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Laboratory Exercise Illustrating the Error of the Mean

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Many measurements in physics lab experiments are affected by random errors. The usual approach in such cases is to take multiple measurements and use the mean value of the measurements as the experimental value for the physical quantity. The best estimate of the uncertainty in this experimental value is the error of the mean. Students are very familiar with the concept of the mean value due to its common use in determining their grades. The error of the mean, however, is not something that they encounter in everyday life and it has been my experience that the vast majority of students in first year physics labs do not come away with a clear understanding of this important quantity. At best they treat it as a black-box formula they are expected to use without really understanding it and, at worst, they fail to understand the difference between the standard deviation and the error of the mean. In this talk I will discuss a laboratory exercise which gives students a practical introduction to the normal distribution, standard deviation and the error of the mean. This exercise helps undergraduate physics students to gain a practical understanding of this important concept in experimental physics.

Keyword-1

Laboratory

Keyword-2

Mean Error

Keyword-3

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