A03-517P-Y01

Ring Launcher Experimental Kit

I. Purpose

Use electromagnetic induction of Lenz's law to launch the ring.

II. Theory

The application of electromagnetic induction principles and Lenz's law

Lenz's law：

The direction of magnetic field of induced current is against the magnetic field which generates the induced current. The direction of induced electromagnetic induction (EMF) and induced current are the same.

The ring launcher is consisted of a coil with many turns. When switch on the launcher, the current passes through each turn of the coil and creates a strong magnetic field.

Due to a sudden magnetic flux, the aluminum ring or the copper ring that we places over the ring launcher induces a strong induced EMF and an induced current. The magnetic field of these rings opposes the magnetic field of the ring launcher. Through the magnetic force, the aluminum ring and the copper ring are launched from the ring launcher.

III. Instrument

List of ring launcher instrument					
NO	Accessory	Qty	No	Accessory	Qty
1	Experimental base	1	2	Aluminum ring (31mm×H43mm)	1
2	Aluminum ring (31mm ×H31mm)	1	2	Aluminum ring (31mm×H16mm)	1
2	Aluminum ring (38mm ×H16mm)	1	2	Split aluminum ring (38mm×H30mm)	1
3	Copper ring (38mm×H16mm)	1	4	Induction coil (with light bulb)	1
5	Solenoid	1	6	Iron rod	1
7	Thin steel rods (two sets)	1	8	Plastic ring	1

Picture of the ring launcher instrument

Note:
1. Do not hold down the microswitch for more than 25 seconds.
2. Continuous operation is easy to make the solenoid heat to produce high temperature, then do not touch, to avoid burns.
3. RECOMMENDATION: Pause the microswitch for two minutes when operating for five

minutes.

IV. Procedure

1. Place one aluminum ring over the launcher core. Switch on the launcher to launch the ring (figure 1.)

2. Place another aluminum ring (same diameter but longer length) over the launcher core. Switch on the launcher and launch the ring. The launching height of the longer ring is higher than the shorter ring.

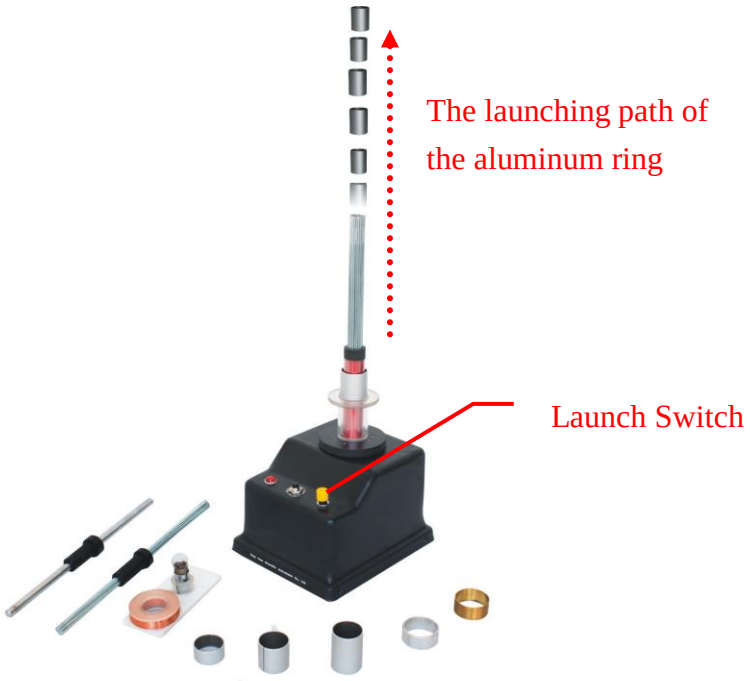

Figure 1. Experiment figure of the launcher

3. Place a split aluminum ring over the launcher core. The launcher can not launch this ring.

4. Replace the aluminum ring with a copper ring and launch the copper ring. The launching height is almost zero because of copper's diamagnetic property.

5. Replace the copper ring with an induction coil with light bulb. Launch the induction coil and the light bulb shines briefly (figure 2).

6. Replace the launcher core from iron coil to solid iron rod or coil with smaller turns. By comparing the experiment results, we can observe the height of the aluminum

ring is lower in the coil with smaller turns.

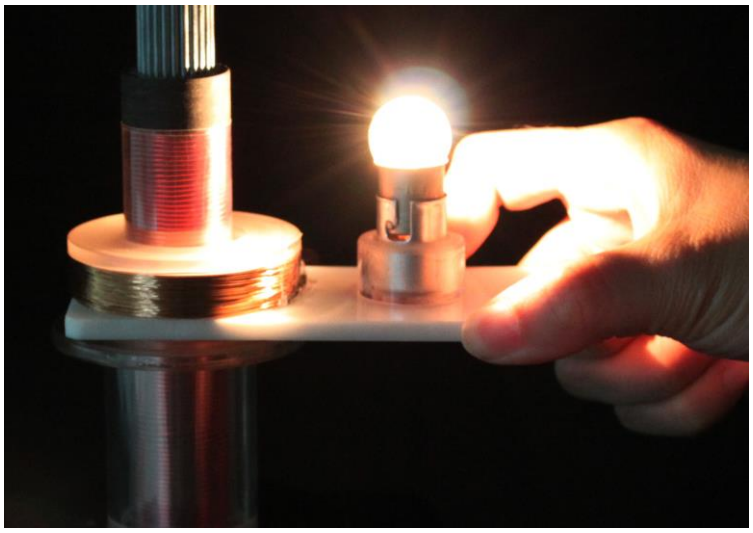

Figure 2. Induced light bulb

V. Questions and discussions

1. Will it affect the experiment result if we take off the transparent plastic ring?

ANS: The ring can not be launched because of different induced electromagnetic force. For example, there is a downward force at the lower part of the core to drag the ring.

2. What is the relationship between the brightness and the position of the induced light bulb?

ANS: The brightness changes according to the position of the electromagnetic induction.

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