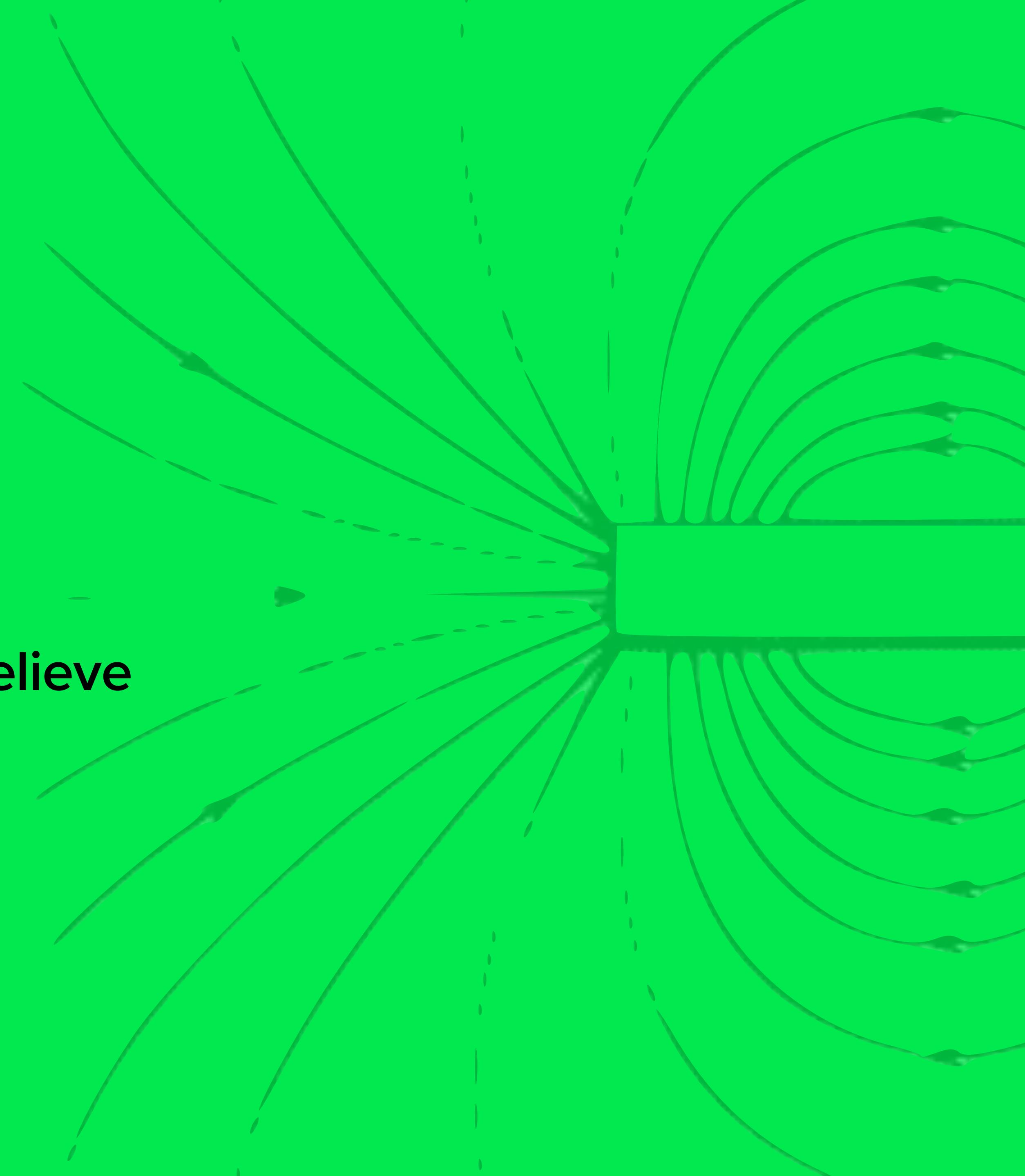


LEE WILKINS

# MAGNETIC FIELDS

School of Machines, Making & Make Believe



**HELLO!**

**HOW ARE YOU?