WJEC (Eduqas) Physics A Level

SP3.9b - Investigation of Magnetic Flux Density Using a Hall Probe

Practical Flashcards

What is a solenoid?

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A solenoid is a current carrying wire coil which induces a magnetic field inside and around it.

How can the magnetic flux density of a solenoid be measured?

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A Hall probe can be placed into the solenoid's magnetic field.

What is magnetic flux?

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Magnetic flux is equal to the product of the magnetic flux density and the area through which it passes. It can be thought of as the total number of field lines passing through a given area.

What equation is used to calculate magnetic flux when the area is at an angle to the field lines?

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$$\Phi = BA\cos\theta$$

What is magnetic flux linkage?

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Magnetic flux linkage is equal to the magnetic flux passing through a coil, multiplied by the number of turns that cut this flux.

What is the unit of magnetic flux?

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Webers (Wb)

How can the unknown magnetic field of a solenoid be calculated from the Hall pd in the solenoid and in a known magnetic field?

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$$B_2 = B_1V_2/V_1$$

1: Known magnetic field

2: Solenoid

What is the relationship between the Hall potential difference and the magnetic flux density?

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The output potential difference from a Hall probe is directly proportional to the magnetic flux density.

Why must the Hall probe be placed perpendicular to the magnetic field?

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The magnetic flux is only at a maximum when the probe is perpendicular to the magnetic field lines. If it is at a different orientation, the reading given will be less than the true maximum value.

What Hall potential difference would you expect to obtain if the probe was placed parallel to the field lines?

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If placed parallel to the field lines, there would be no magnetic flux passing through the probe's area and so the potential difference reading would be zero.

What must remain constant throughout this experiment?

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The current must remain constant throughout this experiment for the relationships utilised to be valid.