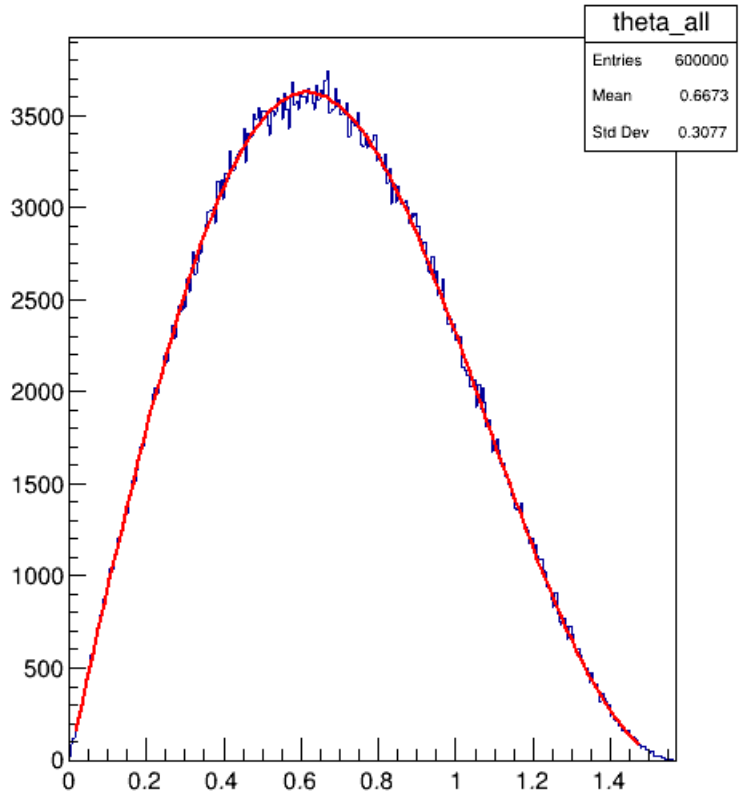
AVANCES DE TESIS
SEMANA 12/DIC/2024

Simulacion de Primeros Principios
Ajustes de Espectros

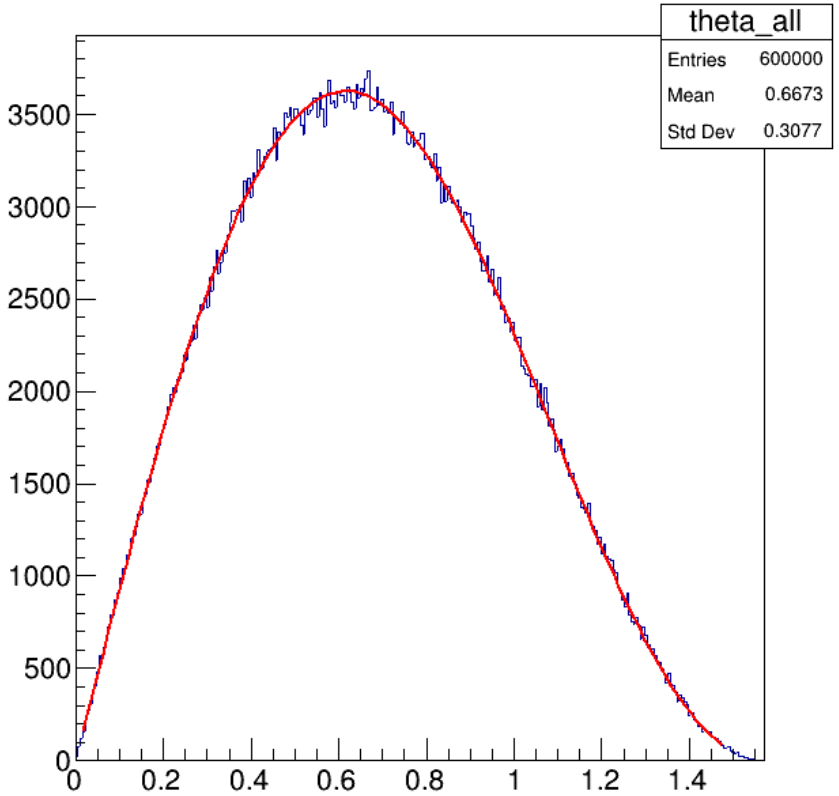
El script de la simulación ya funciona en el cluster del ICN por lo que será mas facil obtener una buena cantidad de datos en menor tiempo. Ahora tambien se puede utilizar la función TChain de ROOT para leer varios archivos al mismo tiempo.

