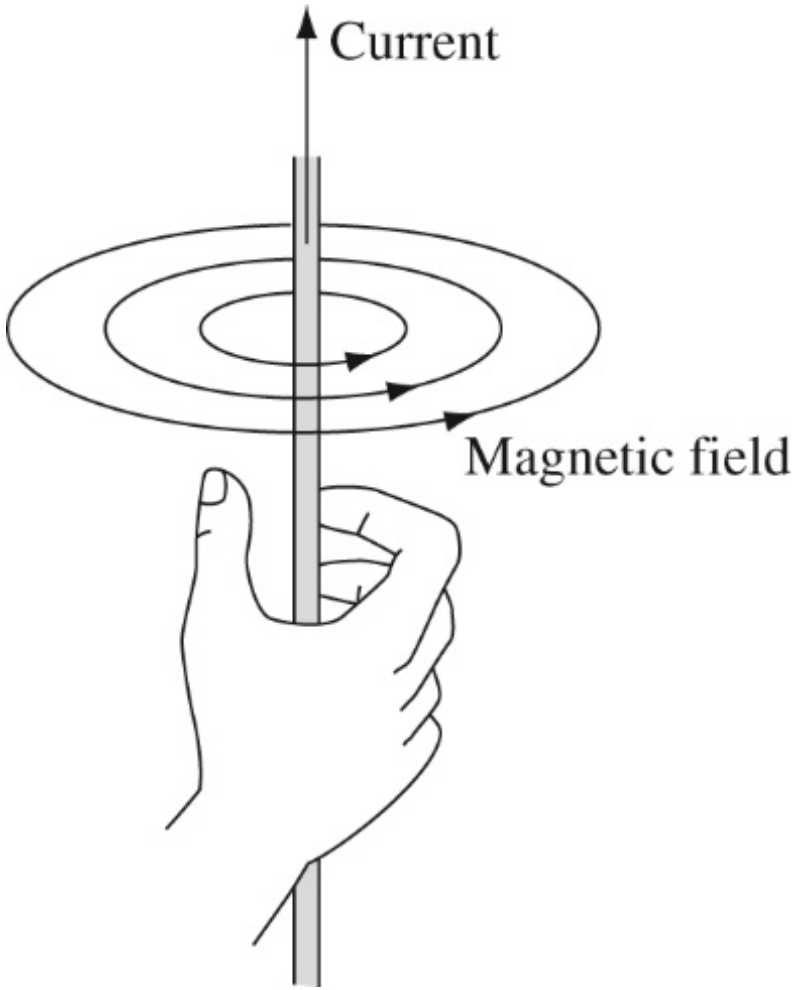
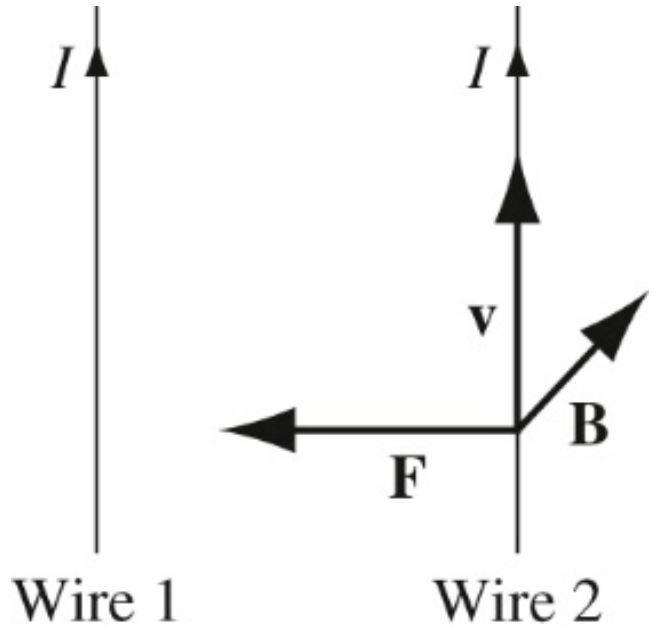
Lecture 27 Slides
Phys 313 Fall 2026

K1-02: FORCE BETWEEN CURRENT-CARRYING WIRES - PROJECTION

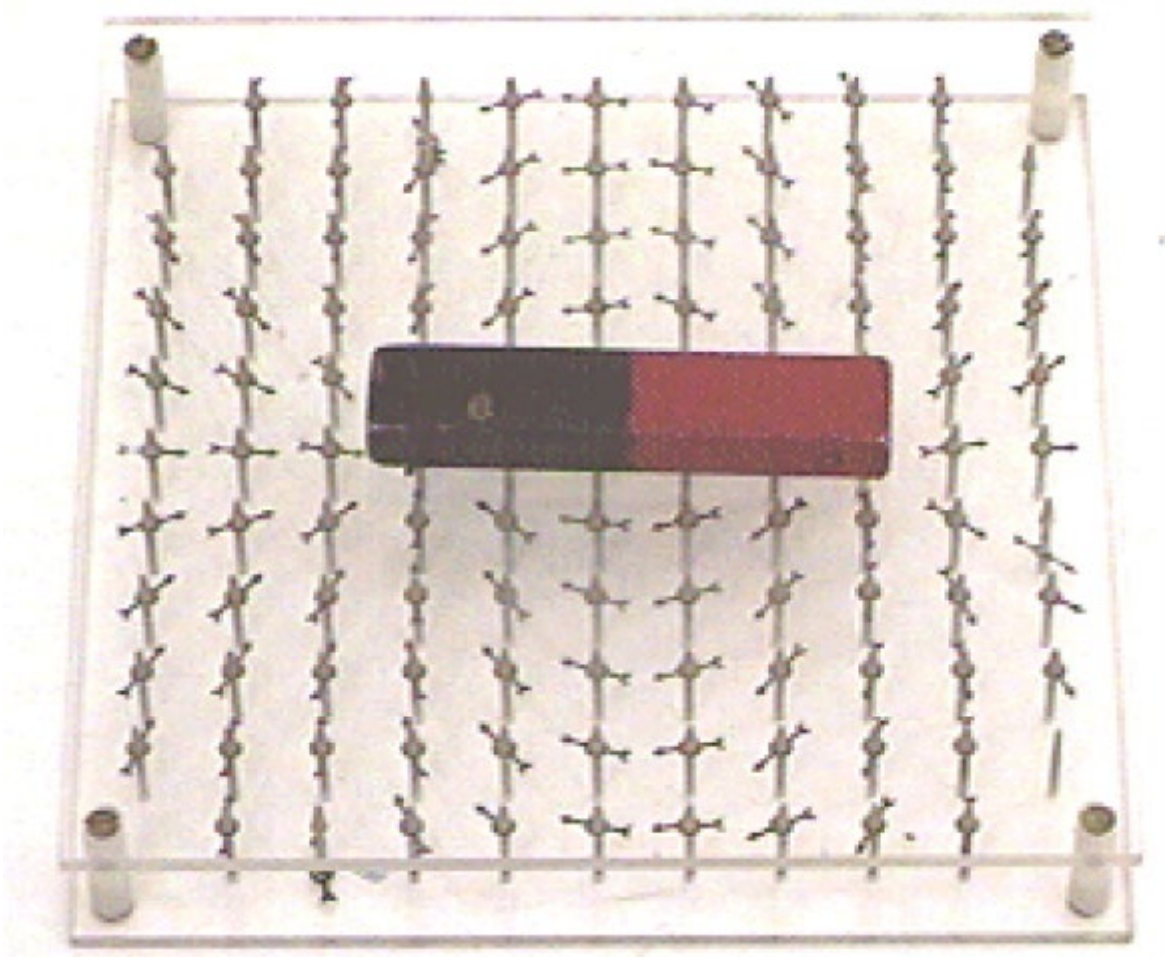


- **Purpose:** Demonstrates the force between two adjacent parallel current-carrying wires
- **Description:** A pair of wires are mounted in an overhead projector, as seen without any current flowing in the photograph above. The device can be wired to carry parallel currents or antiparallel currents. Connect power supply to the desired wires, one set at a time. With the red and black connectors (at right in the photo above) hooked up in series, the current will be antiparallel. With a shunt joining those two connectors, the two wires can be run in parallel, with one cable connected to each end.
- Students should clearly see that parallel currents attract and antiparallel currents repel.


