SOLUTION FOR HOMEWORK ASSIGNMENT NO. 07

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Exercise 7.1

We are asked to determine the expected standard deviation of λ where $I(\lambda)$ is the Fisher information and $\hat{\lambda}$ an efficient operator. The decay time distributions for $\mathcal{B}^0 \to J/\Psi K_s^0$ and $\overline{\mathcal{B}^0} \to J/\Psi K_s^0$ are

$$N_{\mathcal{B}^0 \to J/\Psi K_s^0} \propto e^{-t} \left[1 + \lambda \sin(0.7t)\right],$$
$$N_{\overline{\mathcal{B}^0} \to J/\Psi K_s^0} \propto e^{-t} \left[1 + \lambda \sin(0.7t)\right].$$

To calculate the standard deviation we shall use a value of $\lambda = 0.3$.

a) We consider 500 decays of $\mathcal{B}^0$.

b) We consider 500 decays of $\overline{\mathcal{B}^0}$.

c) We consider 250 decays of $\mathcal{B}^0$ and 250 decays of $\overline{\mathcal{B}^0}$.

d) Put very nice explanation here.

Exercise 7.2

Given electron tracks we are asked to first plot five tracks into one image. Afterwards we shall construct a theoretical model for the motion of electrons under the influence of a magnetic field. Using this model we have to fit it to the given data using a self-written χ^2 model. After plotting different values we eventually state a potential isotope from which the electrons come from.

As usual, please find the script in the text file `exercise7_2.C`.