Determinarea sarcinii specifice a electronului

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Scopul lucrarii: Determinarea sarcinii specifice a electronului 𝑒/𝑚0 utilizând un dispozitiv exper- imental în care traiectoriile electronilor emişi de un tun electronic sunt modificate de un câmp magnetic exterior, uniform, produs de bobinele Helmholtz.

Cunoscând diferenţa de potenţial U la care electronul a fost accelerat, se determinǎ (m/e)v2 . De aici poate fi determinată valoarea sarcinii specifice (e/m0 ).

**import numpy as np import math**

**import matplotlib.pyplot as plt**

r = [0.05, 0.04, 0.03]

I3 = np.array([0.686, 0.927, 1.802, 2.107, 2.208, 2.350])

I4 = np.array([0.160, 0.202, 1.363, 1.555, 1.635, 1.764])

I5 = np.array([0.003, 0.003, 1.148, 1.261, 1.324, 1.404])

R = 0.2

U = np.array([100, 120, 140, 160, 180, 200])

n = 154

u = 4 \* math.pi \* 1e-7

epem5 = (125/32.0) \* ((R\*\*2) / ( u\*\*2 \* n\*\*2)) \* (U / ((r[0]\*\*2) \* (I5 \*\* 2)))

epem4 = (125/32.0) \* ((R\*\*2) / ( u\*\*2 \* n\*\*2)) \* (U / ((r[1]\*\*2) \* (I4 \*\* 2)))

epem3 = (125/32.0) \* ((R\*\*2) / ( u\*\*2 \* n\*\*2)) \* (U / ((r[2]\*\*2) \* (I3 \*\* 2)))

*# -------- r = 5cm*

y5 = I5 \*\* 2

plt.scatter(U / (r[0] \*\* 2), y5)

coeffs5 = np.polyfit(U / (r[0] \*\* 2), y5, 1)

x5 = np.linspace(min(U / (r[0] \*\* 2)), max(U / (r[0] \*\* 2)), 100) y5 = coeffs5[0] \* x5 + coeffs5[1]

plt.plot(x5, y5, label='r = 5cm')

*# -------- r = 4cm*

y4 = I4 \*\* 2

plt.scatter(U / (r[1] \*\* 2), y4)

coeffs4 = np.polyfit(U / (r[1] \*\* 2), y4, 1)

x4 = np.linspace(min(U / (r[1] \*\* 2)), max(U / (r[1] \*\* 2)), 100) y4 = coeffs4[0] \* x4 + coeffs4[1]

plt.plot(x4, y4, label='r = 4cm')

*# -------- r = 3cm*

y3 = I3 \*\* 2

plt.scatter(U / (r[2] \*\* 2), y3)

coeffs3 = np.polyfit(U / (r[2] \*\* 2), y3, 1)

x3 = np.linspace(min(U / (r[2] \*\* 2)), max(U / (r[2] \*\* 2)), 100) y3 = coeffs3[0] \* x3 + coeffs3[1]

plt.plot(x3, y3, label='r = 3cm')

em5 = (125/32) \* ((R\*\*2) / (u\*\*2 \* n\*\*2)) \* (1/coeffs5[0]) em4 = (125/32) \* ((R\*\*2) / (u\*\*2 \* n\*\*2)) \* (1/coeffs4[0]) em3 = (125/32) \* ((R\*\*2) / (u\*\*2 \* n\*\*2)) \* (1/coeffs3[0])

m = 9.109 \* 1e-31

plt.xlabel("U/r^2 (V / m^2)") plt.ylabel("I^2 (A^2)")

print('Sarcinile specifice obtinute:') print(str(em5) + ' C/Kg') print(str(em4) + ' C/Kg') print(str(em3) + ' C/Kg')

plt.legend() plt.show()

Sarcinile specifice obtinute: 75920422359.61548 C/Kg

76411221349.05641 C/Kg

84286594677.98564 C/Kg

