



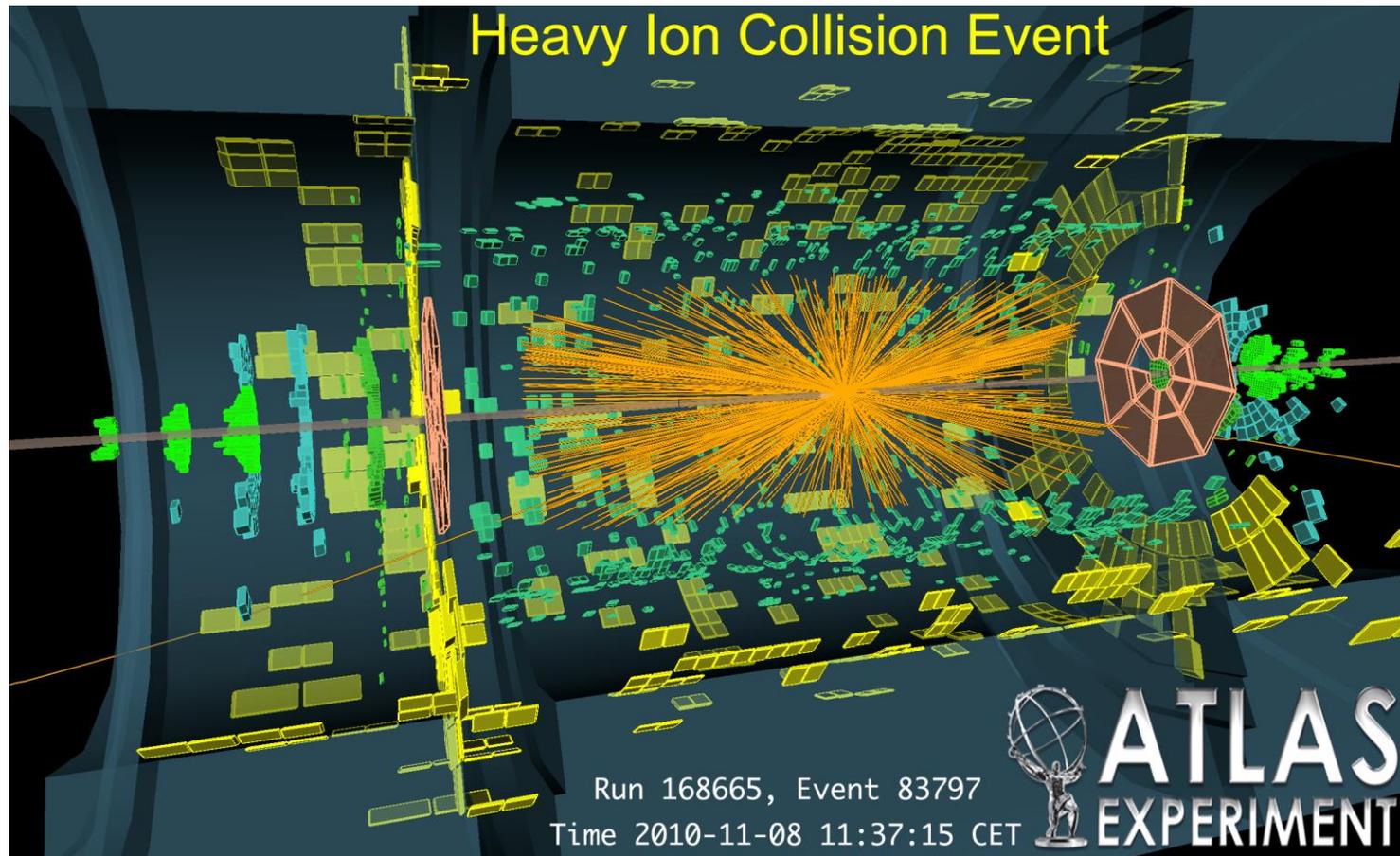
Deep Neural Networks applications in experimental physics data analysis

