prob.meas   Probability and measurement

Probability theory is a well-defined branch of mathematics. Andrey Kolmogorov described a set of axioms in 1933 that are still in use today as the foundation of probability theory.[1]
We will implicitly use these axioms in our analysis. The interpretation of probability is a contentious matter. Some believe probability quantifies the frequency of the occurrence of some event that is repeated in a large number of trials. Others believe it quantifies the state of our knowledge or belief that some event will occur. In experiments, our measurements are tightly coupled to probability. This is apparent in the questions we ask. Here are some examples.

1. How common is a given event?
2. What is the probability we will reject a good theory based on experimental results?
3. How repeatable are the results?
4. How confident are we in the results?
5. What is the character of the fluctuations and drift in the data?
6. How much data do we need?

Probability theory

[1]. For a good introduction to probability theory, see Ash (Robert B. Ash. Basic Probability Theory. Dover Publications, Inc., 2008) or Jaynes andothers. (E.T. Jaynes andothers. Probability Theory: The Logic of Science. Cambridge University Press, 2003. ISBN: 9780521592710. An excellent and comprehensive introduction to probability theory.)

interpretation of probability

event