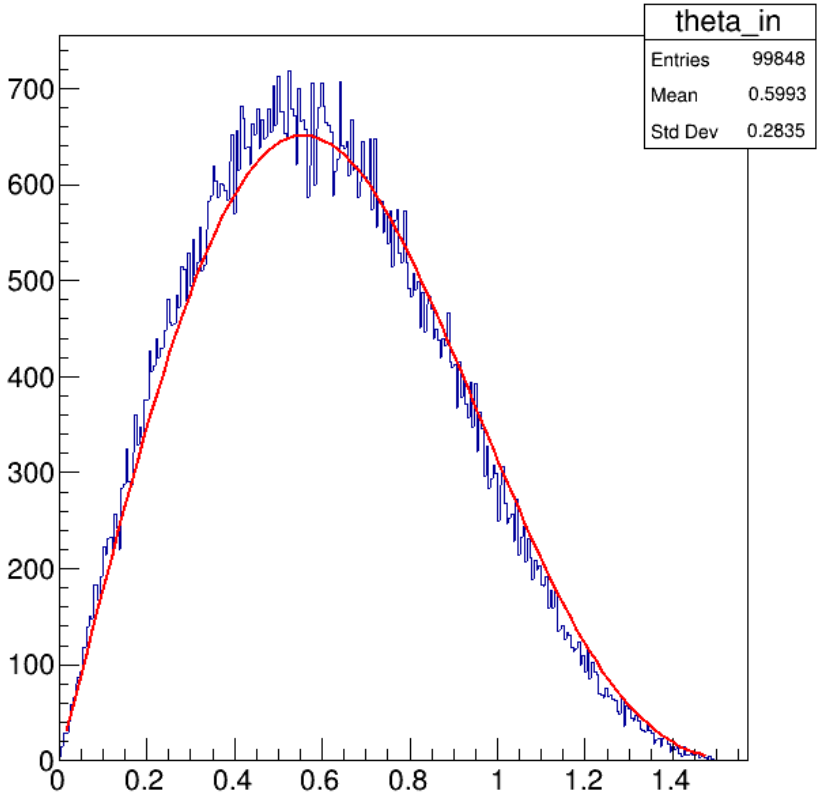
Simulacion_ab_initio > Test_edep_Chain.C > Test_edep_Chain()

```
void Test_edep_Chain(){

    TChain *chain = new TChain("tree");
    chain->Add("treesROOT_CCD/100k/Sim_ab_initio_NMUONS_100000_PLANES_3.0x3.0_RADIO_12_0.root");
    chain->Add("treesROOT_CCD/100k/Sim_ab_initio_NMUONS_100000_PLANES_3.0x3.0_RADIO_12_1.root");
    chain->Add("treesROOT_CCD/100k/Sim_ab_initio_NMUONS_100000_PLANES_3.0x3.0_RADIO_12_2.root");
    chain->Add("treesROOT_CCD/100k/Sim_ab_initio_NMUONS_100000_PLANES_3.0x3.0_RADIO_12_3.root");
    chain->Add("treesROOT_CCD/100k/Sim_ab_initio_NMUONS_100000_PLANES_3.0x3.0_RADIO_12_4.root");
    chain->Add("treesROOT_CCD/100k/Sim_ab_initio_NMUONS_100000_PLANES_3.0x3.0_RADIO_12_5.root");
    // chain->Draw("thet");


    // Sección de Energía depositada //
    // int NB = 150;
    // double tlow = 0;
    // double thi = 1000;
    // TH1F *edep = new TH1F("edep", "", NB, tlow, thi);
    // TH1F *edep_cut = new TH1F("edep_cut", "", NB, tlow, thi);

    // chain->Draw("edep>>edep", "l>0");

    // TCanvas *canv = new TCanvas("canv","", 2*700, 600);
    // canv->Divide(2,1);
    // canv->cd(1);
    // edep->Draw();
    // // func1->Draw("same");

    // canv->cd(2);
    // edep_cut->Draw();

    // Sección de theta //
    // int NB = 90;
    int NB = 300;
    double tlow = 0;
    double thi = TMath::Pi()/2.0;
    TH1F *theta_all = new TH1F("theta_all", "", NB, tlow, thi);
    TH1F *theta_in = new TH1F("theta_in", "", NB, tlow, thi);
```

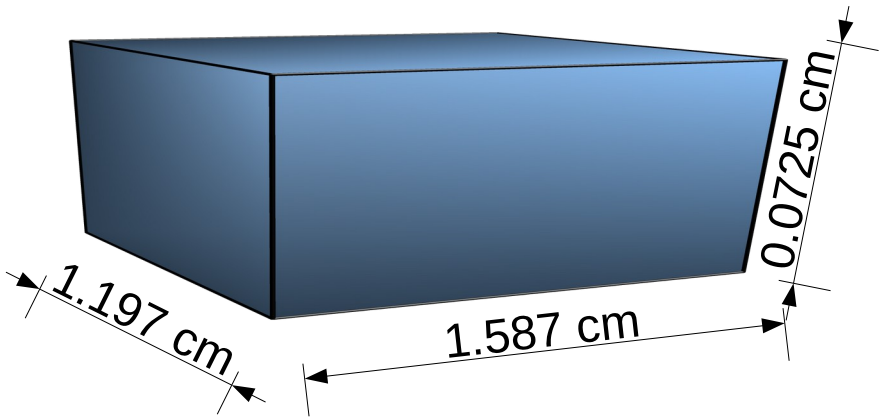


Sin embargo aun había un error en las constantes que se determinan con las probabilidades del sensor.

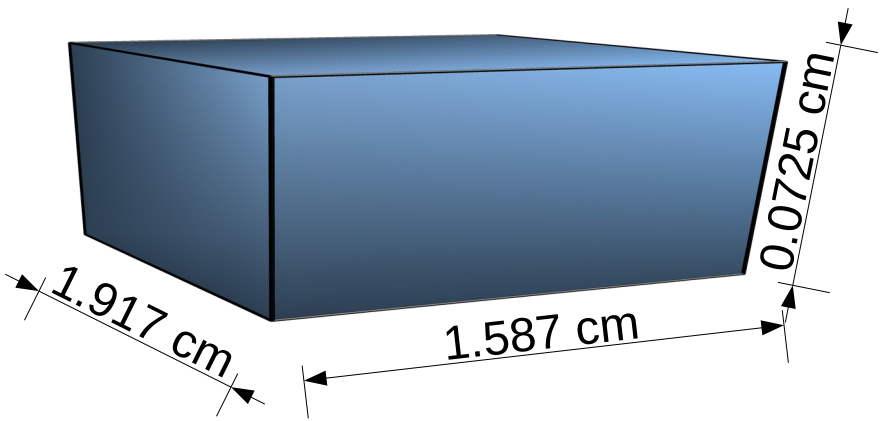




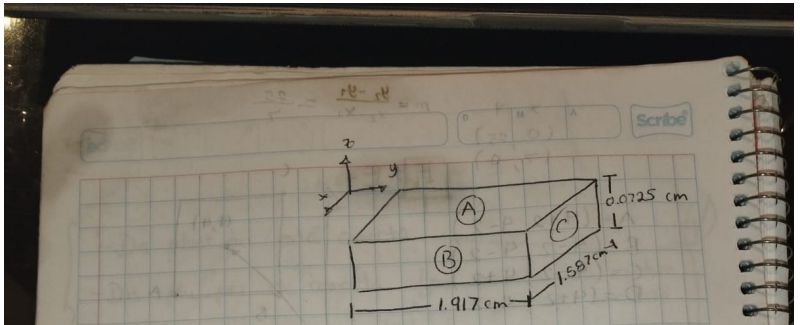
Un error importante se encontraba en las medidas de la CCD.
Esto ya se corrigió en la simulación y en las cuentas hechas



Incorrecto



Correcto



$D_y = 1.917\text{cm}$, $D_x = 1.587\text{cm}$, $D_z = 0.0725\text{ cm}$

(A) $(D_x)(D_y) = 3.042279\text{ cm}^2$

(B): $(D_y)(D_z) = 0.1389825\text{ cm}^2$

(C): $(D_x)(D_z) = 0.1150575\text{ cm}^2$

$A_T = (A) + 2((B)+(C)) =$

$= 3.042279 + 2(0.1389825 + 0.1150575)$

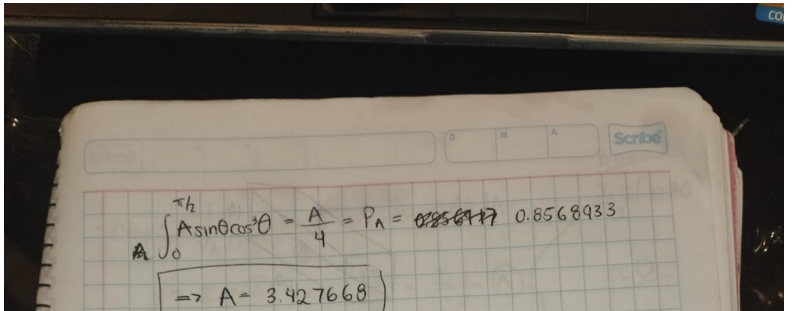
$= 3.042279 + 2(0.2540400)$

$= 3.042279 + 0.5080800 = 3.550359$

$P_A = \frac{(A)}{A_T} = \frac{0.8568933}{}$

$P_B = \frac{(B)}{A_T} = 0.039146041$

$P_C = \frac{(C)}{A_T} = 0.032407286$



$\int_0^{\pi/2} A\sin\theta\cos^3\theta = \frac{A}{4} = P_A = 0.8568933$

$\Rightarrow A = 3.427668$

$\int_0^{\pi/2} B\sin^2\theta\cos^2\theta = \frac{\pi B}{16} = 2(P_B + P_C) = 2(0.071553327)$

$= 0.143106654$

$\Rightarrow B = \frac{2.289706464}{\pi}$

$\int_0^{2\pi} A\,d\phi = 2\pi A = 0.8568933$

$\Rightarrow A = \frac{0.8568933}{2\pi}$

$\int_0^{2\pi} B\,|\cos\varphi|\,d\varphi = 4B = 2(0.039146041)$

$= 0.078292082$

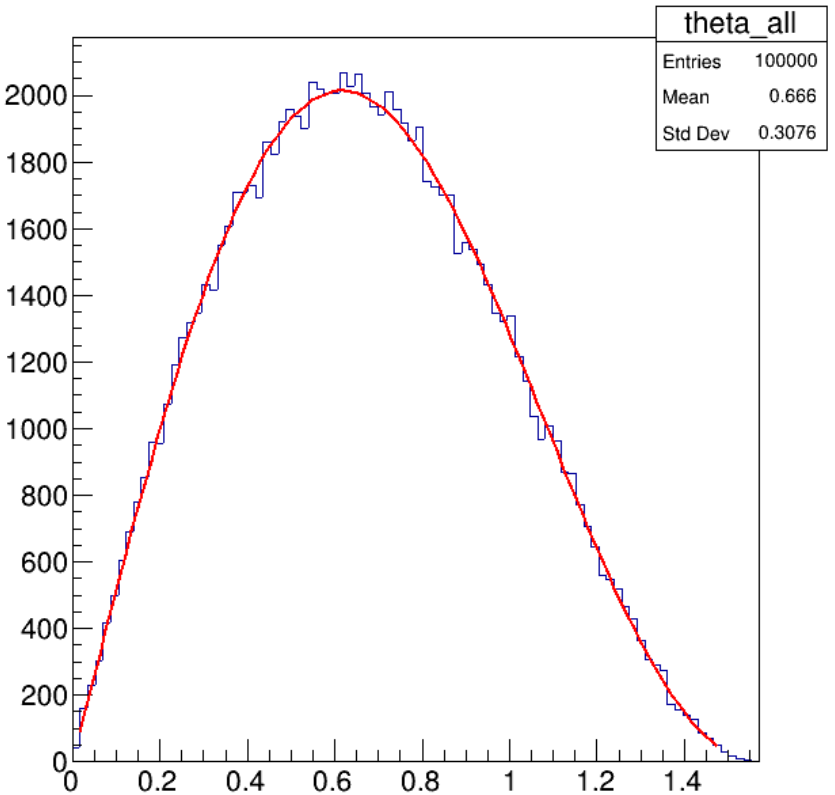
$\Rightarrow B = \frac{0.078292082}{4}$

$\int_0^{2\pi} C\,|\sin\varphi|\,d\varphi = 4C = 2(0.032407286)$

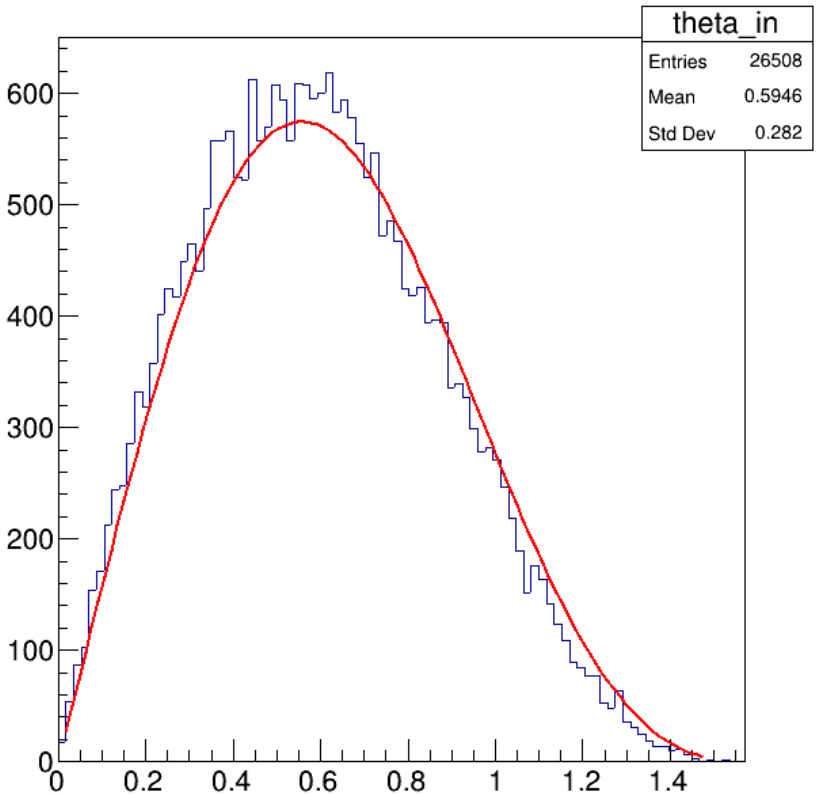
$= 0.064814572$

$\Rightarrow C = \frac{0.064814572}{4}$

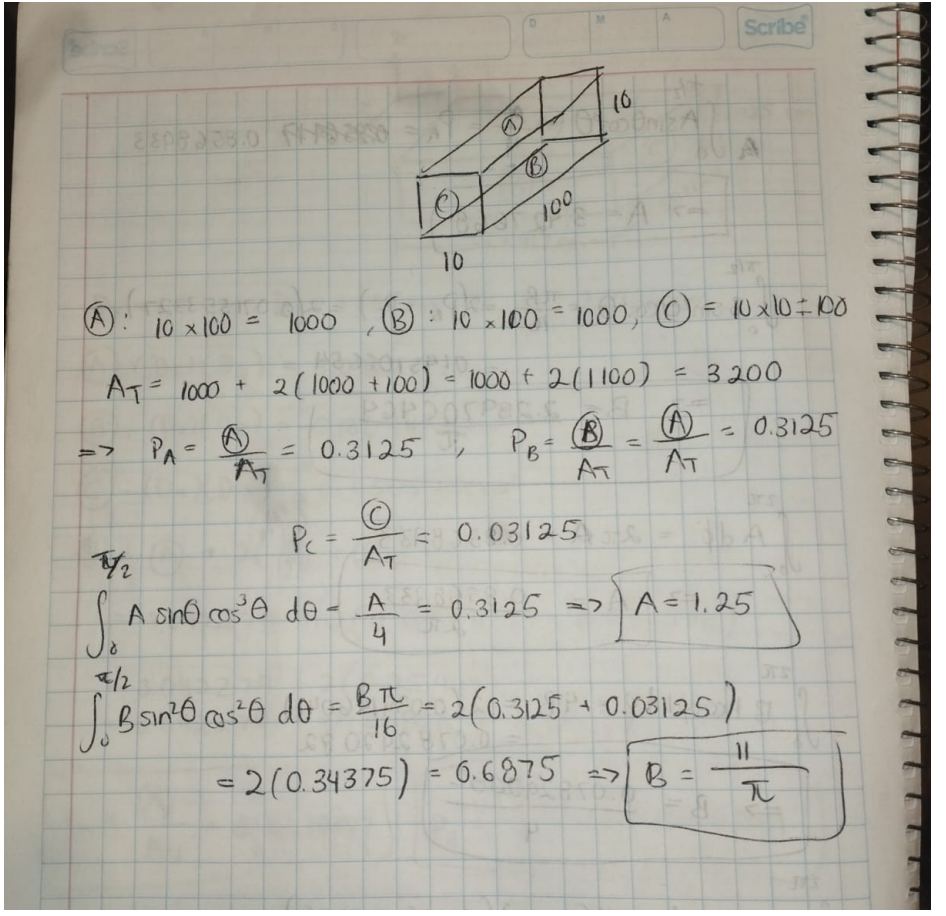
$A*\sin(\theta)\cos^2(\theta)$



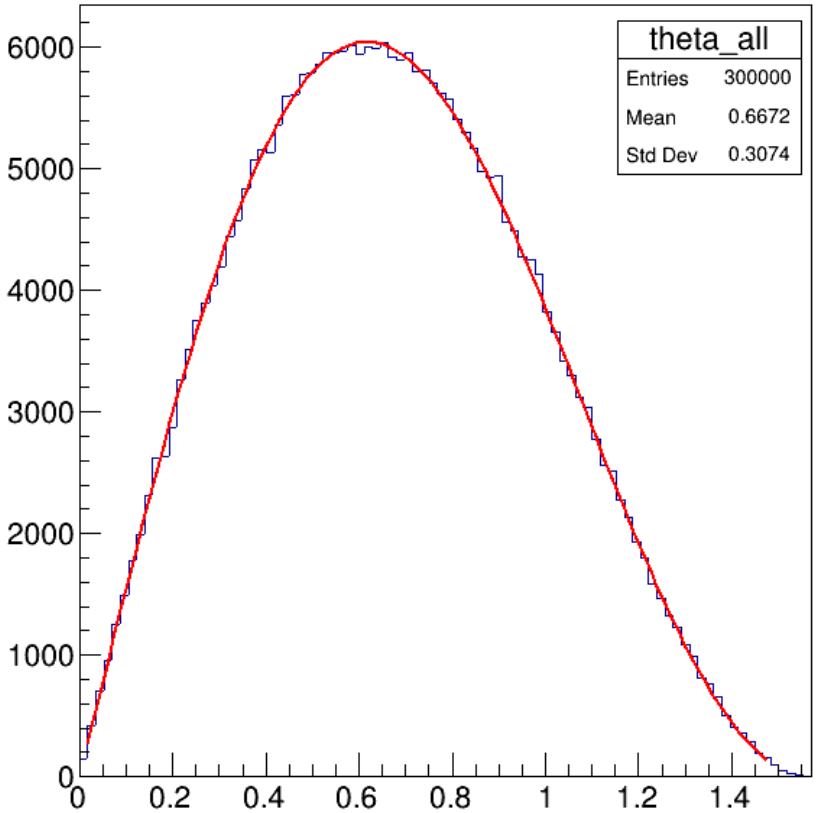
$A*\sin(\theta)\cos^3(\theta) + B*\sin^2()\cos^2()$

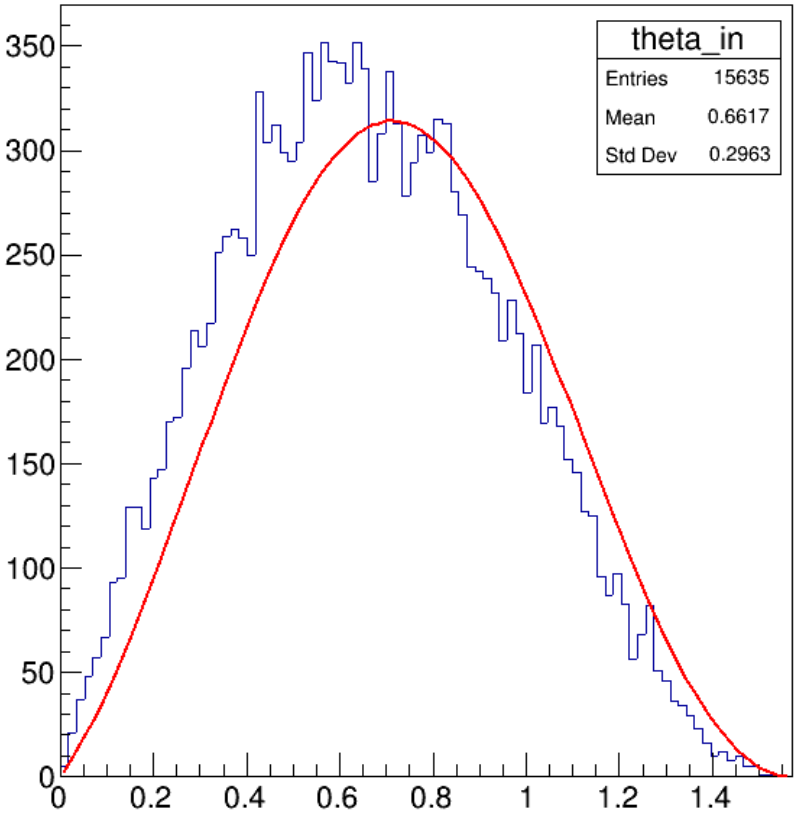


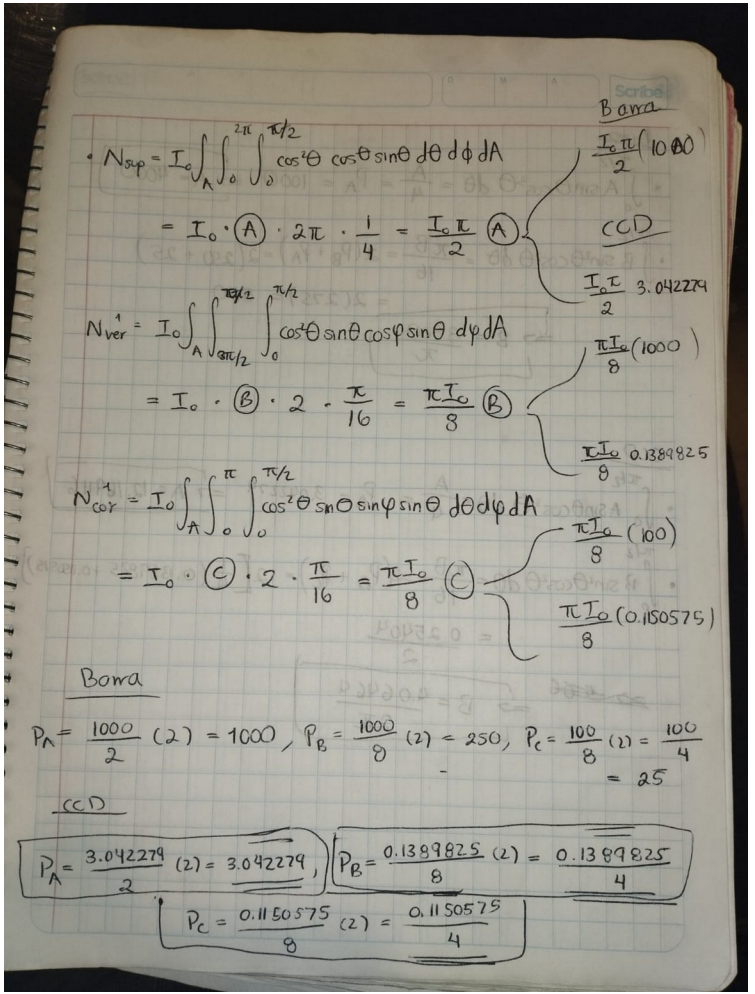
Para corroborar que el procedimiento era correcto se realizaron las cuentas con las medidas de la Barra



Pero claramente tampoco salió, las constantes A y B obtenidas de esta forma no son las que se encuentran en la tesis de licenciatura de Bryan.







$N_{sup} = I_0 \int_A \int_0^{2\pi} \int_0^{\pi/2} \cos^2\theta \cos\theta \sin\theta \, d\theta \, d\phi \, dA$

$= I_0 \cdot (A) \cdot 2\pi \cdot \frac{1}{4} = \frac{I_0 \pi}{2} (A)$

$N_{ver}^{1} = I_0 \int_A \int_{3\pi/2}^{\pi/2} \int_0^{\pi/2} \cos^2\theta \sin\theta \cos\varphi \sin\theta \, d\varphi \, dA$

$= I_0 \cdot (B) \cdot 2 \cdot \frac{\pi}{16} = \frac{\pi I_0}{8} (B)$

$N_{cor}^{1} = I_0 \int_A \int_0^{\pi} \int_0^{\pi/2} \cos^2\theta \sin\theta \sin\varphi \sin\theta \, d\theta \, d\varphi \, dA$

$= I_0 \cdot (C) \cdot 2 \cdot \frac{\pi}{16} = \frac{\pi I_0}{8} (C)$

Barra

$\frac{I_0 \pi}{2}$ (1000)

CCD

$\frac{I_0 \pi}{2}$ 3.042279

$\frac{\pi I_0}{8}$ (1000)

$\frac{\pi I_0}{8}$ 0.1389825

$\frac{\pi I_0}{8}$ (100)

$\frac{\pi I_0}{8}$ (0.1150575)

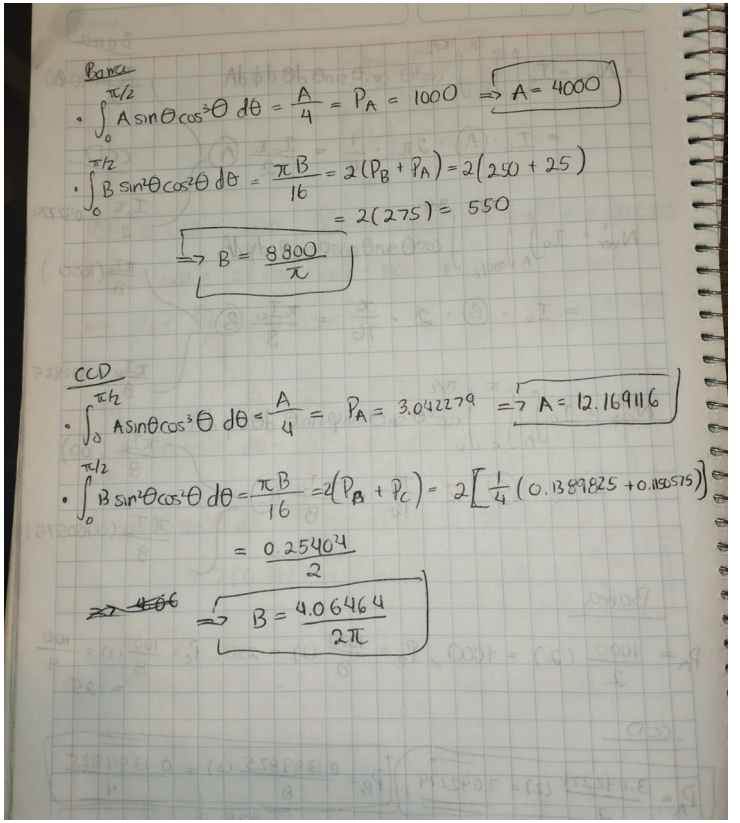
Barra

$P_A = \frac{1000}{2}(2) = 1000$, $P_B = \frac{1000}{8}(2) = 250$, $P_C = \frac{100}{8}(2) = \frac{100}{4} = 25$

CCD

$P_A = \frac{3.042279}{2}(2) = 3.042279$, $P_B = \frac{0.1389825}{8}(2) = \frac{0.1389825}{4}$

$P_C = \frac{0.1150575}{8}(2) = \frac{0.1150575}{4}$



Barra

$\int_0^{\pi/2} A \sin\theta \cos^3\theta \, d\theta = \frac{A}{4} = P_A = 1000 \Rightarrow A = 4000$

$\int_0^{\pi/2} B \sin^2\theta \cos^2\theta \, d\theta = \frac{\pi B}{16} = 2(P_B + P_A) = 2(250 + 25)$

$= 2(275) = 550$

$\Rightarrow B = \frac{8800}{\pi}$

CCD

$\int_0^{\pi/2} A \sin\theta \cos^3\theta \, d\theta = \frac{A}{4} = P_A = 3.042279 \Rightarrow A = 12.169116$

$\int_0^{\pi/2} B \sin^2\theta \cos^2\theta \, d\theta = \frac{\pi B}{16} = 2(P_B + P_C) = 2\left[\frac{1}{4}(0.1389825 + 0.1150575)\right]$

$= \frac{0.25404}{2}$

$\Rightarrow B = \frac{4.06464}{2\pi}$

Con esos valores obtenidos el ajuste hecho para la variable θ ya es el correcto.