

Questions during the school

This is a live document to post questions to the lecturers and tutors during the school. Feel free to post questions here and we'll address the issues during breaks or in the following lecture.

BSM in the lab

Lecture notes:

https://www.dropbox.com/s/xc44l83ka9bpc4u/lecture_1and2.pdf?dl=0

https://www.dropbox.com/s/5vaczcyr72cgh/lecture_3and4.pdf?dl=0

Why does the hierarchy problem is a problem since we can always add counterterms to renormalize the Higgs mass ? (Or why does the fine tuning between the counterterms and the bare mass is a problem ?) To what extent experiments can be able to probe BSM models?

Could you explain a little bit what is an anomalous mediator (carrier), please?

Can you reexplain what are the difference between gauge mediator, gravity mediator and anomalous mediator for the susy breaking ?

More talk about dark matter candidates in twin Higgs models would be nice.

The relaxion mechanism allows to explain why the electroweak scale is small compared to UV physics but it does not explain why its value is TeV scale. Even if a solution to the naturalness problem, either SUSY, composite Higgs, little Higgs or relaxation, was experimentally verified, none of them would explain why we live in an anthropic window other than...anthropic principles.

BSM in the sky

The link to the problems is: [BSMskytuto.pdf](#)

First order phase transitions and gravitational waves

Machine learning

ML activity

To access the online ML activity go to

<https://dmaitre.phyip3.dur.ac.uk/notebooks/ljubljana/>

To log in use userXY and username and XYresu as password, where XY is the number next to your name in the table below. The notebook server can take a while to start. If your name is not in the list contact me at daniel.maitre@durham.ac.uk to get your number. It is important to have different username so files can be edited independently.

To get to the activity after logging in click on the “assignment” tab, click on the “Fetch” button in the “Ljubljana” line. This will download the activity notebook to your work area. It will appear in the “Downloaded assignments” section. Click on the “Ljubljana” name to open the assignment list, which only contains one notebook called “ML activity”. Click on it to start your notebook.

You can find information on how to use jupyter notebooks at

<https://dmaitre.phyip3.dur.ac.uk/notebooks/help/manual/workingwiththenotebook/>

If you wish to keep your notebook at the end of the session, you can save it to your computer by going back to the home screen (it should stay open but you can access it by clicking on the jupyter logo at the top left of the notebooks tab). Select the notebook, once you shutdown the notebook (i.e. you stop the underlying python kernel) you will be able to download the python notebook.

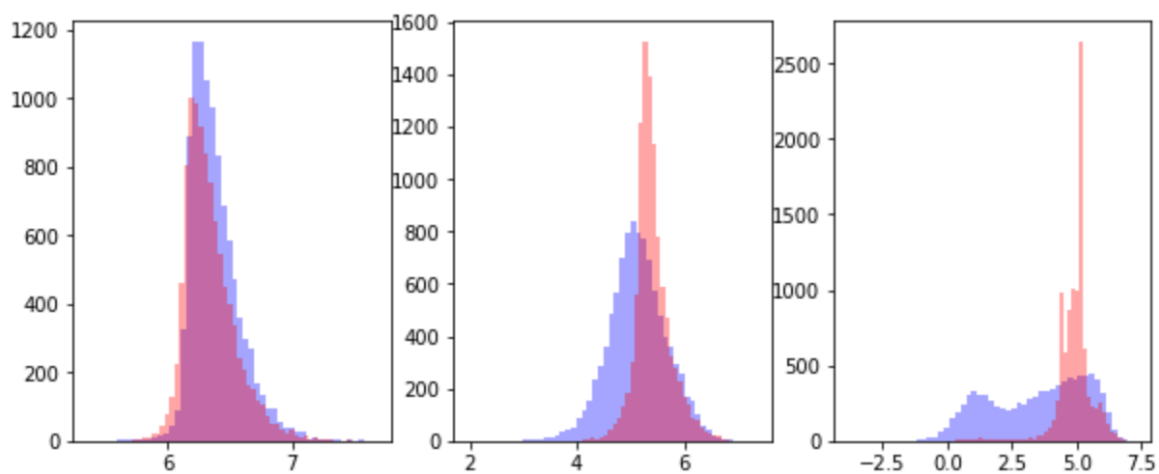
AVERSANO, Michele	1
Dr. BAHTIYAR, Huseyin	2
CACCIAPUOTI, Carmine	3
Dr. CATALANO, Enrico	4