**

**WHERE ARE YOU AND WHAT'S THE WEATHER  
LIKE?**

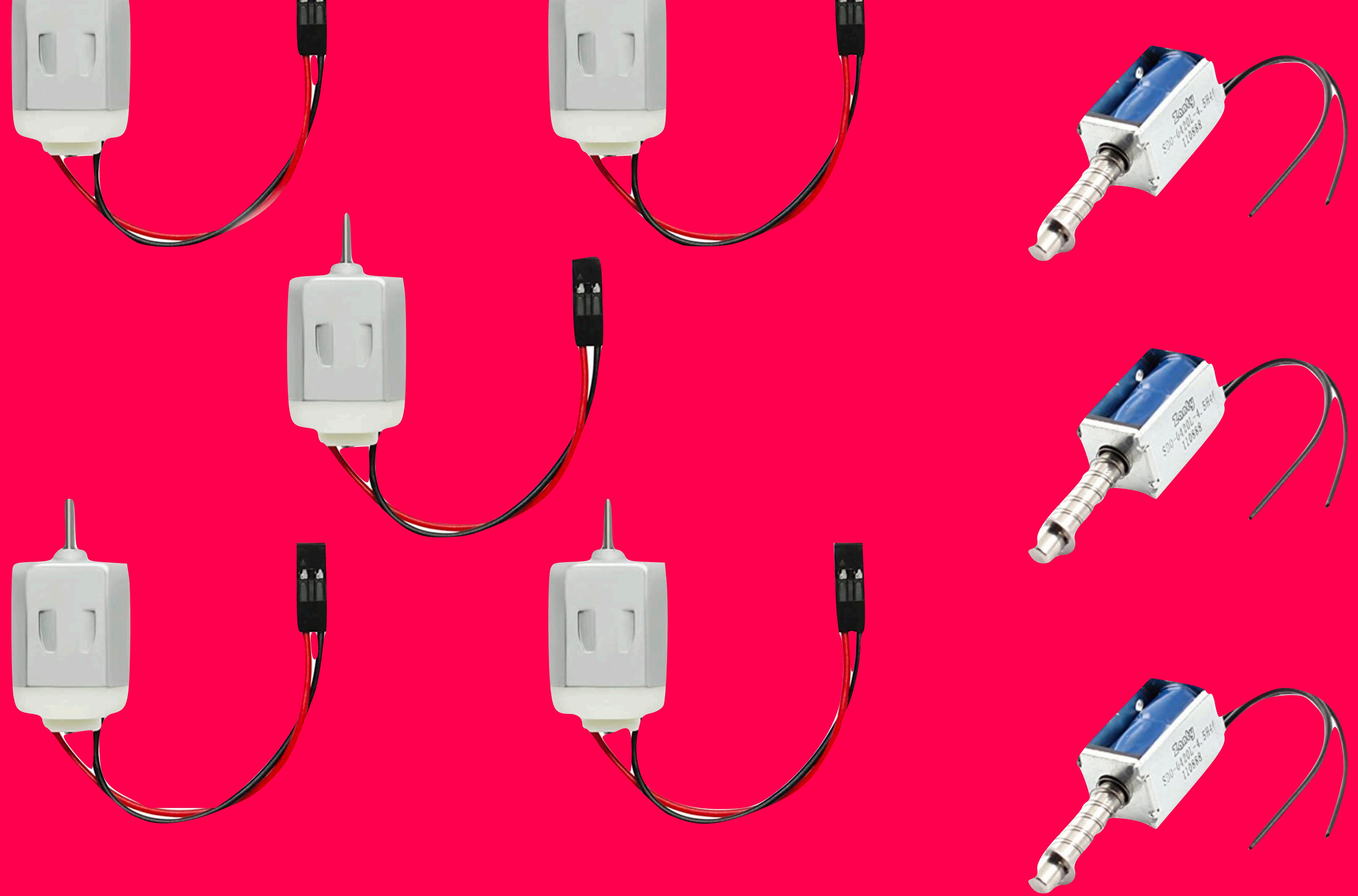
**SHARE YOUR BEAUTIFUL MOVEMENT?