Current
Magnetic field

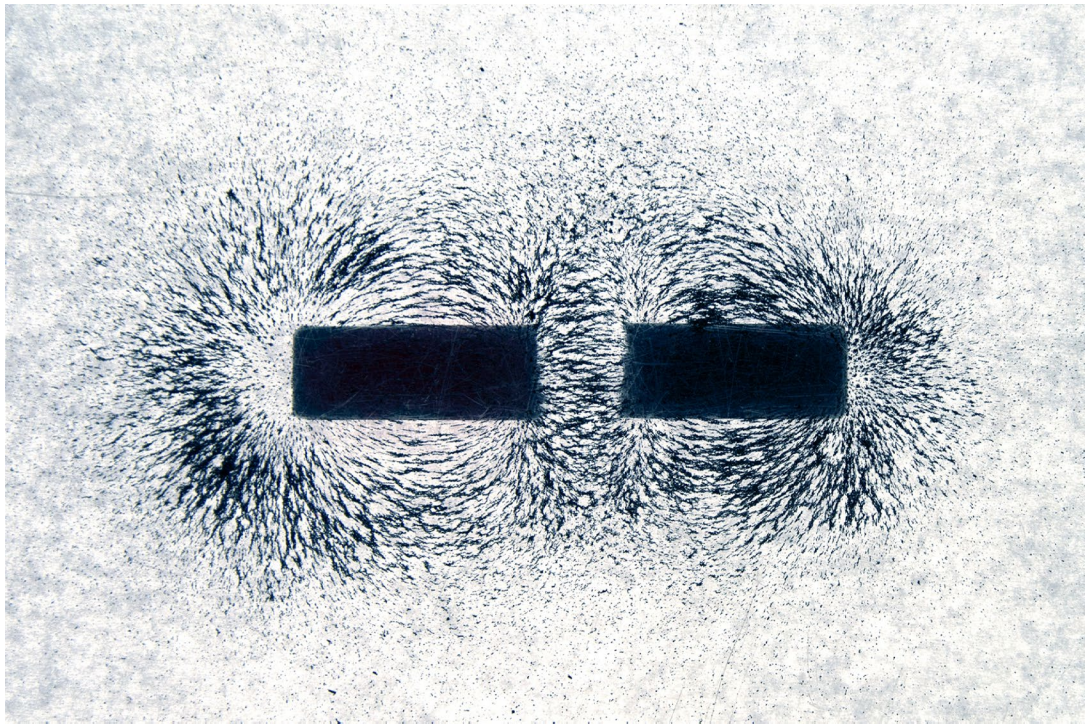

I
I
v
B
F
Wire 1
Wire 2

J5-05: MAGNET MODEL - FIELD LINES



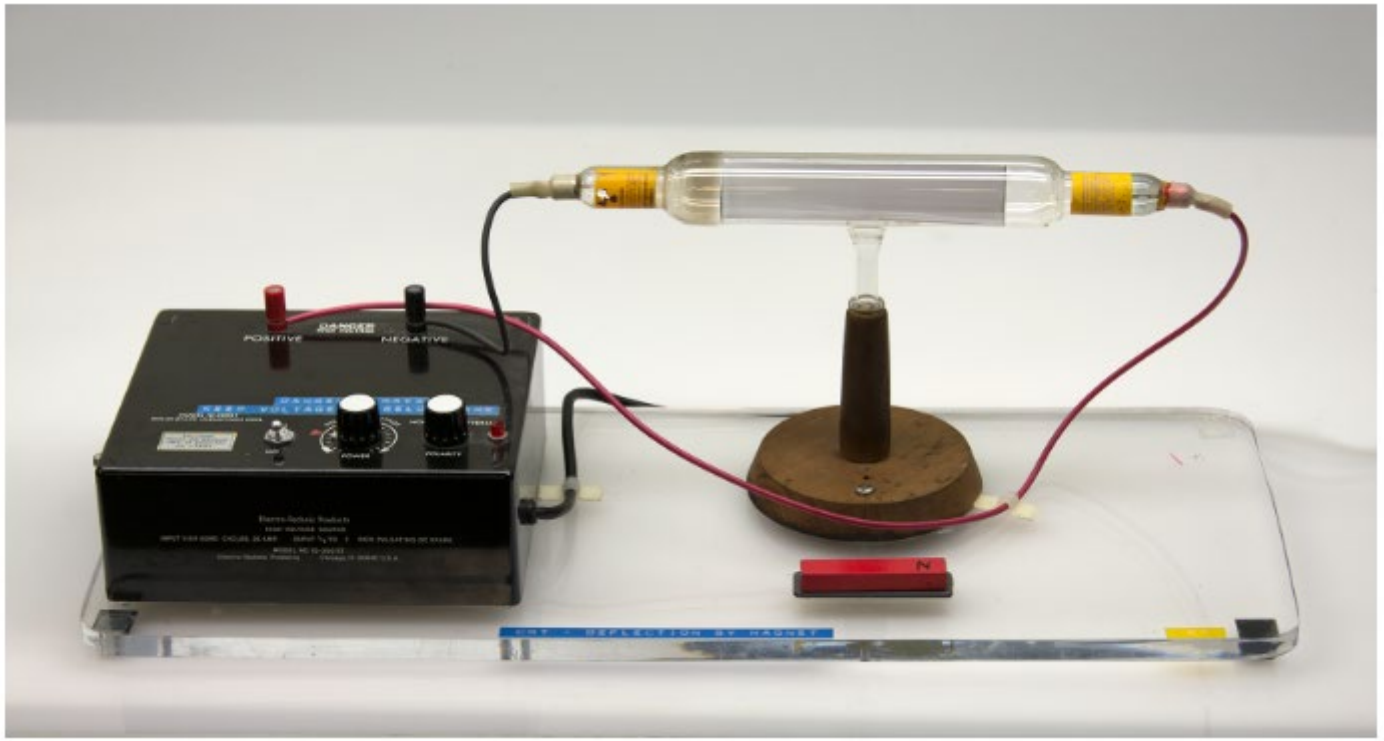
- **Purpose:** Visualize the magnetic field of a bar magnet.
- **Description:** A bar magnet is placed on an array of small compass needles on an overhead projector. The array of compasses maps out the magnet field of the bar magnet.

J5-06 MAGNET - BROKEN BUT NO MONOPOLE



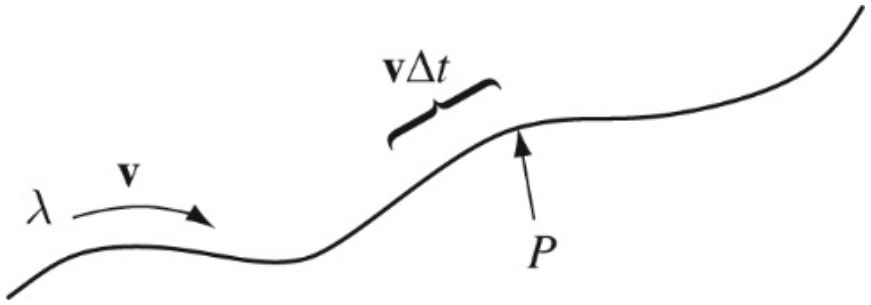
- **Purpose:** Demonstrates that magnet poles come in pairs
- **Description:** The magnetic field of a bar magnet is demonstrated using iron filings on an overhead projector. The magnet is then broken and the demonstration is repeated. Each half of the original magnet has both poles

