

Magnetic field of single coils / Biot-Savart's law 4.3.02-01/15



Set-up of experiment P2430215 with Cobra3

What you can learn about ...

- Wire loop
- Biot-Savart's law
- Hall effect
- Magnetic field
- Induction
- Magnetic flux density

Principle:

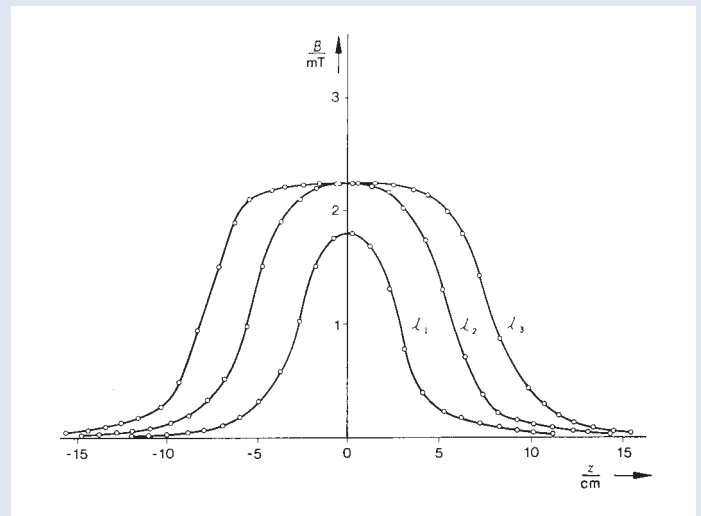
The magnetic field along the axis of wire loops and coils of different dimensions is measured with a teslameter (Hall probe). The relationship between the maximum field strength and the dimensions is investigated and a comparison is made between the measured and the theoretical effects of position.

What you need:

Experiment P2430215 with Cobra3

Experiment P2430201 with teslameter

Teslameter, digital	13610.93	1
Digital multimeter 2010	07128.00	1
Induction coil, 300 turns, $d = 40$ mm	11006.01	1 1
Induction coil, 300 turns, $d = 32$ mm	11006.02	1 1
Induction coil, 300 turns, $d = 25$ mm	11006.03	1 1
Induction coil, 200 turns, $d = 40$ mm	11006.04	1 1
Induction coil, 100 turns, $d = 40$ mm	11006.05	1 1
Induction coil, 150 turns, $d = 25$ mm	11006.06	1 1
Induction coil, 75 turns, $d = 25$ mm	11006.07	1 1
Conductors, circular, set	06404.00	1 1
Hall probe, axial	13610.01	1 1
Power supply, universal	13500.93	1 1
Distributor	06024.00	1 1
Meter Scale, $l = 1000 \times 27$ mm	03001.00	1 1
Barrel base -PASS-	02006.55	2 2
Support rod -PASS-, square, $l = 250$ mm	02025.55	1 1
Right angle clamp -PASS-	02040.55	1 2
G-clamp	02014.00	2 2
Lab jack, 200 x 230 mm	02074.01	1 1
Reducing plug 4 mm/2 mm socket, 1 pair	11620.27	1 1
Connecting cable, 4 mm plug, 32 A, blue, $l = 50$ cm	07361.04	1 1
Connecting cable, 4 mm plug, 32 A, red, $l = 50$ cm	07361.01	2 2
Bench clamp -PASS-	02010.00	1
Plate holder, opening width 0...10 mm	02062.00	1
Silk thread on spool, $l = 200$ mm	02412.00	1
Weight holder, 1g, silver bronzing	02407.00	1
Cobra3 BASIC-UNIT	12150.00	1
Software Cobra3 Force/Tesla	14515.61	1
Cobra3 measuring module Tesla	12109.00	1
Cobra3 current probe 6 A	12126.00	1
Movement sensor with cable	12004.10	1
Adapter BNC socket/4 mm plug pair	07542.27	2
Adapter, BNC socket - 4 mm plug	07542.20	1



Curve of magnetic flux density (measured values) for coils with a constant density of turns n/l , coils radius $R = 20$ mm, lengths $l_1 = 53$ mm, $l_2 = 105$ mm and $l_3 = 160$ mm.

Tasks:

1. To measure the magnetic flux density in the middle of various wire loops with the Hall probe and to investigate its dependence on the radius and number of turns.
2. To determine the magnetic field constant μ_0 .
3. To measure the magnetic flux density along the axis of long coils and compare it with theoretical values.

Power supply 12V/2A	12151.99	1
Data cable 2 x SUB-D, plug/socket, 9 pole	14602.00	1
PC, Windows® 95 or higher		

Complete Equipment Set, Manual on CD-ROM included
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Biot-Savart's law **P24302 01/15**