**

**BEAUTIFUL MOVEMENT**

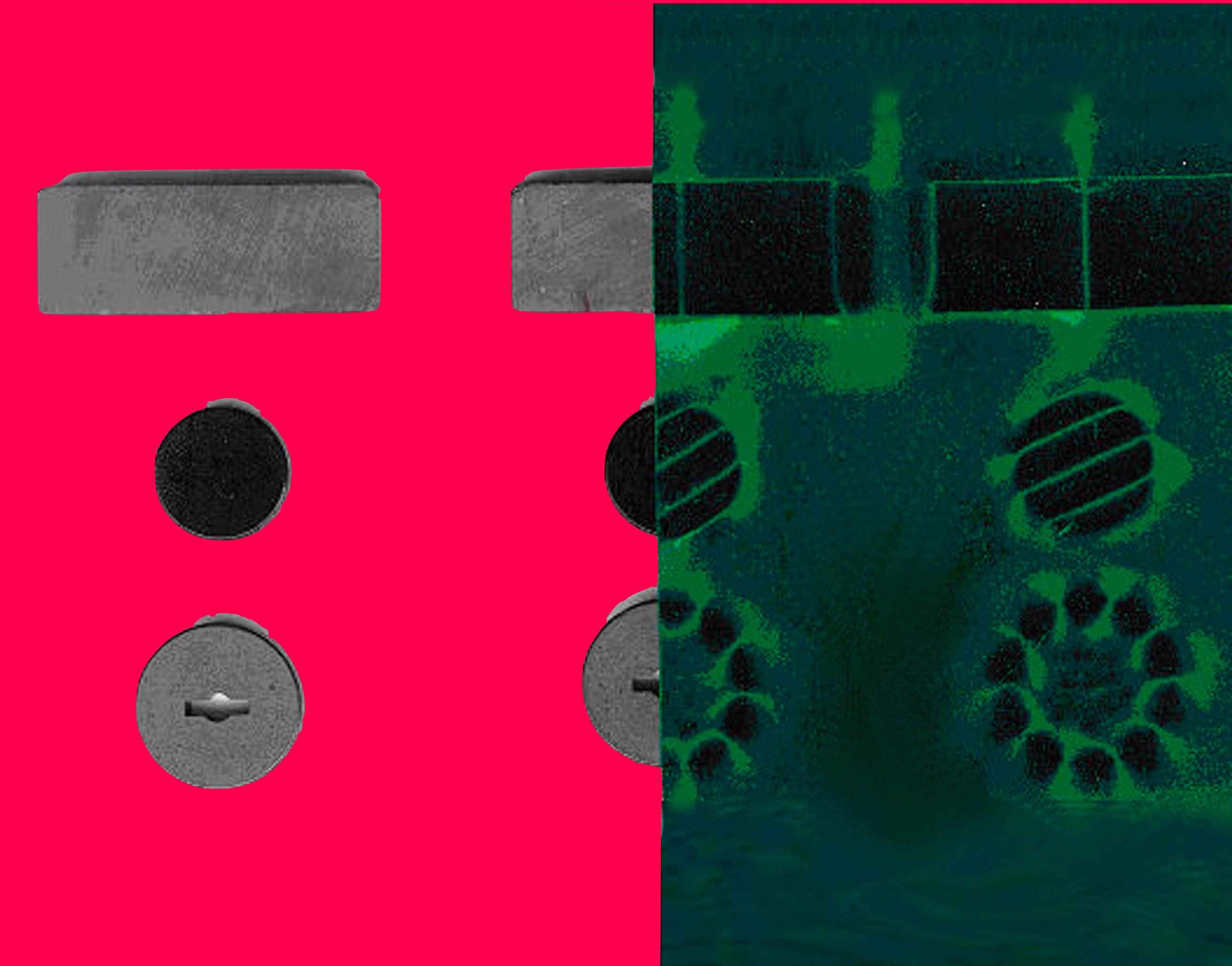
**CAKE DECORATING MACHINES**

**BEAUTIFUL MACHINES**

**GLOVE FACTORY**

