

# Between Models and Reality: School on Machine Learning in Physics



## Report of Contributions

Contribution ID: 1

Type: **not specified**

## Arrival, Breakfast, Registration

*Monday 2 June 2025 08:30 (1 hour)*

**Presenter:** PETERSEN, Troels (Niels Bohr Institute)

Contribution ID: 2

Type: **not specified**

## **Scope of School and Lecture 1: Introduction and overview of Machine Learning**

*Monday 2 June 2025 09:30 (1h 15m)*

**Presenter:** PETERSEN, Troels (Niels Bohr Institute)

Contribution ID: 3

Type: **not specified**

## **Lecture 2: Basics of Machine Learning & Fast Data Loaders**

*Monday 2 June 2025 11:00 (1h 15m)*

**Presenters:** TIMIRYASOV, Inar (NBI); PETERSEN, Troels (Niels Bohr Institute)

Contribution ID: 4

Type: **not specified**

## **Discussion of Lectures and Introduction to exercises**

*Monday 2 June 2025 13:15 (45 minutes)*

**Presenter:** MURNANE, Daniel (Niels Bohr Institute, University of Copenhagen)

Contribution ID: 5

Type: **not specified**

## Work on exercises

*Monday 2 June 2025 14:00 (30 minutes)*

**Presenters:** MURNANE, Daniel (Niels Bohr Institute, University of Copenhagen); ØRSØE, Rasmus (TUM); PETERSEN, Troels (Niels Bohr Institute)

Contribution ID: 6

Type: **not specified**

## Work on exercises

*Monday 2 June 2025 15:00 (1h 30m)*

**Presenters:** MURNANE, Daniel (Niels Bohr Institute, University of Copenhagen); ØRSØE, Rasmus (TUM); PETERSEN, Troels (Niels Bohr Institute)

Contribution ID: 7

Type: **not specified**

## Lecture 3: Networks with Learned Uncertainties

*Tuesday 3 June 2025 09:00 (1h 15m)*

All my lectures will be on the blackboard, based on the published Heidelberg lecture notes. Tutorials maintained by the Heidelberg group are linked in the lecture notes.

**Presenter:** PLEHN, Tilman (Heidelberg University)



Contribution ID: 8

Type: **not specified**

## **Lecture 4: Generative Networks and Classifier Tests**

*Tuesday 3 June 2025 10:45 (1h 15m)*

**Presenter:** PLEHN, Tilman (Heidelberg University)

Contribution ID: 9

Type: **not specified**

## **Discussion of Lectures and intro to exercises**

*Tuesday 3 June 2025 13:00 (30 minutes)*

Contribution ID: **10**

Type: **not specified**

## Work on exercises

*Tuesday 3 June 2025 13:30 (1 hour)*

Contribution ID: **11**

Type: **not specified**

## Work on exercises

*Tuesday 3 June 2025 15:00 (1h 30m)*

Contribution ID: 12

Type: **not specified**

## Lecture 5: Modern Generative Networks

*Wednesday 4 June 2025 09:00 (1h 15m)*

**Presenter:** PLEHN, Tilman (Heidelberg University)

Contribution ID: 13

Type: **not specified**

## **Lecture 6: Probabilistic regression with generative models**

*Wednesday 4 June 2025 10:45 (1h 15m)*

**Presenter:** ALGREN, Malte

Contribution ID: 14

Type: **not specified**

## **Discussion of Lectures and intro to exercises**

*Wednesday 4 June 2025 13:00 (30 minutes)*

Contribution ID: **15**

Type: **not specified**

## Work on exercises

*Wednesday 4 June 2025 13:30 (1 hour)*



Contribution ID: 16

Type: **not specified**

## **Train ride to Helsingør, visit to Kronborg Castle, drinks on the ramparts, and dinner at Værftets Madmarket.**

*Wednesday 4 June 2025 15:30 (6h 30m)*

Contribution ID: 17

Type: **not specified**

## **Lecture 7: Anomaly Detection**

*Thursday 5 June 2025 09:00 (1h 15m)*

**Presenter:** AARRESTAD, Thea (ETH Zurich)

Contribution ID: **18**

Type: **not specified**

## **Lecture 8: Network optimisation and fast inference**

*Thursday 5 June 2025 10:45 (1h 15m)*

**Presenter:** AARRESTAD, Thea (ETH Zurich)

Contribution ID: **19**

Type: **not specified**

## Lunch Break

Contribution ID: **20**

Type: **not specified**

## **Work on exercises and own projects**

*Thursday 5 June 2025 13:00 (1h 30m)*

Contribution ID: **21**

Type: **not specified**

## **Work on exercises and own projects**

*Thursday 5 June 2025 15:00 (2 hours)*

Contribution ID: 22

Type: **not specified**

## **Lecture 9: Transformers and Foundation Models**

*Friday 6 June 2025 09:00 (1h 15m)*

**Presenter:** ALGREN, Malte

Contribution ID: 23

Type: **not specified**

## **Lecture 10: Domain shifts and Past experiences**

*Friday 6 June 2025 10:45 (1h 15m)*

**Presenter:** PETERSEN, Troels (Niels Bohr Institute)



Contribution ID: 24

Type: **not specified**

## Discussion of Lectures

*Friday 6 June 2025 13:00 (30 minutes)*

Contribution ID: 25

Type: **not specified**

## **Presentation of projects over drinks and snacks**

*Friday 6 June 2025 14:30 (1h 30m)*

Contribution ID: 26

Type: **not specified**

## **Poster session with snacks and drinks**

Contribution ID: 27

Type: **not specified**

## **Exchange of experiences, resources, and "tricks"**

*Friday 6 June 2025 13:30 (1 hour)*