LIP INTERNSHIP PROGRAM 2021

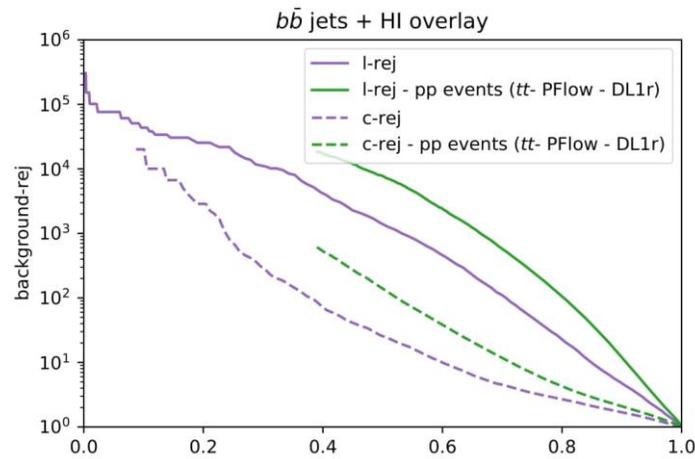
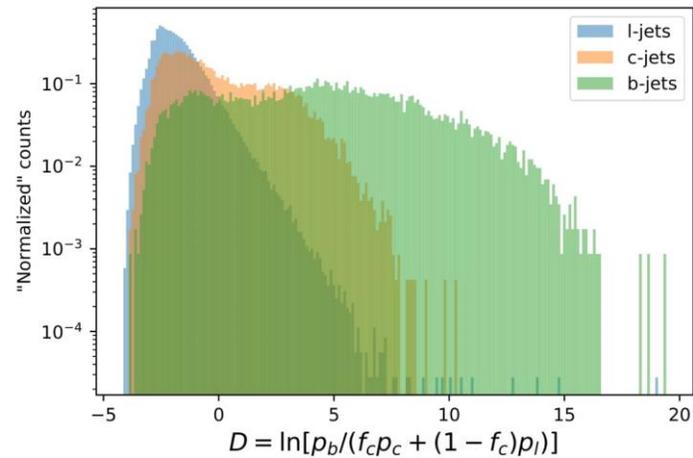
AUTHOR: PEDRO MENDEIROS

SUPERVISOR: HELENA SANTOS

Heavy Ions Experiment

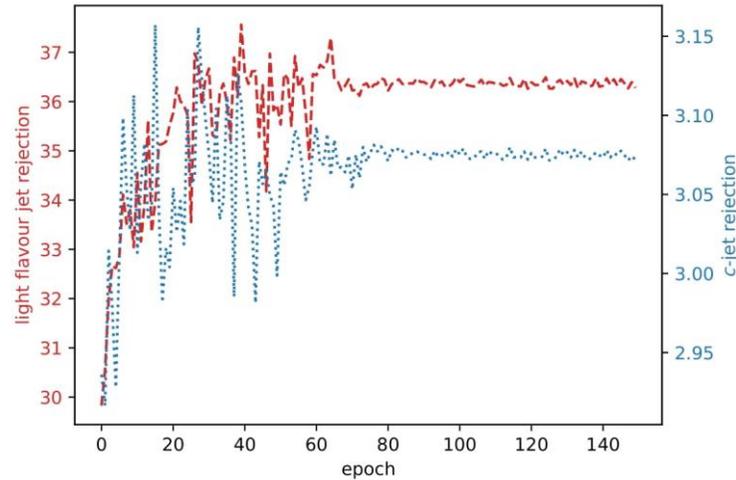
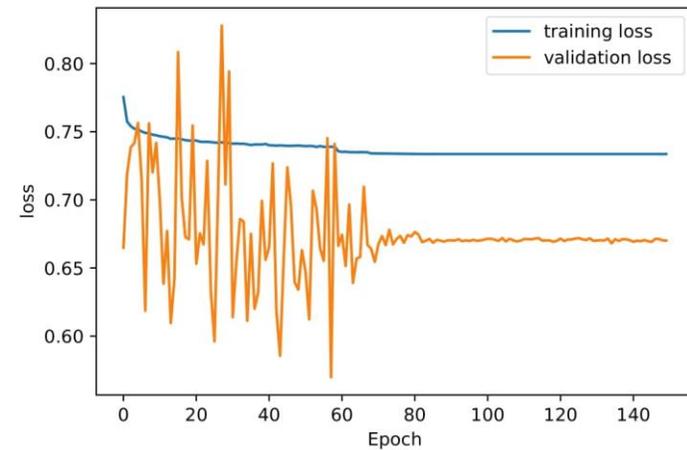