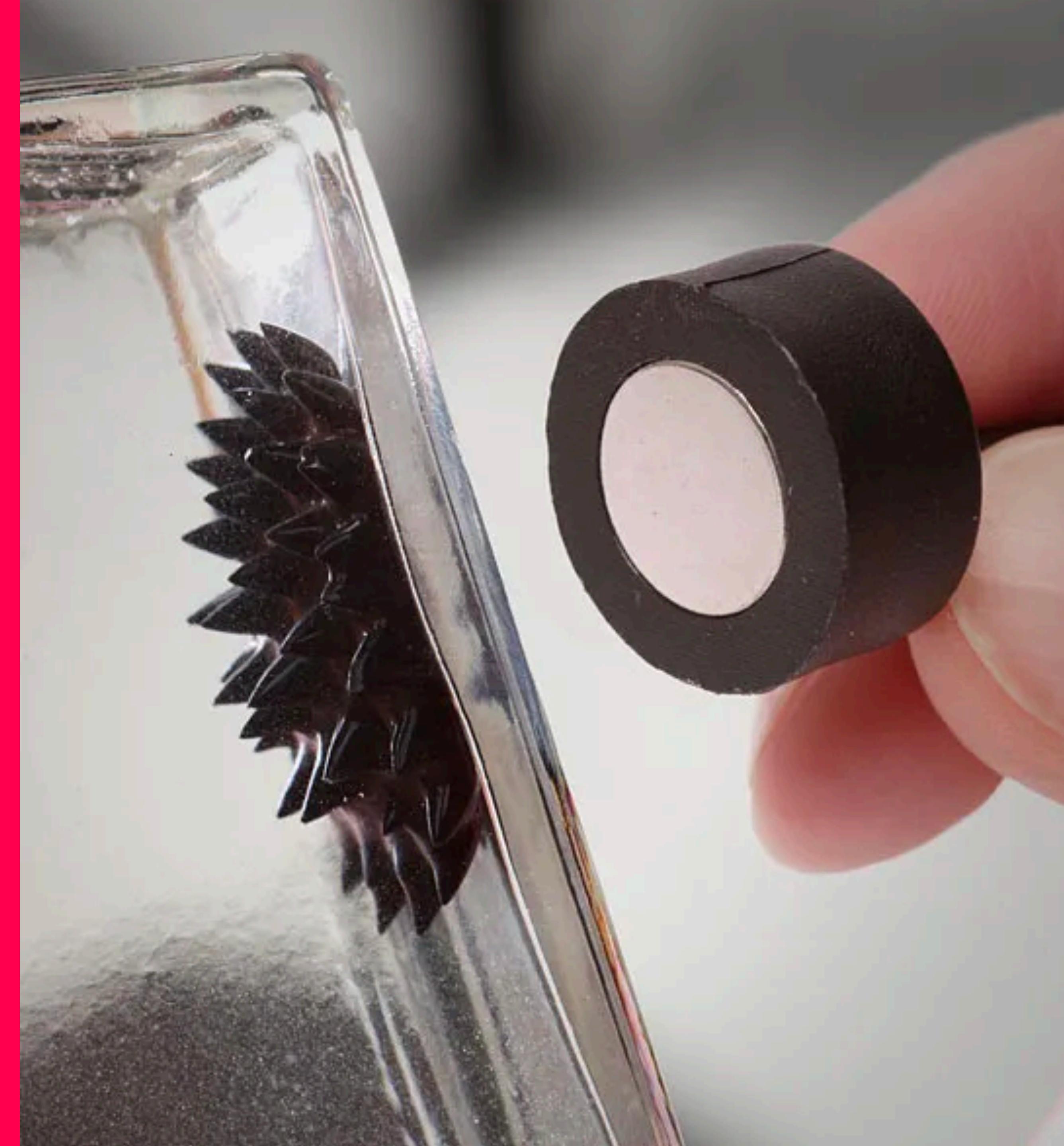


# MAGNETIC FIELD VIEWER



# FERROFLUID

**LINK TO NILE RED  
MAKING YOUR OWN**



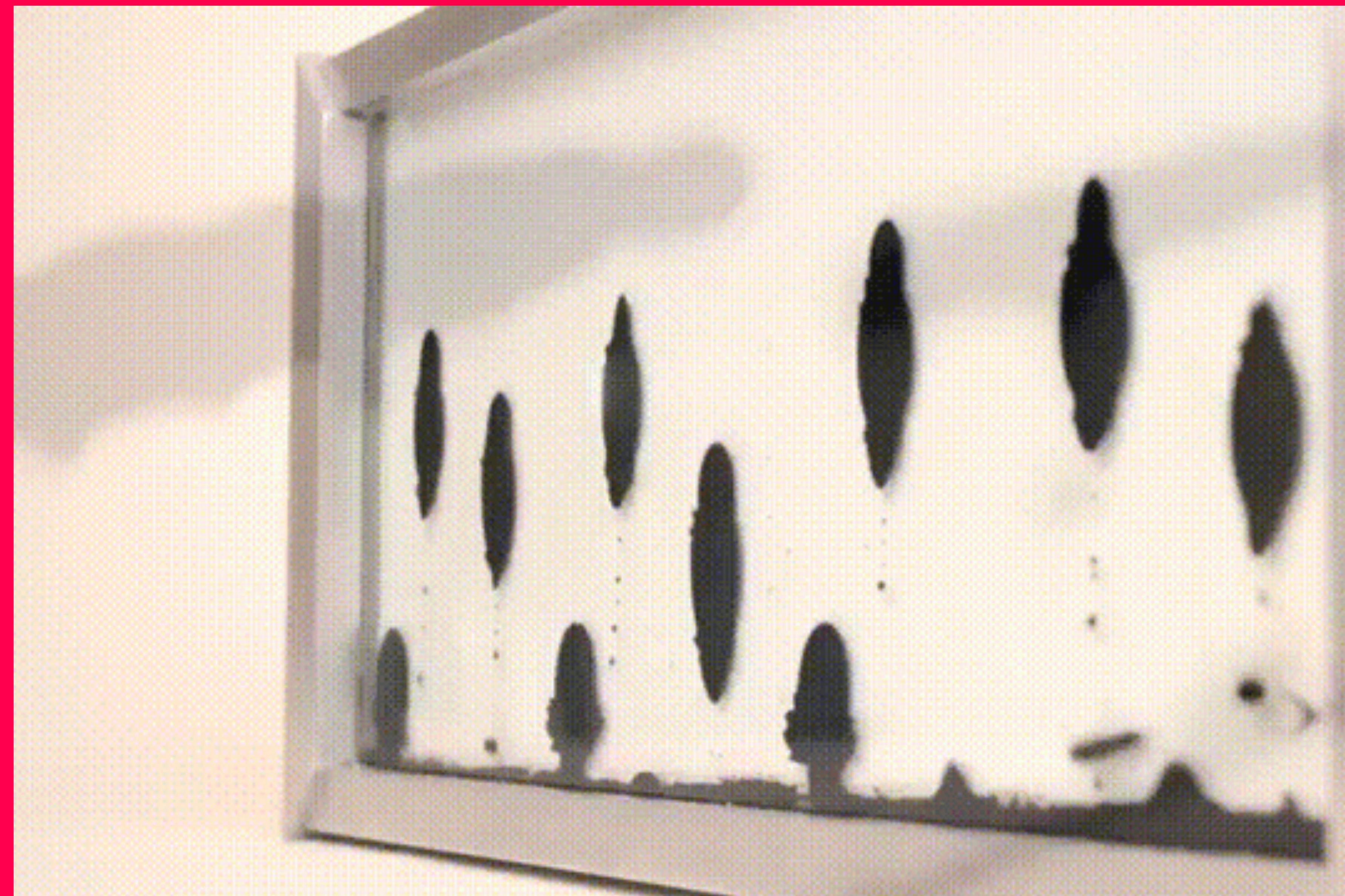


