
November 29, 2022

Neural Network Architecture

» We use the same neural network architecture used in single tracks to extract the dimuon properties.

» We use classification layer and regression layer;

```
* * * * *
```

* Input *	* Classification Layer *	* Regression layer *	* * * * *
* Tensor * -->	* 2 Linear hidden layers *	* 3 Linear hidden layers *	* --> * Target *
* *	* ReLu activation function *	* ReLu activation function *	* Tensor *
* * * * *	* CrossEntropyLoss *	* MSELoss *	* * * * *
	* Adam optimizer *	* Adam optimizer *	
	* * * * *	* * * * *	

Learning rate: 0.0001

L2 Regularization: 0.00001

» We have to change the input & output tensor features;

For dimuons the input is;

```
[mu[/+, -/], station1[/x, y, z/], station3[/x, y, z/], station1[/px, py, pz], station3[/px, py, pz]]
```

Target is;

```
[dimuon[/x, y, z, px, py, pz, m/]]
```

Classification and Regression Loss

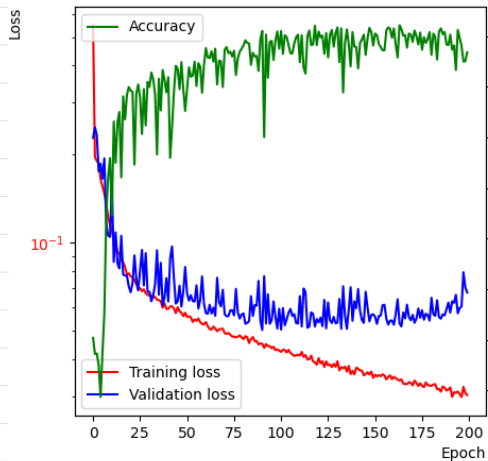


Figure 1: Train, validation classification loss and accuracy score.

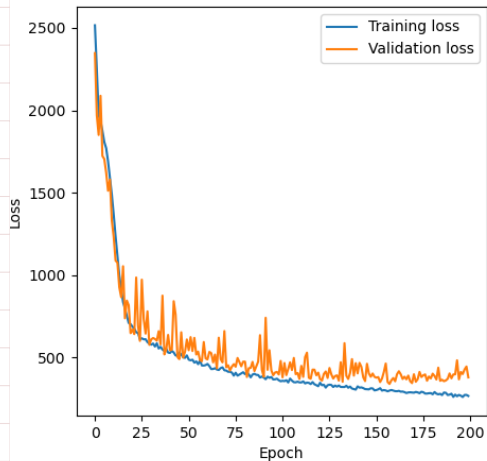


Figure 2: Train , validation regression loss.

Dimuon Properties

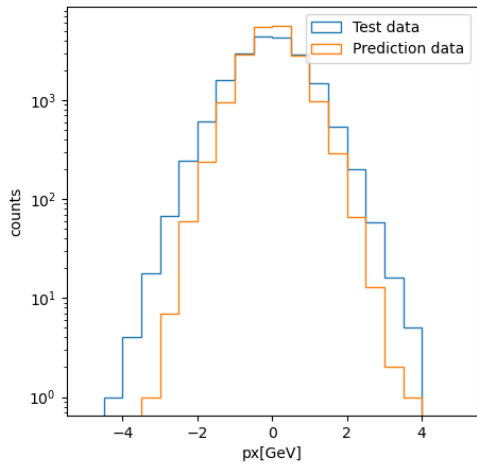


Figure 3: Dimuon p_x .

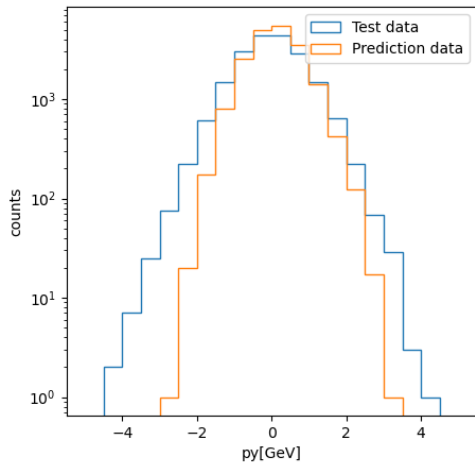


Figure 4: Dimuon p_y .

Dimuon Properties

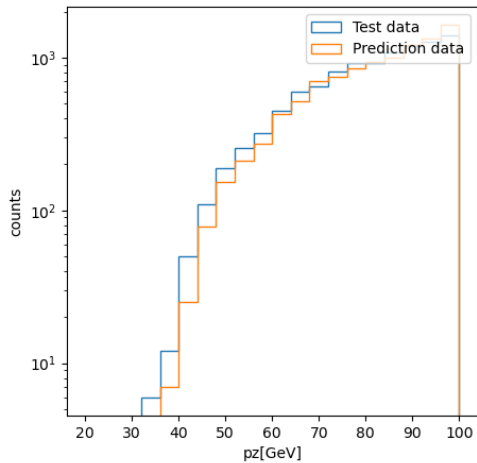


Figure 5: Dimuon p_z .

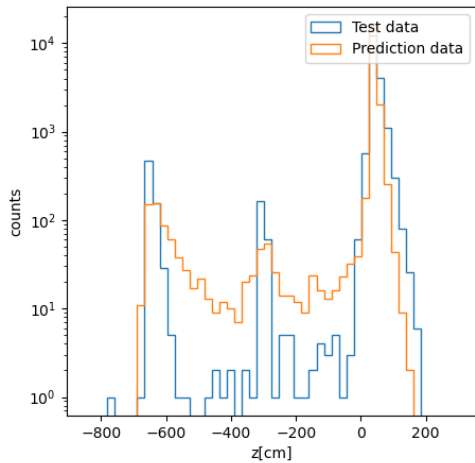


Figure 6: Dimuon z .

Dimuon Properties

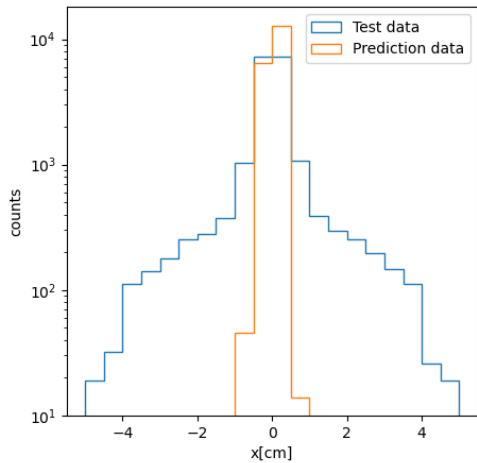


Figure 7: Dimuon x.

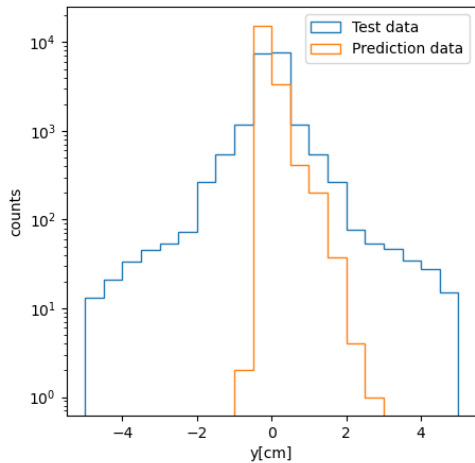


Figure 8: Dimuon y.

Dimuon Properties

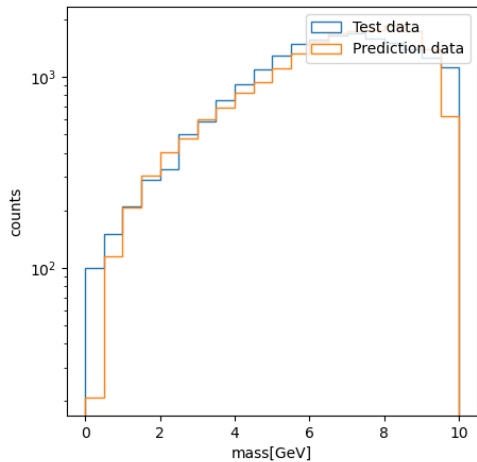


Figure 9: Dimuon mass.

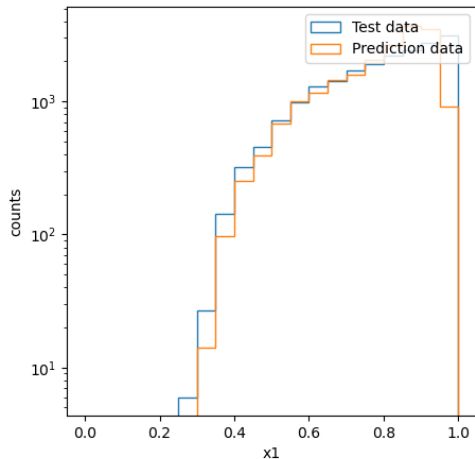


Figure 10: Dimuon x_1 .

Dimuon Properties

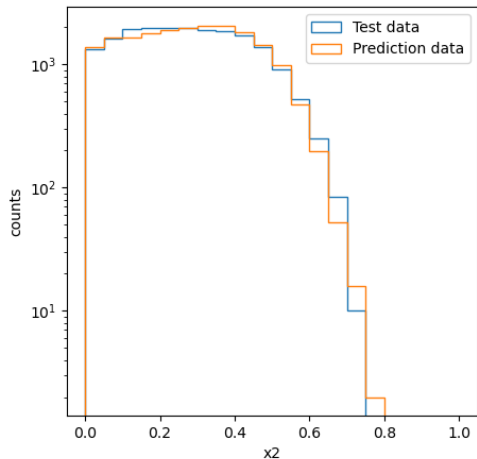


Figure 11: Dimuon x_2 .

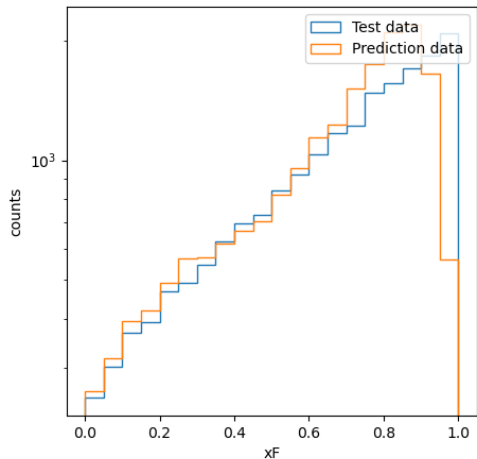


Figure 12: Dimuon x_F .

Other

>>