Dr. DE PAOLI, Elena	5
Dr. DILLON, Barry	6
Dr. FAROUGHY, Darius A.	7
Mr. FRISENNA, Fausto	8
Mr. FRITZ, Lukas	9
Mr. GHOSHAL, Anish	10
Mr. GUADA, Victor	11
Mr. HAMDELLOU, Hilal	12
Mr. HERRERA, Gonzalo	13
Mr. KORAJAC, Arman	14
Mr. LEBAN, Blaž	15
Mr. MEDVEŠ, Rok	16
Mr. MORANDINI, Alessandro	17
Dr. PAIS, Pablo	18
Dr. PATRA, Monalisa	19
Mr. PRISCO, Renato Maria	20
Dr. PÉLI, Zoltán	21
Mr. RIZZUTO, Leonardo Benjamin	22
SMOLKOVIČ, Aleks	23
Mr. SØRENSEN, Philip	24
VENTURINI, Elena	25
Mr. WEISS, Yaniv	26
Mr. ZATTERA, Giovanni	27

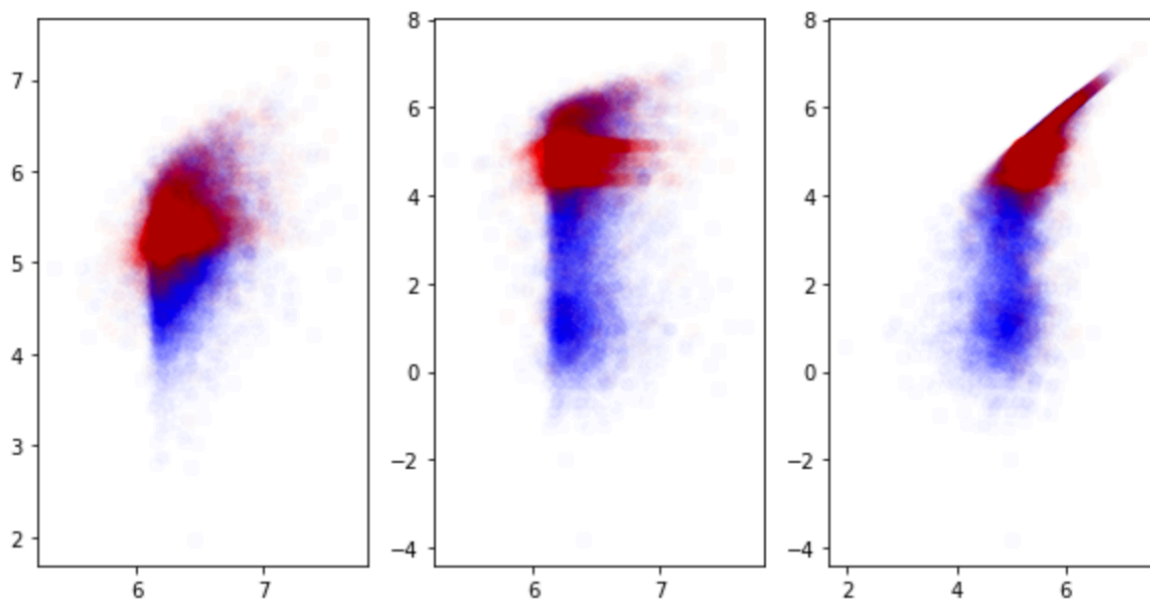
Link to the ML lectures associated to the additional exercises::

<https://dmaitre.phyip3.dur.ac.uk/notes/ML/>

Preview histograms for task 1 (log scale):



2d- histograms:



ROC curve:

