

Quadrupole Magnet Modelling & Simulation

SOKENDAI KEK Tsukuba/J-Parc Summer School program 2026

Tegest Gaetti

About me

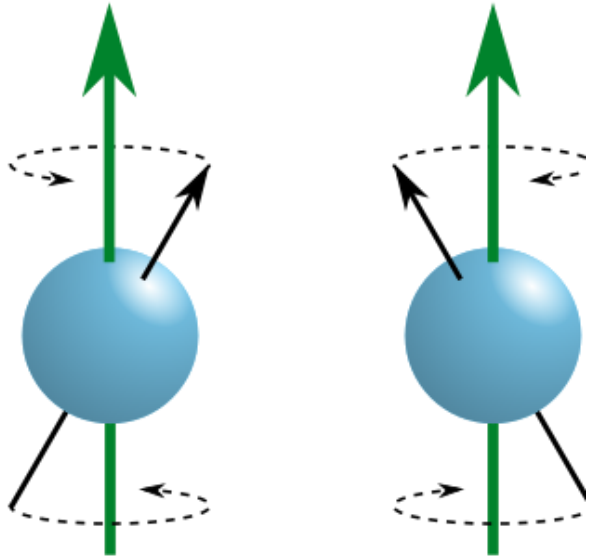


S O K E N D A I

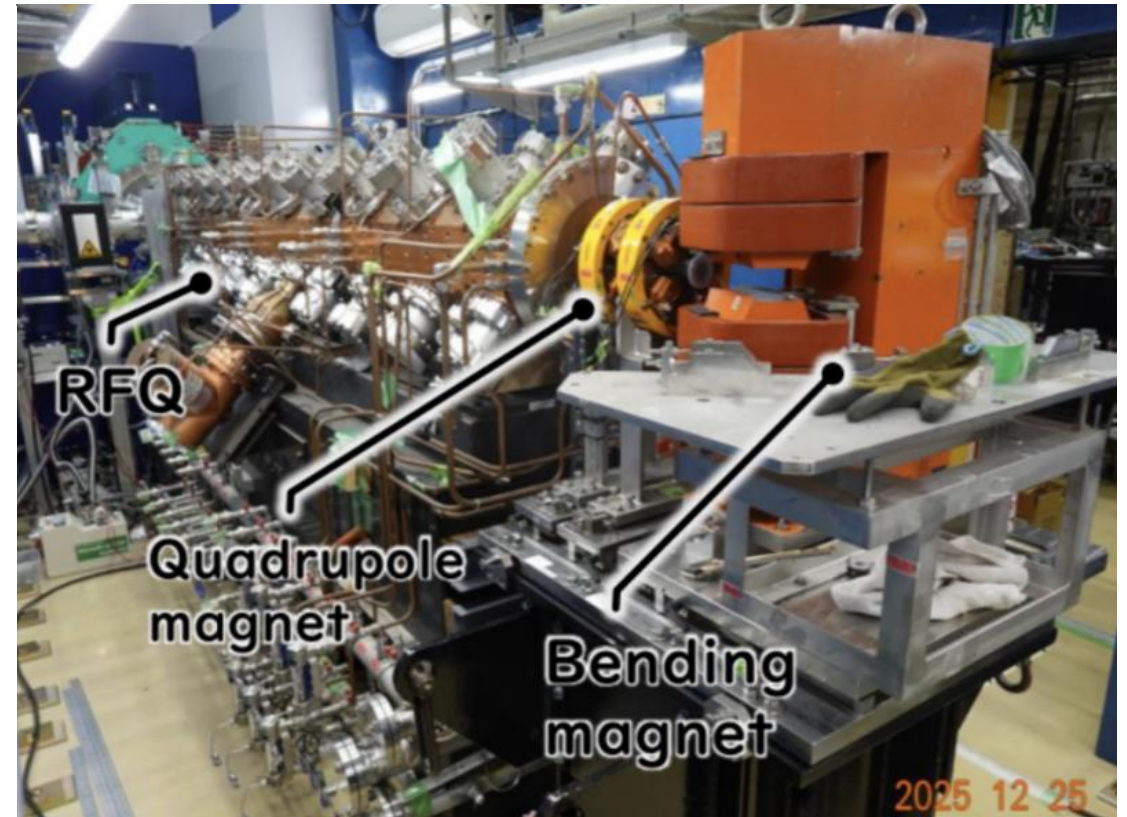
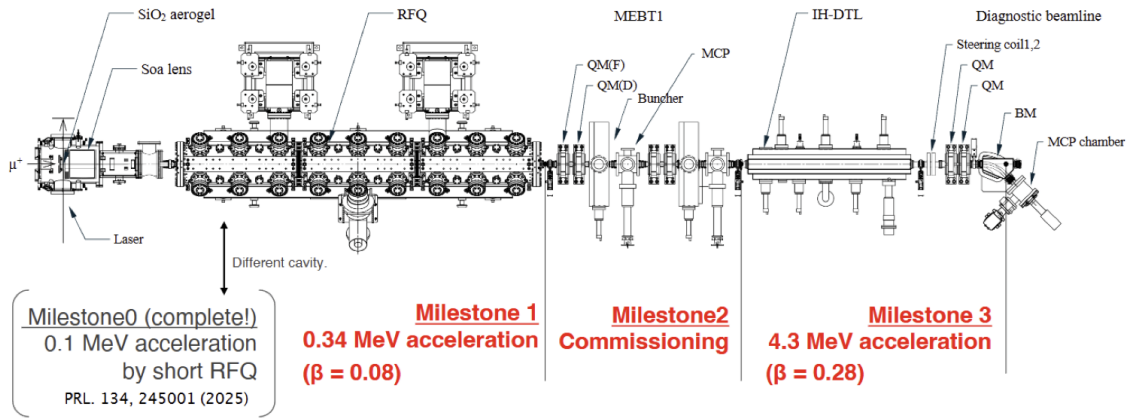
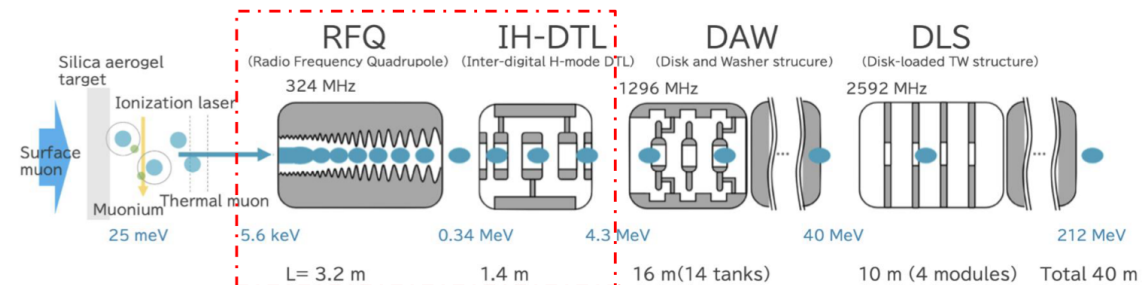


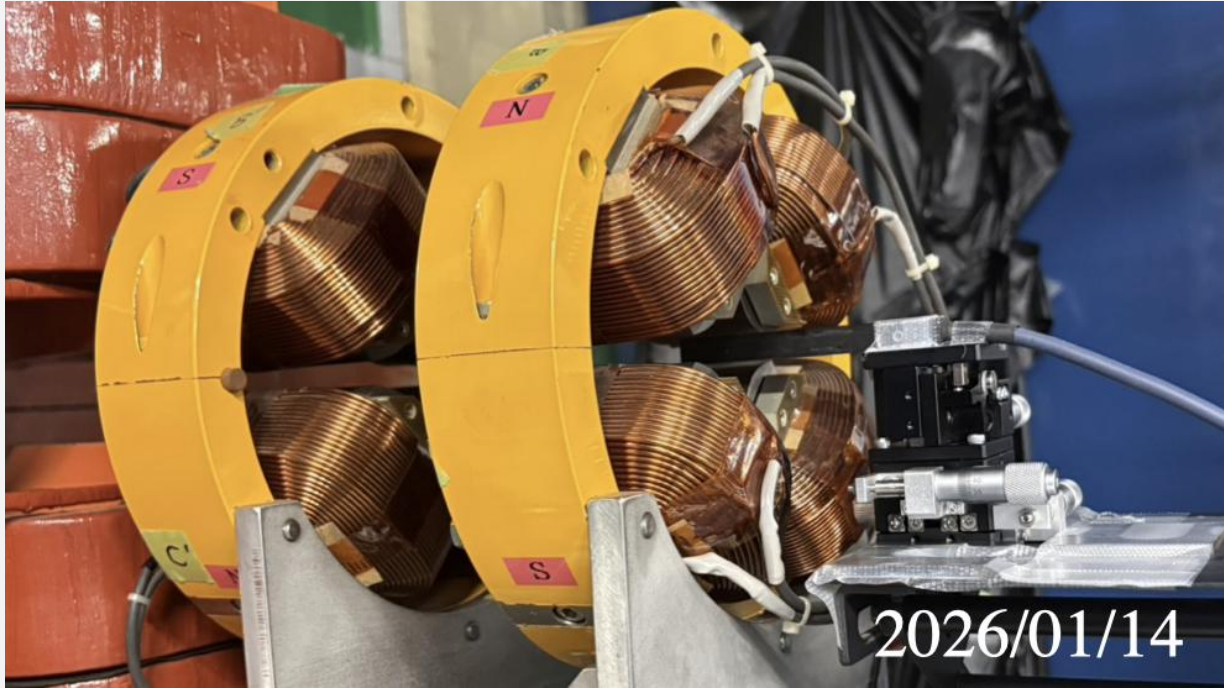
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TEGT

Project – G-2 group



Present structure





Supervisors: Masashi Otani
& Yuga Nakazawa

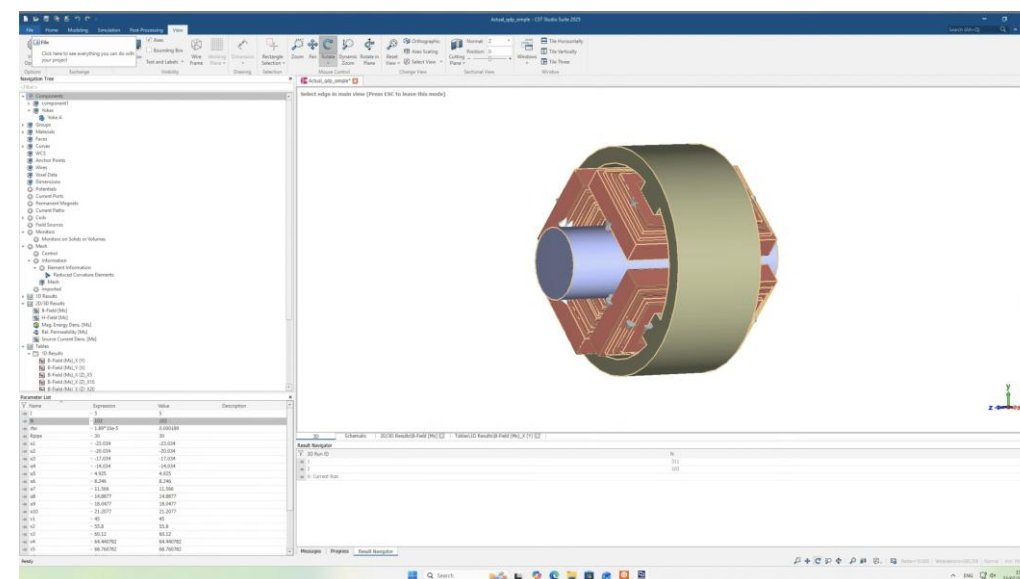
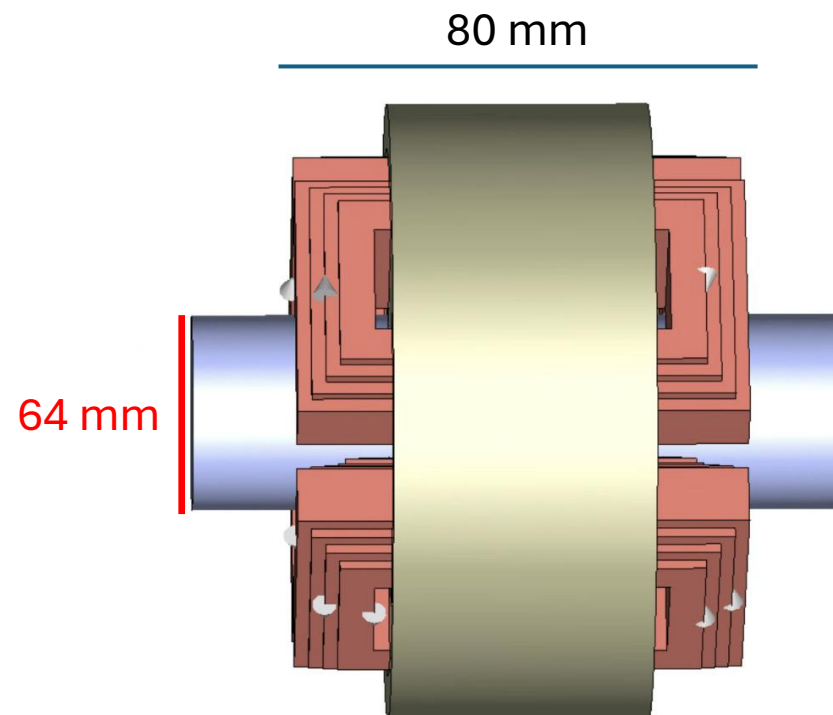
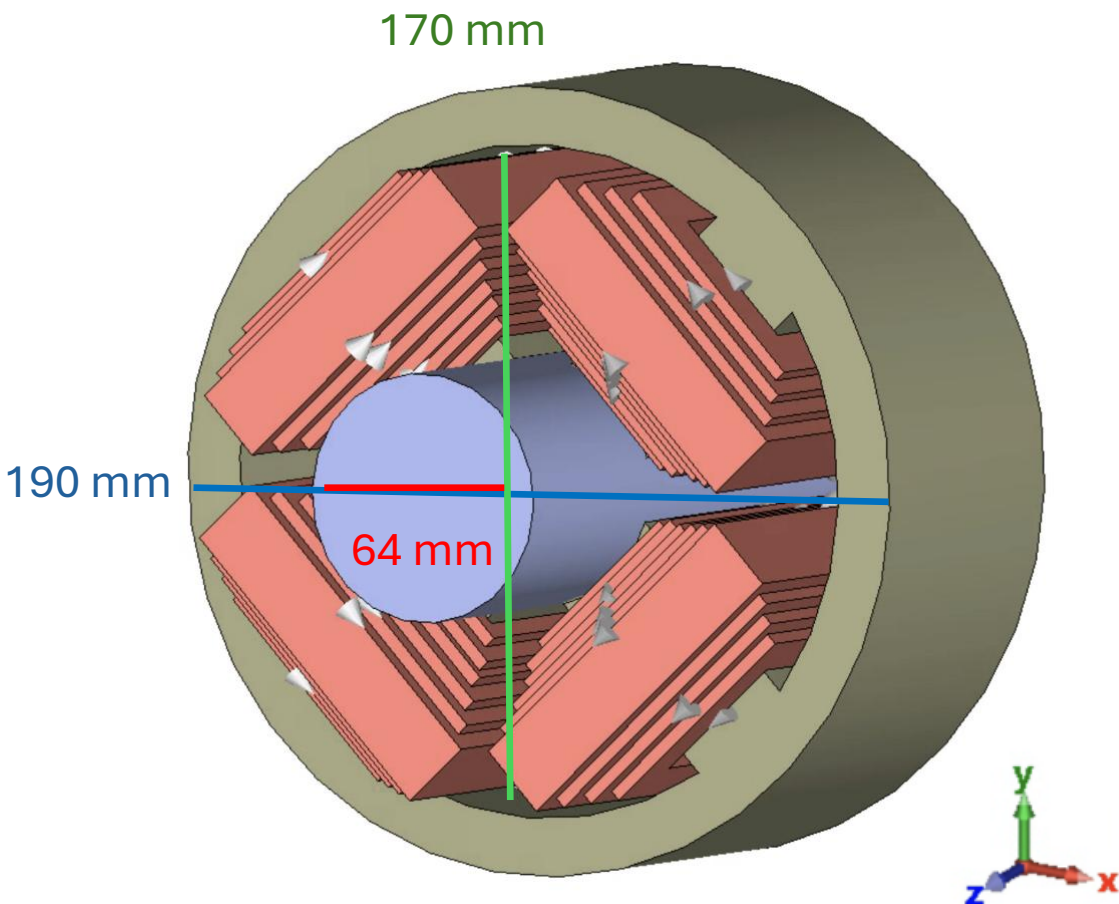
Objective

1. QM model in CST

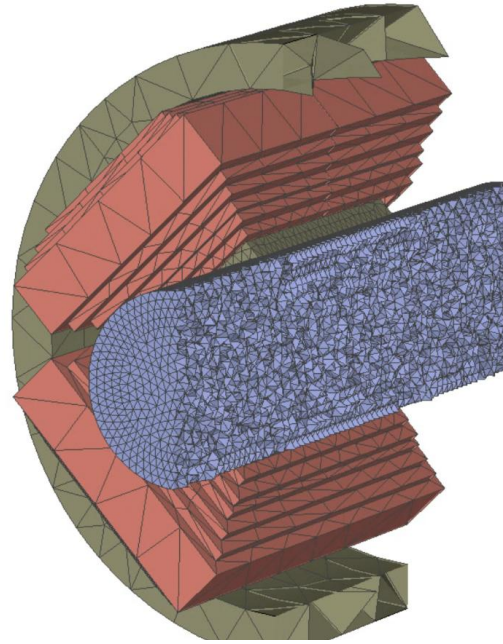
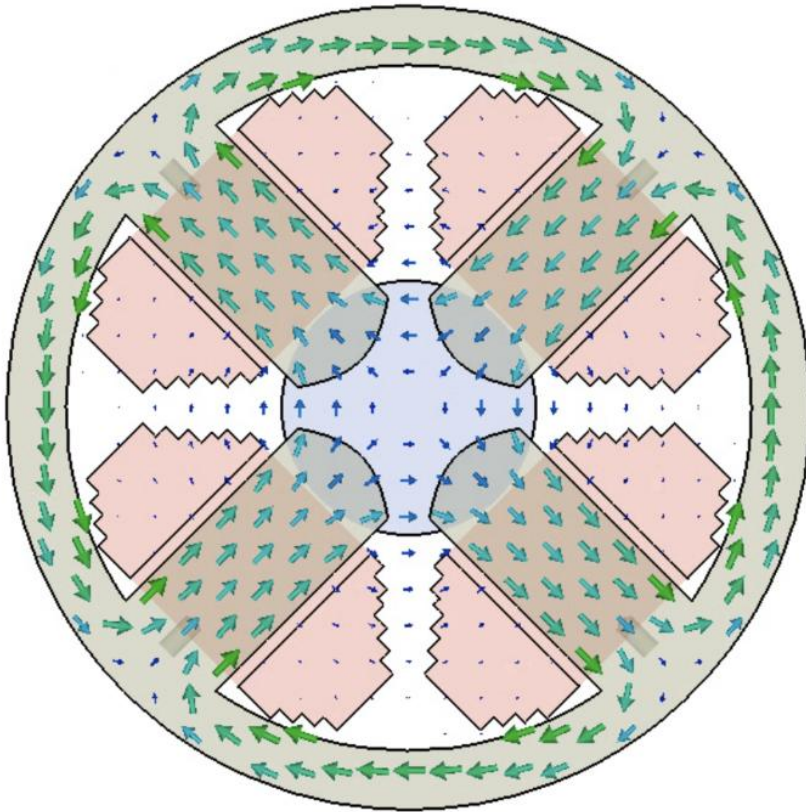
2. QM measurements

3. Beam simulation

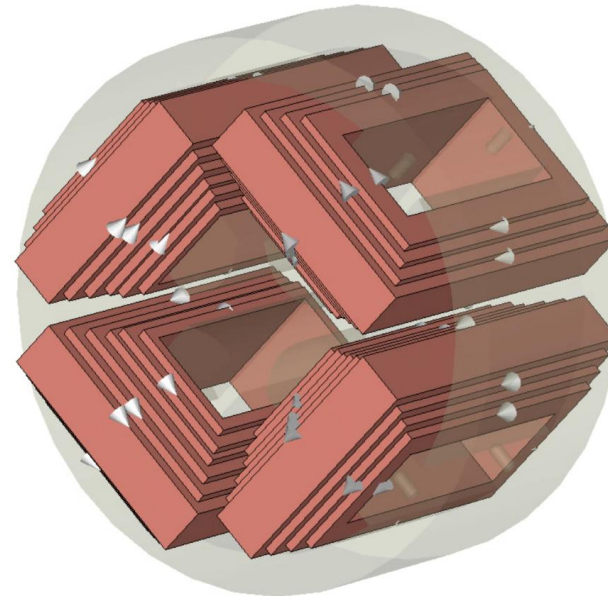
Progress - Modelling



Simulation



Mesh



Coil

Turns: 103
Current: 5 A

Data Processing

Q_M_fields_analysis } No Selection

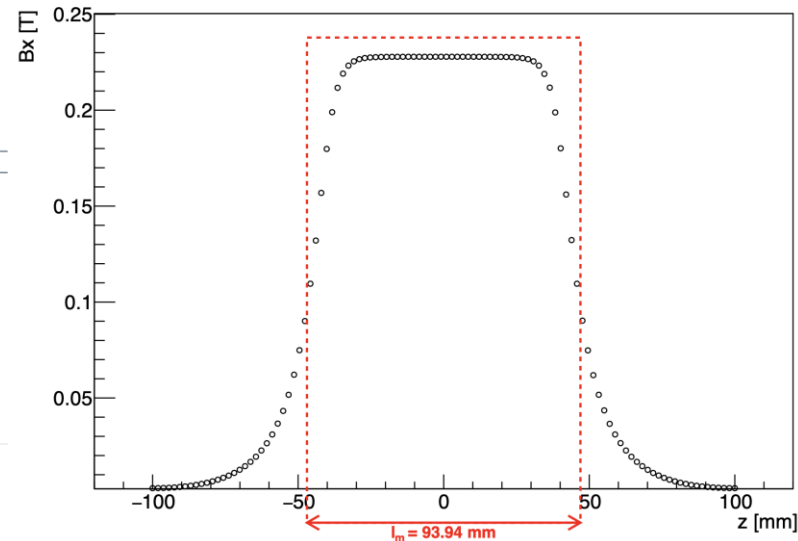
```

32
33 using namespace std;
34
35
36 // ----- CREATING ROOT TTREE -----
37 //-----
38 void createRootTree(string inFileName, string outFileName)
39 {
40     gROOT->Reset();
41     TFile *f = new TFile(outFileName.c_str(), "RECREATE");
42     TTree *T = new TTree("T", "Data from ACII filw");
43     TH1F *h1 = new TH1F("h1", "x direction", 100, -4,4);
44
45     Long64_t treeLines = T->ReadFile(inFileName.c_str(), "x:y:z:Bx:By:Bz");
46     printf(" found %lld pointsn", treeLines);
47
48     T->Write();
49     f->Close();
50 }
51
52
53 //----- PROCESSING DATA -----
54 //-----
55
56 class MagField {
57 private:
58     TTree* T;
59     TGraph* gr;
60     TF1* fit;
61
62     Float_t x, y, z, Bx, By, Bz;
63
64     Double_t* c;
65     Float_t G, B_max, l_m, int_B_dz;
66     Double_t targetX, targetY, targetZ;
67

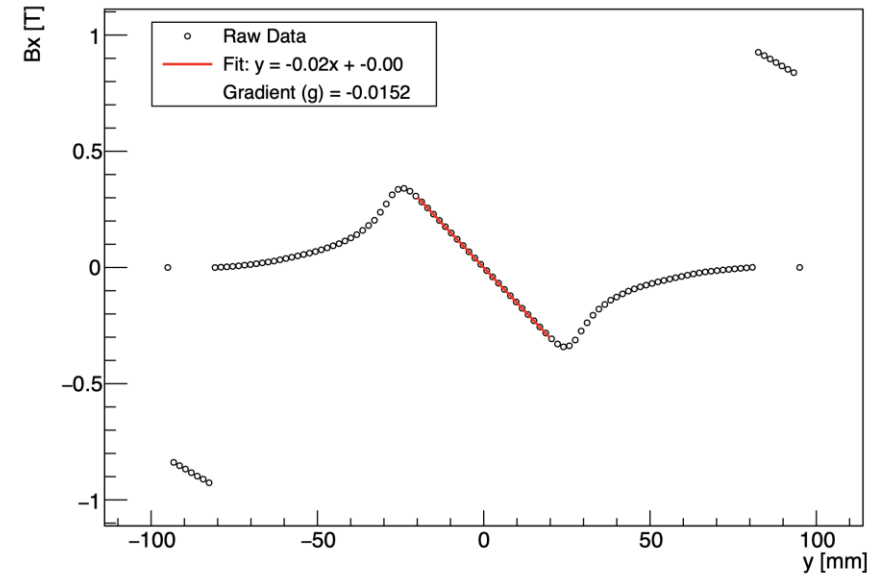
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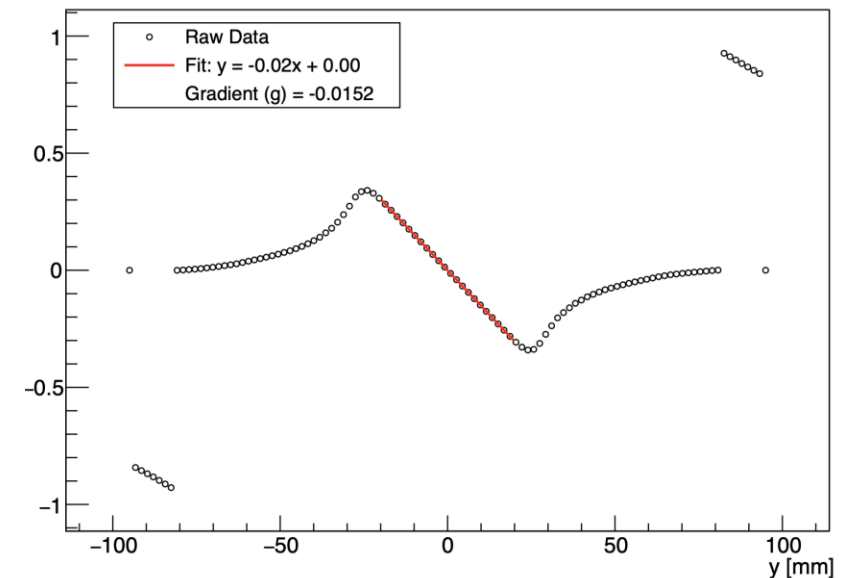
Bx along z at (x = 15 mm, y = 0 mm)



By along x at (y = 0 mm, z = 0 mm)



Bx along y at (x = 0 mm, z = 0 mm)





Next steps

- 1: Simulate the magnetic field for different currents
- 2: Conduct the quadrupole measurements
- 3: Adjusting the model and beam simulation
- Side project:
- Building a 3D model of a Dipole magnet through CST Studio Suite



Thank you for the
attention!