**FERROFLUID  
SHOES BY IRIS  
VAN HERPEN**

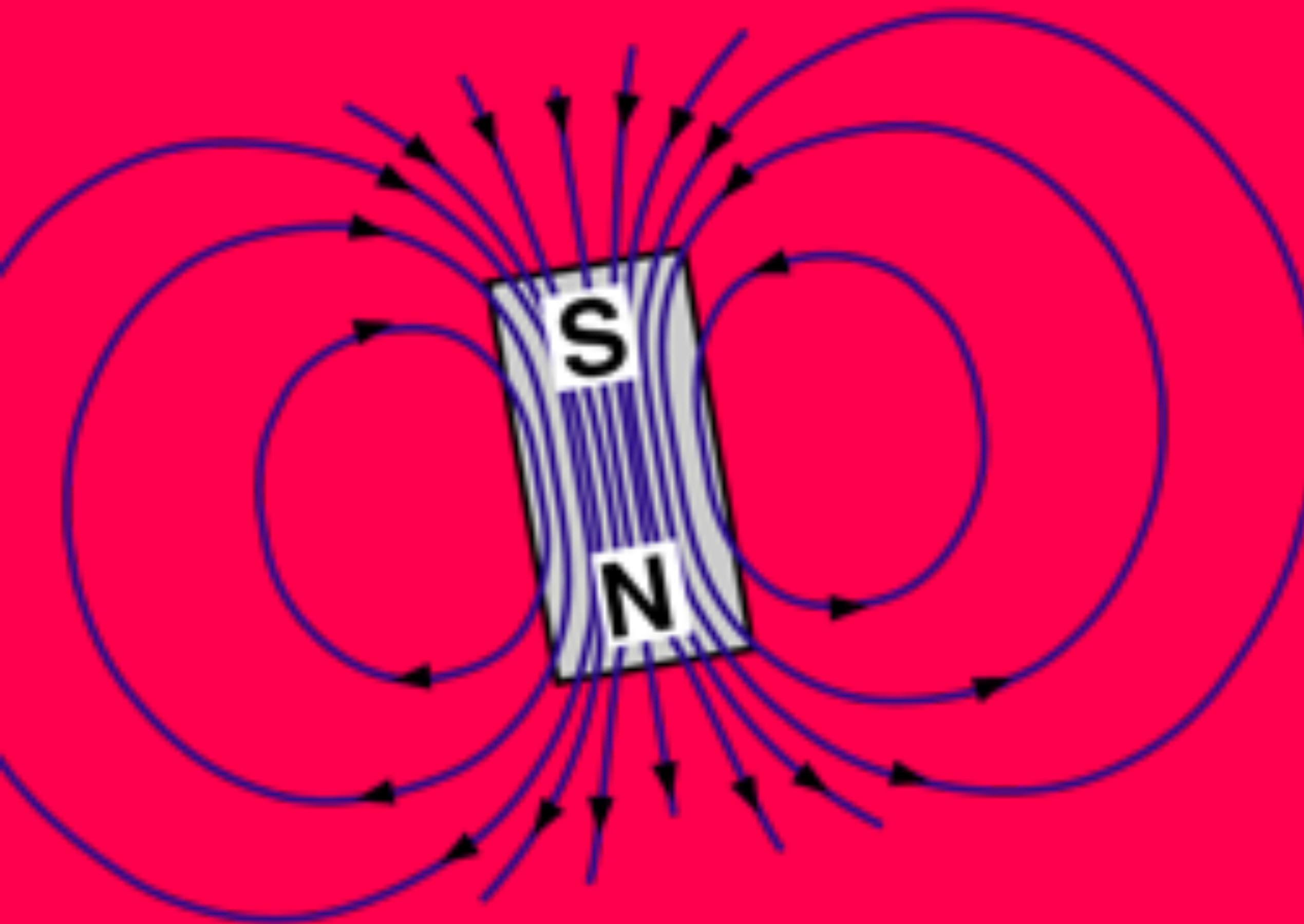
# FERROFLUID AUDIO VISUALIZER BY DAKD JUNG



