

## Application No. 131: Marble cannon

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### A simple experiment with a striking effect...

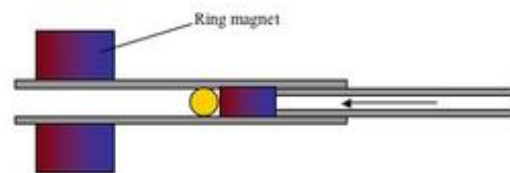
A simple experiment with a striking effect ... the marble cannon!

For this experiment you need:

- Two plastic tubes, e.g. made out of PVC, approx. 15-20 cm long. The one should have an inner radius big enough for the marble, the other should easily fit into the larger one.
- A large ring magnet (from another supplier)
- Two disc magnets ([www.supermagnete.de/eng/S-15-08-N](http://www.supermagnete.de/eng/S-15-08-N))
- Two steel rings of approx. 15 mm radius
- One or more marbles



First, you put a ring magnet on the one end of the larger PVC tube, the cannon barrel. The utilised ring magnet comes from another supplier.



Then, you load the cannon with a cylindrical magnet and a marble (see drawing).

In order to build a nicely fitting cylindric magnet, I used two S-15-08-N ([www.supermagnete.de/eng/S-15-08-N](http://www.supermagnete.de/eng/S-15-08-N)), and I added a steel ring in the front and at the end. Everything glides beautifully into the larger tube. The poles of the stacked disc magnets are arranged to stick to each other but also to be rejected by the larger ring magnet.

Now, you push the thinner PVC tube into the backside of the barrel, and thereby push the marble and the magnetic cylinder towards the ring magnet (see drawing above).

When the magnetic package goes below a certain distance to the ring, it suddenly is strongly drawn to the ring opening. The marble up front will be shot off with quite some force. The video shows how well that works!

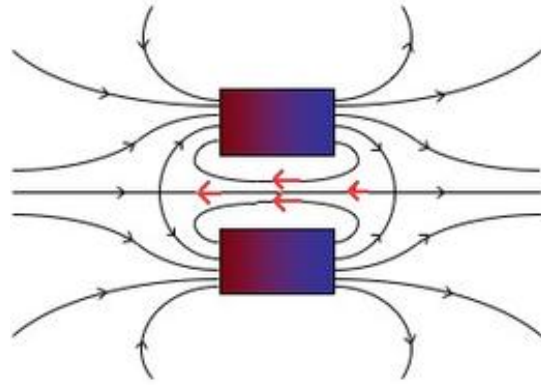


Video, 1 MB

**CAUTION:** If you want to try it out yourself, never point the cannon at living creatures or at breakable objects!

I actually discovered this principle by accident, when I wanted to try something else with ring magnets.

Thoughtlessly, I assumed that the magnetic field within the ring would have the same direction as the field on axis level outside of the ring. But my experiment did not work out. So, I drew the conclusion that the field characteristics are more like on the drawing on the right. Meaning, the magnetic field on axis level inside the ring works in the exact opposite direction.



So, it is understandable, why the cylindric magnet shoots into the ring all of a sudden, although the influencing forces are very complicated.

Another system to launch marbles can be found under "launching pad" ([www.supermagnete.de/eng/project68](http://www.supermagnete.de/eng/project68)).

#### Articles used

2 x S-15-08-N ([www.supermagnete.de/eng/S-15-08-N](http://www.supermagnete.de/eng/S-15-08-N))

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