

PHYS 50733 - Computational Physics

Homework 3

Homework 3 is due at **midnight** on **Friday 8 March 2019**. Along with your jupyter notebook you should include copies of any plots generated and any analytical derivations or calculations required in a folder labeled Homework_3 in your github repository. Remember to comment your code. You will be graded on whether your notebook runs on my computer and produces the correct results as well as your use of functions when possible.

Problem 1

In class on 5 March 2019, we used Monte Carlo to fit a function to data with error bars in two dimensions assuming a uniform random distribution of errors. Each of you was assigned a different statistical error distribution (Sachi - Binominal, Carson - Poisson, Baylor - Gamma, Christine - Log Normal, Hope - Gaussian, Sarah - Rayleigh). Your assignment is to create the following plots and answer the equations below.

On one set of axis plot the following, (1) your noisy data with the error bars in x and y, (2) the function you inputting to create the data, (3) the best fit curve from your Monte Carlo fitting, (4) a shaded region showing the area between curves which are one standard deviation above and below the best fit line. Make this plot for $N_{MonteCarlo} = 10, 100, 1000$.

How do your results for your given distribution compare to the ones you found in class for a uniform distribution of errors?

Comment on how your results might change with the intrinsic scatter and size of the error bars in your data. Did you need to populate the error bars to one standard deviation, two?