E 4.01 MAGNETIC FIELDS – FIELD LINE PATTERNS

Material:

Qty.	Description	Location
1	Magnetic field plate	5
2	Magnet, AlNiCo, D=10 mm,L=50 mm	6
2	Pole-plate	7
1	U-shaped core, flat type, with yoke	11

We want to find out the field line patterns around different types of permanent magnets.

Experiment 1:

a) Put the U-shaped core and the yoke at a distance of about 15 cm on the table. Place one magnet to middle (according to the diagram).

b) Take the Magnetic field plate and shake it, until the iron filings in the fluid are spread around the complete plate. Then place the plate over the magnet onto the U-core and yoke.

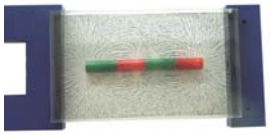
c) With some aid, that is by knocking on the plate, the iron filings array themselves along the lines of the magnetic field.

Experiment 2:

a) Remove the plate. Add the second magnet to the first one according to the diagram.

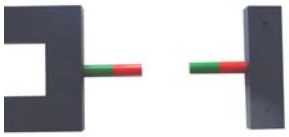
b) Take the Magnetic field plate and shake it. Then place the plate over the magnets onto the U-core and yoke.

c) Again knock on the plate, and observe the lines of the magnetic field.



Experiment 3:

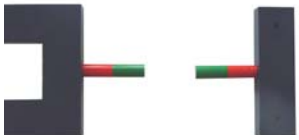
a) Remove the plate. Move one magnet to U-core, the other to the yoke. The magnets with opposing poles facing each other (magnetic attraction).



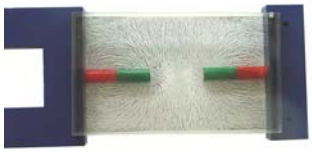
b) Take the Magnetic field plate and shake it. Then place the plate over the magnets onto the U-core and yoke.

c) Knock on the plate, and observe the lines of the magnetic field.

Experiment 4:
a) Remove the plate. Turn one magnet, so the magnets have their like poles facing each other (magnetic repulsion).



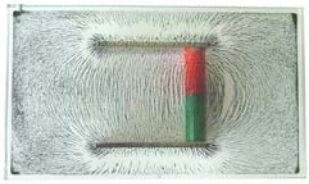
b) Take the Magnetic field plate and shake it. Then place the plate over the magnets onto the U-core and yoke.



c) Knock on the plate, and observe the lines of the magnetic field.

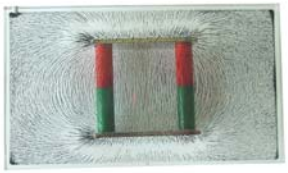
Experiment 5:
a) Remove the plate and U-I core. Build up a U-shaped magnet (horseshoe-magnet) with 2 magnets and 2 pole-plates (according to the diagram).

b) Take the Magnetic field plate, shake it, and place it onto the U-shaped magnet.



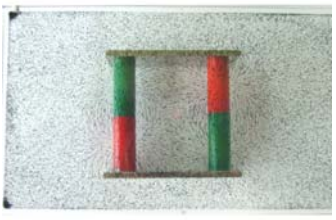
c) Knock on the plate, and observe the lines of the magnetic field.

Experiment 6:
a) Remove the plate. Build up the magnets with pole-plates according to the diagrams.



b) Take the Magnetic field plate, shake it, and place it onto the pole-plates.

c) Knock on the plate, and observe the lines of the magnetic field.



What is the difference between the two field lines?

Note: At the diagram below you hardly can see any magnetic field outside of the magnets. This shows the best way of storage of magnets. Here the magnetic field is a “closed” system.