Im Fakultativteil des physikalischen Vertiefungsgebiets

Elektronische Eigenschaften von Festkörpern

wird im Sommersemester 2021 folgende Vorlesung angeboten:

Statistical Evidence in Experimental Science
(lectures will be given in English)

Prof. Dmytro Inosov

WO?	**Online (in Zoom), check OPAL platform for details**
WANN?	**Wednesday, 4. DS**
	First Lecture: 14.04.2021, 13:00
FÜR WEN?	Physikstudierende ab dem 6. Fachsemester, Doktoranden

Topics covered in this lecture course

The goal of this lecture course is to provide a detailed overview of the available approaches to the interpretation of statistical data in experimental science, including the analysis of most common fallacies and misconceptions that are common in scientific literature. In the format of an informal discussion club, we will discuss, in particular, the following topics:

- **Common data fallacies that everyone needs to know**
  We start by considering most common statistical fallacies and "paradoxes" that can potentially distort the interpretation of experimental data, such as those that involve a *lurking variable* (e.g. Simpson's paradox) or faulty logical inferences (e.g. correlation or population fallacies).

- **Three paradigms of statistics**
  We discuss three common approaches to the statistical data interpretation, originating from
  (1) Fischerian significance tests based on p-values;
  (2) Neyman-Pearson decision procedures (hypothesis testing);
  (3) the evidential paradigm based on the likelihood principle.
  Using simple examples, we will consider benefits and drawbacks of every approach and define their applicability range in the context of modern scientific publishing.

- **Publication bias**
  Distortion of the scientific record can result not only from mistakes of individual researchers, but also from the way how our academic publication system operates, favouring only "significant" results. We consider several factors influencing the publication bias and discuss its consequences in modern science.