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Lecture announcement SS25

An Introduction to Large Deviations

*Course webpage:*¹

https://konarovskiy.de/teaching/2025/LDP/Large_Deviations_2025.html

The large deviations theory is one of the key techniques of modern probability. It concerns with the study of probabilities of rare events and its estimates is the crucial tool required to handle many questions in statistical mechanics, engineering, applied probability, statistics etc. During the course we discuss the following topics:

- Cramer's theorem (large deviation principle (LDP) for sum of independent random variables);
- LDP for Gaussian vectors, Brownian motion and SDEs;
- contraction principle (transformation of LDP under a continuous map);
- Gärtner-Ellis's theorem and Varadhan's lemma;
- weak large deviation principle and exponential tightness;
- applications of LDP.

The course is organized as a first look on the theory and only basic knowledge of probability is required.

Date and Plase: Friday, 14:15-15:45 (+2 UTC), in Zoom:

<https://uni-hamburg.zoom.us/j/65296402127?pwd=J9TSFbAmNwDnbCqjpA5TUT9fstmJdM.1>

Meeting ID: 652 9640 2127

Passcode: 71776632

References

- [1] Amir Dembo and Ofer Zeitouni. Large deviations techniques and applications, volume 38 of Applications of Mathematics (New York). Springer-Verlag, New York, second edition, 1998.
- [2] Frank den Hollander. Large deviations, volume 14 of Fields Institute Monographs. American Mathematical Society, Providence, RI, 2000.
- [3] Richard S. Ellis. Entropy, large deviations, and statistical mechanics. Classics in Mathematics. Springer-Verlag, Berlin, 2006. Reprint of the 1985 original.
- [4] Olav Kallenberg. Foundations of modern probability. Probability and its Applications (New York). Springer-Verlag, New York, second edition, 2002.

¹Will be created soon