**FERROFLUID  
CLOCK  
BY  
FERROLIC.COM**



# PROJECT BREAKOUTS

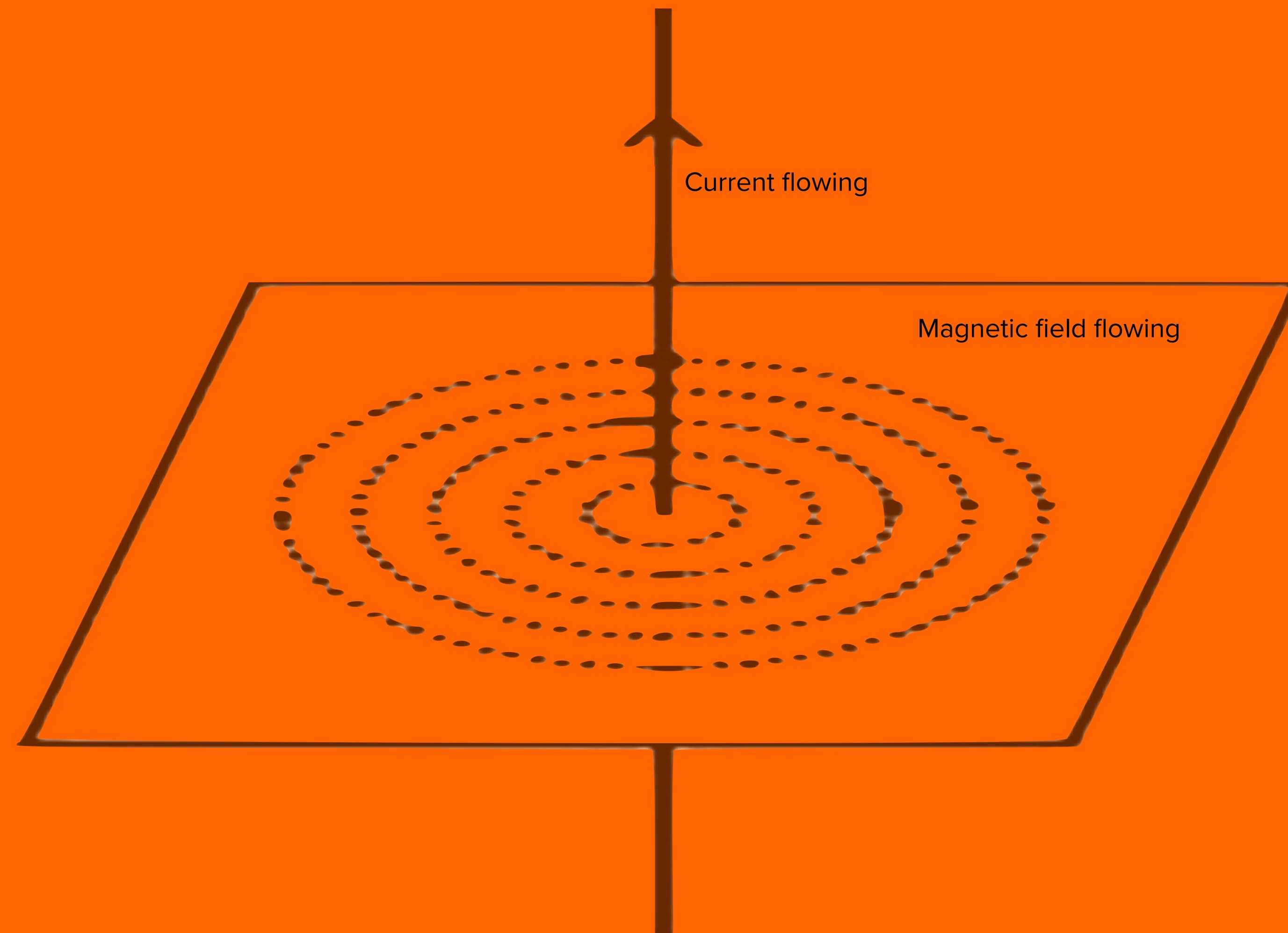


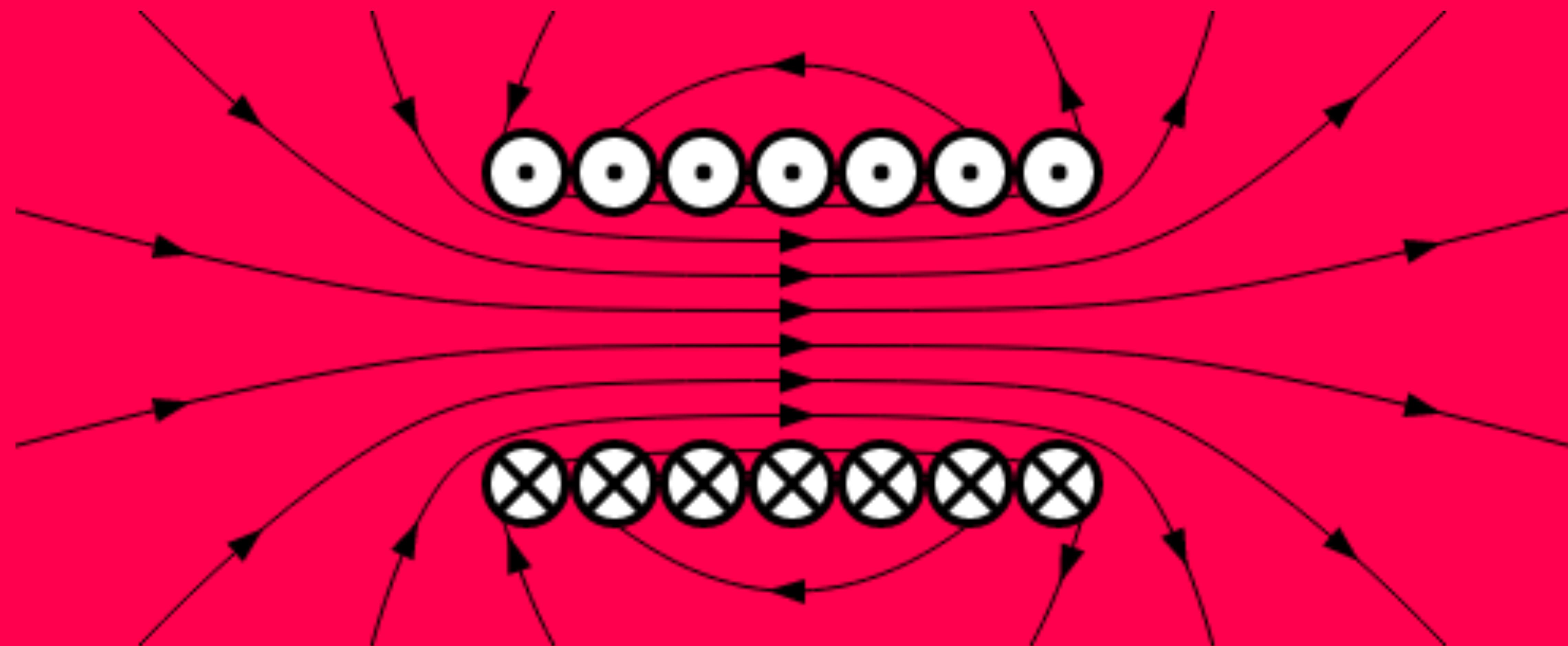
# WHAT IS A MAGNETIC FIELD?

