

Statistical Methods in Particle Physics

Quiz on chapter 3: Uncertainties

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**Heidelberg University
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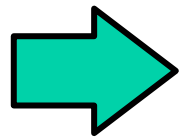
Suppose the average number of proton-proton collisions per bunch crossing at an interaction point of the LHC is 25. What is the variance of the number of collisions per bunch crossing?

1. 5
2. 12.5
3. 25
4. 625

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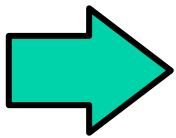
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The uncertainty of the sum $z = x + y$ of two uncorrelated variables x and y is given by the square root of

1. the uncertainties of x and y added in quadrature
2. the relative uncertainties of x and y added in quadrature
3. uncertainties of x and y added linearly
4. the absolute values of the relative uncertainties of x and y added linearly

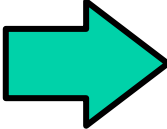
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Using linear error propagation, the relative uncertainty of the product $z = x \times y$ of two uncorrelated variables x and y is given by the square root of

1. the uncertainties of x and y added in quadrature
2. the relative uncertainties of x and y added in quadrature
3. the product of the relative uncertainties of x and y
4. the absolute value of the product of the relative uncertainties of x and y

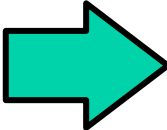
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Linear error propagation of two correlated measurements x and y

1. is identical to the case of uncorrelated measurements
2. is possible if the covariance matrix of x and y is known
3. can only be done numerically (Monte Carlo error propagation)
4. is not possible

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In the weighted average of n measurements with uncertainties σ_i , the weight of each measurement is proportional to

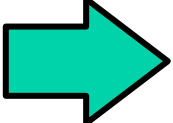
1. σ_i
2. σ_i^2
3. $1 / \sigma_i$
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