

Terascale Statistics School 2025

Report of Contributions

Contribution ID: **1**

Type: **not specified**

Registration

Monday 24 February 2025 12:30 (45 minutes)

Contribution ID: 2

Type: **not specified**

Welcome

Monday 24 February 2025 13:15 (5 minutes)

Presenters: HINZMANN, Andreas (CMS (CMS Fachgruppe Searches)); BEHNKE, Olaf (CMS (CMS Fachgruppe TOP))

Contribution ID: 3

Type: **not specified**

Basics (Probabilities, Distributions, CLT)

Monday 24 February 2025 13:20 (1h 40m)

Lectures + Discussions

Presenter: BARLOW, Roger (Huddersfield)

Contribution ID: 4

Type: **not specified**

Basics II (Probabilities, distributions, CLT)

Presenter: BARLOW, Roger (Huddersfield)

Contribution ID: 5

Type: **not specified**

Hypothesis Testing - basics

Monday 24 February 2025 15:30 (1 hour)

Lecture + Discussion

Presenter: COWAN, Glen (RHUL)

Contribution ID: 6

Type: **not specified**

Parameter Estimation

Tuesday 25 February 2025 09:00 (1 hour)

Lectures + Discussion

Presenter: BARLOW, Roger (Huddersfield)

Contribution ID: 7

Type: **not specified**

Parameter Estimation - Tutorial

Tuesday 25 February 2025 10:30 (2 hours)

Tutorial - Introduction to the Python code and practical exercises with it

https://www.pp.rhul.ac.uk/~cowan/stat/exercises/cowan_stat_exercises.pdf

Today: p4 ff

Tutorial 1: Maximum Likelihood Fitting

Presenter: COWAN, Glen (RHUL)

Contribution ID: 8

Type: **not specified**

Hypothesis Testing - Limit Setting

Tuesday 25 February 2025 14:00 (1h 30m)

Lectures + Discussions

Presenter: COWAN, Glen (RHUL)

Contribution ID: 9

Type: **not specified**

Systematics

Tuesday 25 February 2025 16:00 (1h 30m)

Lectures + Discussions

Presenter: BARLOW, Roger (Huddersfield)

Contribution ID: **10**

Type: **not specified**

Bayesian Parameter Estimation - Intro + Tutorial

Wednesday 26 February 2025 09:00 (1h 30m)

Tutorial + introductory Lecture

Presenter: COWAN, Glen (RHUL)

Contribution ID: **11**

Type: **not specified**

Systematics: Errors on Errors

Wednesday 26 February 2025 11:00 (1h 30m)

Lecture + Discussion + Tutorial

Solutions are at https://www.pp.rhul.ac.uk/~cowan/stat/exercises_full/

Presenter: COWAN, Glen (RHUL)

Contribution ID: **12**

Type: **not specified**

Machine Learning I

Wednesday 26 February 2025 14:00 (2 hours)

Lectures + Discussions

https://www.thphys.uni-heidelberg.de/~plehn/pics/modern_ml.pdf

<https://github.com/heidelberg-hepml/ml-tutorials>

Presenters: PLEHN, Tilman (Heidelberg University); PLEHN, Tilman (Heidelberg University)

Contribution ID: **13**Type: **not specified**

Errors on Errors

A statistical model is presented where the uncertainty in assignment of systematic errors is taken into account. Estimates of the systematic variances are modeled as gamma distributed variables. The resulting confidence intervals show interesting and useful properties, e.g., when averaging measurements to estimate their mean, the size of the confidence interval increases as a for decreasing goodness-of-fit, and averages have reduced sensitivity to outliers. The basic properties of the model are presented and several types of examples relevant for Particle Physics are explored. (Based on G. Cowan, Eur. Phys. J. C (2019) 79:133, E. Canonero et al., Eur. Phys. J. C (2023) 83:1100.)