A magnetic field is a vector field that describes the magnetic influence on moving electric charges, electric currents, and magnetic materials.

MAGNETIC FIELDS ARE GENERATED WHENEVER THERE  
IS CURRENT FLOWING THROUGH A CONDUCTOR COILS  
AMPLIFY THIS FIELD BECAUSE OF THEIR SHAPE.

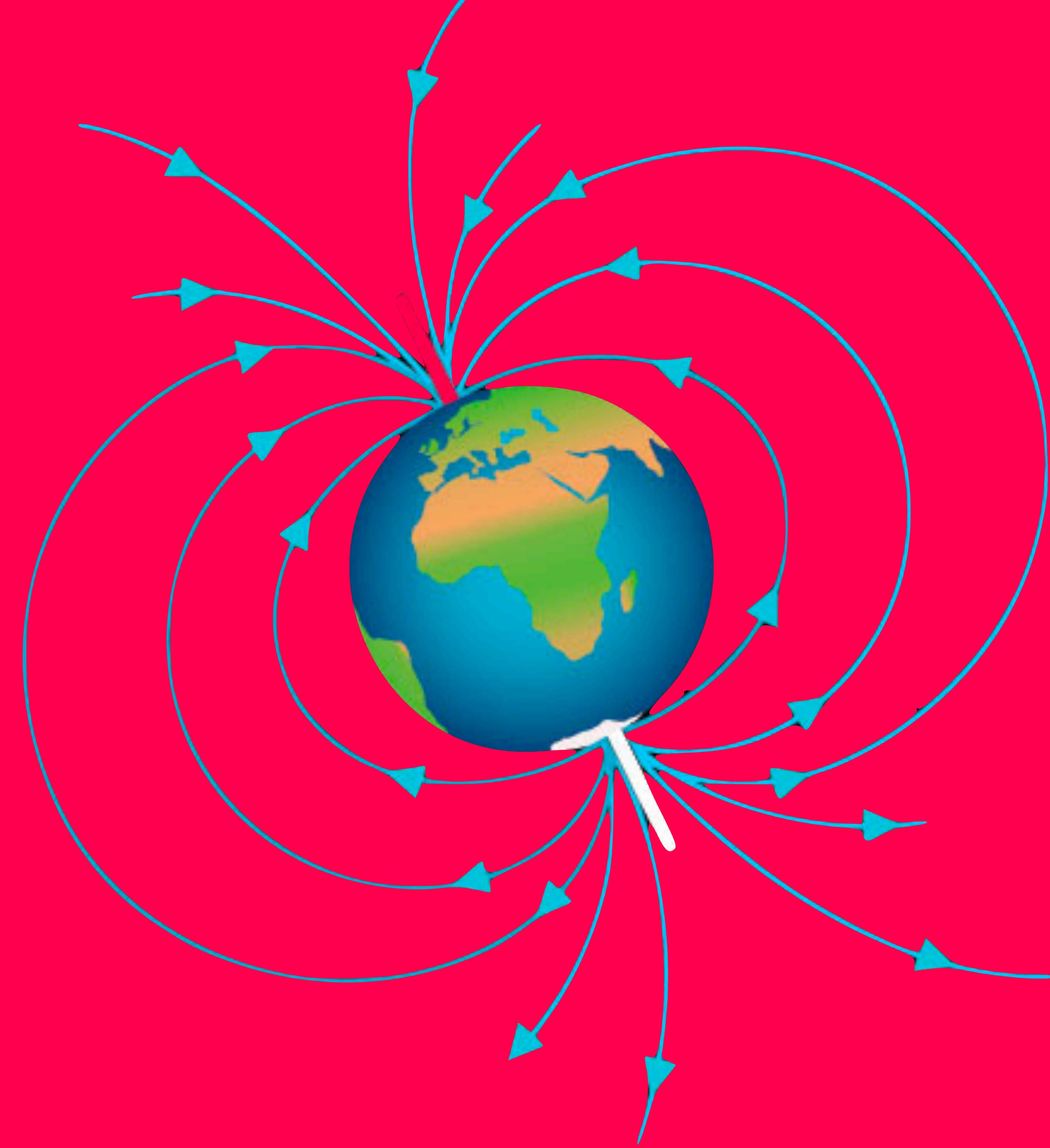