K1-12 CATHODE-RAY TUBE - DEFLECTION BY MAGNET

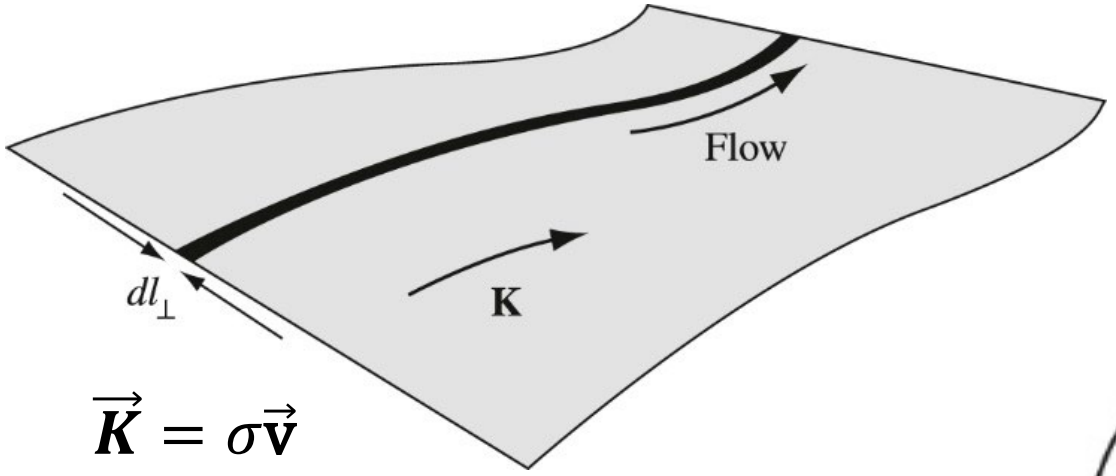


- **Purpose:** Demonstrates the force on an electron beam by a magnetic field
- **Description:** The cathode ray discharge tube produces an electron beam moving from left to right, which can be seen on the fluorescent screen inside the tube. Holding a bar magnet close to the tube, parallel to the tabletop so that it produces a horizontal magnetic field inside the tube, causes the electron beam to deflect up or down. If the directions of the magnet's poles are reversed, the direction of the deflection should also reverse, illustrating the vector nature of the force.

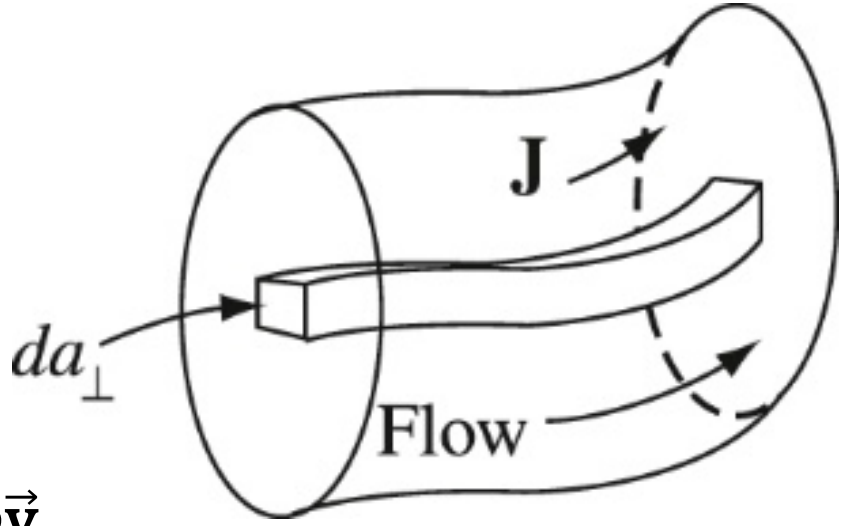
Electrical Currents in 1D, 2D and 3D



$$\vec{I} = \lambda\vec{\mathbf{v}}$$



$$\vec{K} = \sigma\vec{\mathbf{v}}$$



$$\vec{\mathbf{J}} = \rho\vec{\mathbf{v}}$$