Presenter: COWAN, Glen (RHUL)

Contribution ID: **14**

Type: **not specified**

Machine Learning II

Thursday 27 February 2025 09:00 (1h 30m)

Lectures + Discussions

Presenters: PLEHN, Tilman (Heidelberg University); PLEHN, Tilman (Heidelberg University)

Contribution ID: **15**

Type: **not specified**

Theory Uncertainties

Thursday 27 February 2025 11:00 (1h 30m)

Lectures + Discussion

Presenter: TACKMANN, Frank (T (Phenomenology))

Contribution ID: **16**

Type: **not specified**

Discussion time

Contribution ID: 17

Type: **not specified**

Hypothesis Testing II

Presenter: COWAN, Glen (RHUL)

Contribution ID: **18**

Type: **not specified**

Interactive Session (exercises/tutorials)

Contribution ID: **19**

Type: **not specified**

Discussion time

Contribution ID: **20**

Type: **not specified**

Extra time for discussion

Contribution ID: **21**

Type: **not specified**

Discussion time

Contribution ID: 22

Type: **not specified**

Discussion time

Contribution ID: 23

Type: **not specified**

Interactive Session (exercises/tutorials)

Contribution ID: **24**

Type: **not specified**

Time for discussion

Contribution ID: 25

Type: **not specified**

Disasters in Statistical Inference in Particle Physics

Wednesday 26 February 2025 16:30 (1 hour)

Lecture + Discussion

Presenter: BARLOW, Roger (Huddersfield)

Contribution ID: 26

Type: **not specified**

Time for discussion

Contribution ID: 27

Type: **not specified**

Discussion time

Contribution ID: **28**

Type: **not specified**

Theory uncertainties II

Presenter: TACKMANN, Frank (T (Phenomenology))

Contribution ID: 29

Type: **not specified**

Discussion time

Contribution ID: **30**

Type: **not specified**

Unfolding

Thursday 27 February 2025 14:00 (2 hours)

Lectures + Discussion

Presenter: BRENNER, Lydia (Nikhef)

Contribution ID: **31**

Type: **not specified**

Discussion time

Contribution ID: **32**

Type: **not specified**

Unfolding II

Presenter: BRENNER, Lydia (Nikhef)

Contribution ID: 33

Type: **not specified**

Asymmetric uncertainties

Thursday 27 February 2025 16:30 (1 hour)

Lectures + Discussion

Presenter: BARLOW, Roger (Huddersfield)

Contribution ID: **34**

Type: **not specified**

Discussion time

Contribution ID: 35

Type: **not specified**

Machine Learning III

Friday 28 February 2025 09:00 (1h 45m)

Lectures + Discussion

Presenters: PLEHN, Tilman (Heidelberg University); PLEHN, Tilman (Heidelberg University)

Contribution ID: **36**

Type: **not specified**

Discussion time

Contribution ID: 37

Type: **not specified**

Modern Bayesian inference in practice

Friday 28 February 2025 11:15 (1 hour)

Lectures + Discussion

Presenter: KRÖNINGER, Kevin (TU Dortmund)

Contribution ID: **38**

Type: **not specified**

Discussion time

Contribution ID: **39**

Type: **not specified**

Closing of school

Friday 28 February 2025 12:15 (15 minutes)

Presenters: HINZMANN, Andreas (CMS (CMS Fachgruppe Searches)); BEHNKE, Olaf (CMS (CMS Fachgruppe TOP))

Contribution ID: **40**

Type: **not specified**

Discussion time

Contribution ID: **41**

Type: **not specified**

Discussion time

Contribution ID: 42

Type: **not specified**

Setting up of computer interactive exercises

Contribution ID: 43

Type: **not specified**

Overflow time

Contribution ID: 44

Type: **not specified**

Discussion time

Contribution ID: 45

Type: **not specified**

Overflow time

Contribution ID: 46

Type: **not specified**

Discussion time

Contribution ID: 47

Type: **not specified**

Overflow time

Contribution ID: 48

Type: **not specified**

Discussion time

Contribution ID: 49

Type: **not specified**

Hypothesis testing - Tutorial

Monday 24 February 2025 16:30 (1 hour)

Tutorial:

Link to files: <https://www.pp.rhul.ac.uk/~cowan/stat/exercises/>

Description/Tasksheet (file is also attached):

https://www.pp.rhul.ac.uk/~cowan/stat/exercises/cowan_stat_exercises.pdf

Today: Exercises on hypothesis testing 1a-1g, see p.32 ff

Presenter: COWAN, Glen (RHUL)