How to measure performance



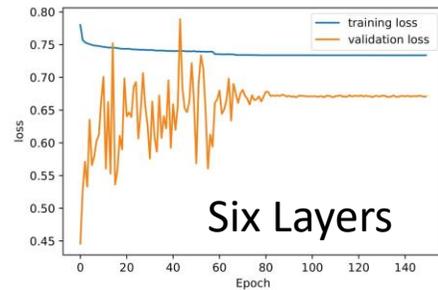
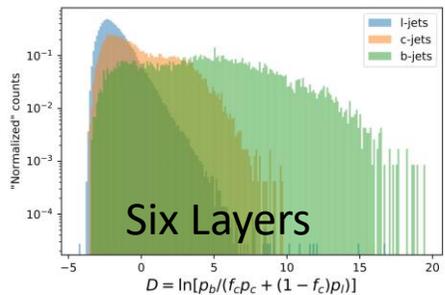
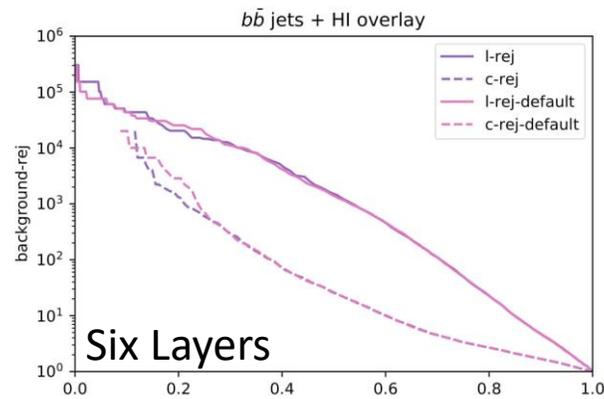
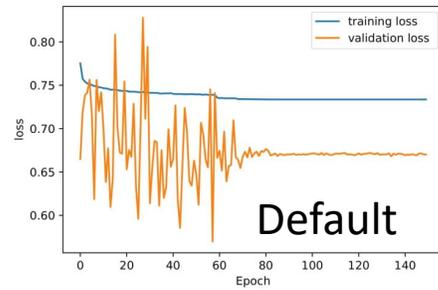
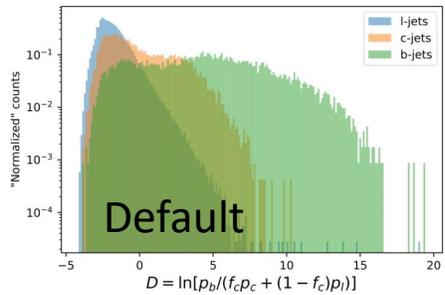
Default	
Layers	[72, 57, 60, 48, 36, 24, 12, 6]
Number of Nodes	315
Activation Function	Relu
Learning Rate	0,01
Batch Size	3000
Number of Epochs	150

How to measure performance



Default	
Layers	[72, 57, 60, 48, 36, 24, 12, 6]
Number of Nodes	315
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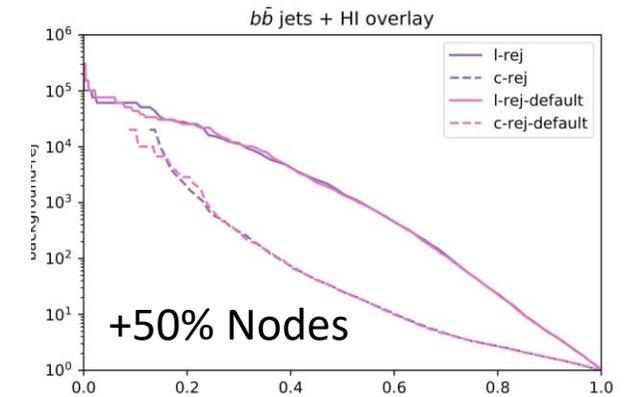
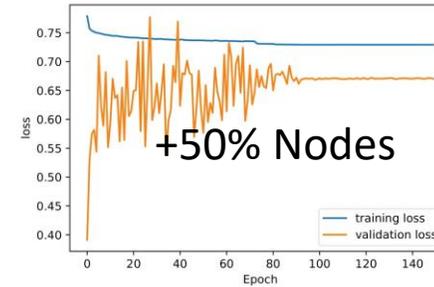
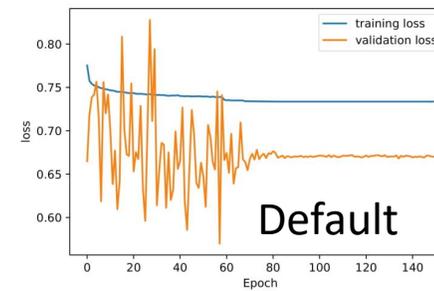
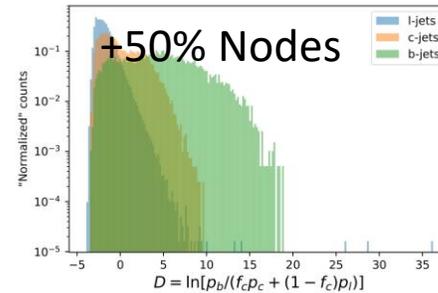
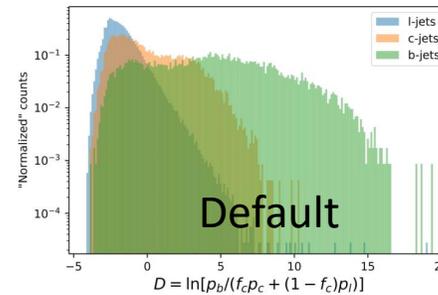
Layers



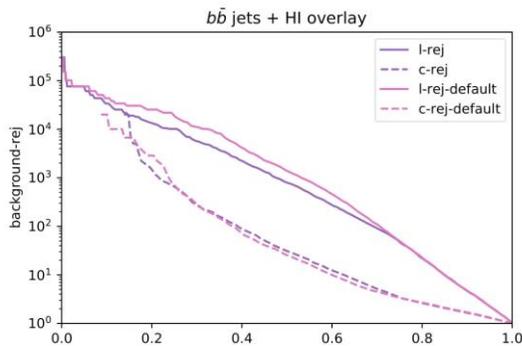
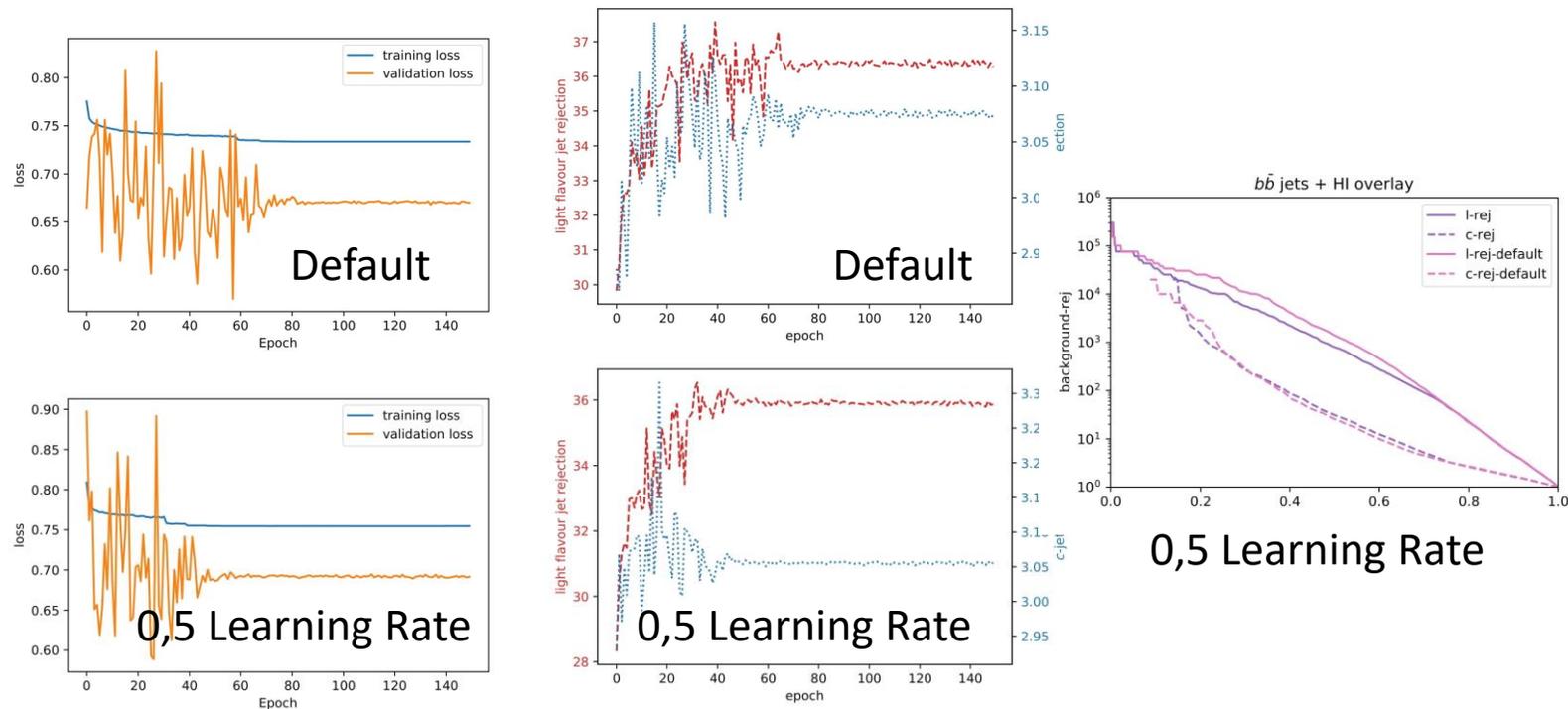
	Default	Six Layers
Layers	[72, 57, 60, 48, 36, 24, 12, 6]	[52, 52, 52, 53, 53, 53]
Number of Nodes	315	315
Activation Function	Relu	Relu
Learning Rate	0,01	0,01
Batch Size	3000	3000
Number of Epochs	150	150

Nodes

	Default	+50% Nodes
Layers	[72, 57, 60, 48, 36, 24, 12, 6]	[108, 86, 90, 72, 54, 36, 18, 9]
Number of Nodes	315	473
Activation Function	Relu	Relu
Learning Rate	0,01	0,01
Batch Size	3000	3000
Number of Epochs	150	150



Learning Rate, Activation Function and Batchsize



	Default	0,5 Learning Rate
Layers	[72, 57, 60, 48, 36, 24, 12, 6]	[72, 57, 60, 48, 36, 24, 12, 6]
Number of Nodes	315	315
Activation Function	Relu	Relu
Learning Rate	0,01	0,5
Batch Size	3000	3000
Number of Epochs	150	150

Conclusions & Next Steps

- Original hyperparameters seem to show the best results;
- Improve the convergence “speed” without sacrificing *tagging*;
- Combine as many hyperparameters as possible;
- Start over with the data treated differently;

Thank
you!