# ELECTRICITY & MAGNETISM





# MAGNETIC EARTH

Generated from the energy produced by the core of the earth moving. It creates the phenomenon of magnetic north on a compass

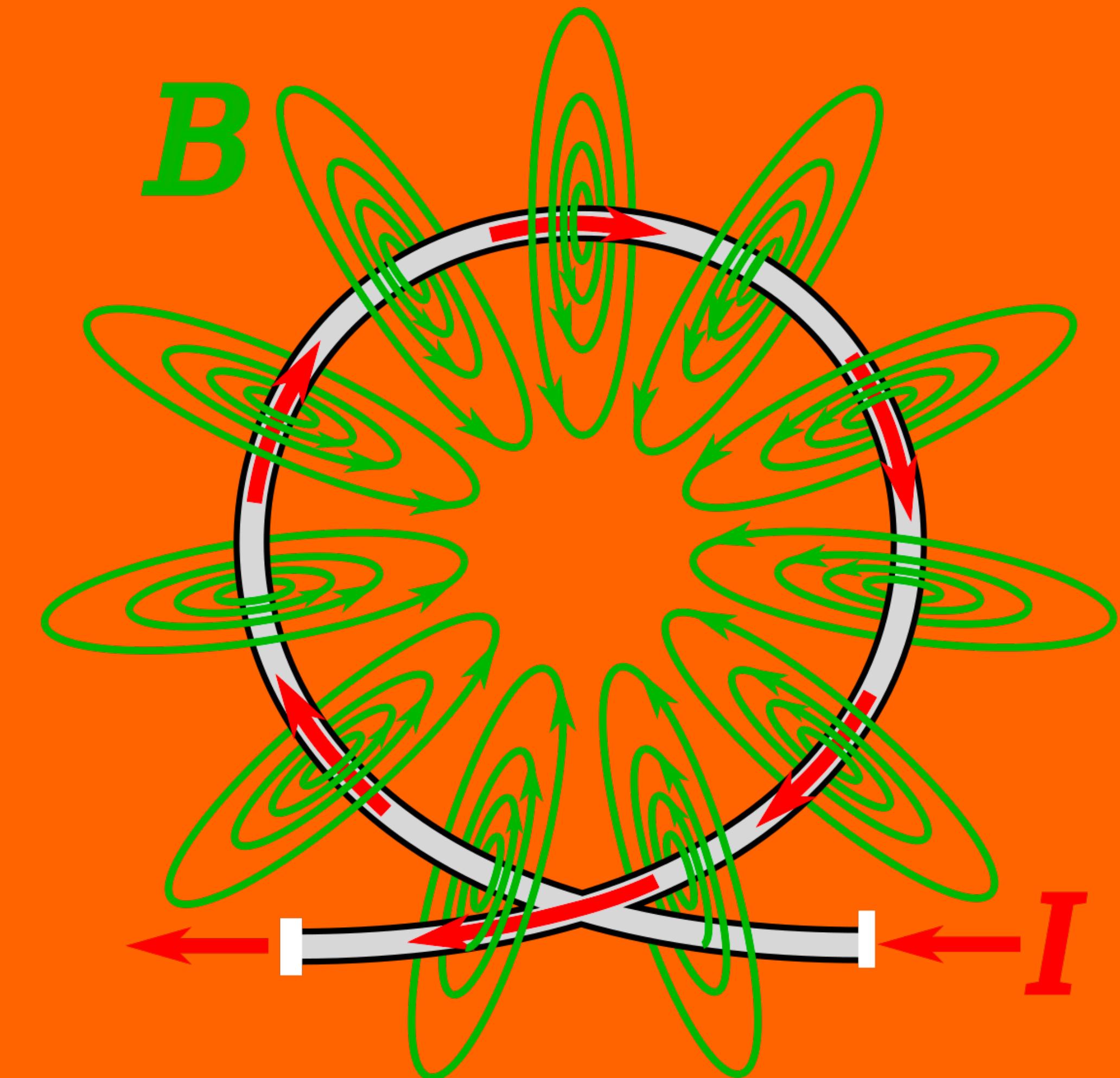


WE CAN SEE THIS EFFECT IN THE AURORAS! THEY ARE MADE FROM CHARGED PARTICLES FROM THE SUN ARE FUNNELLED ALONG FIELD LINES THROUGH POLES, SO WE'RE SEEING MAGNETIC FIELDS.

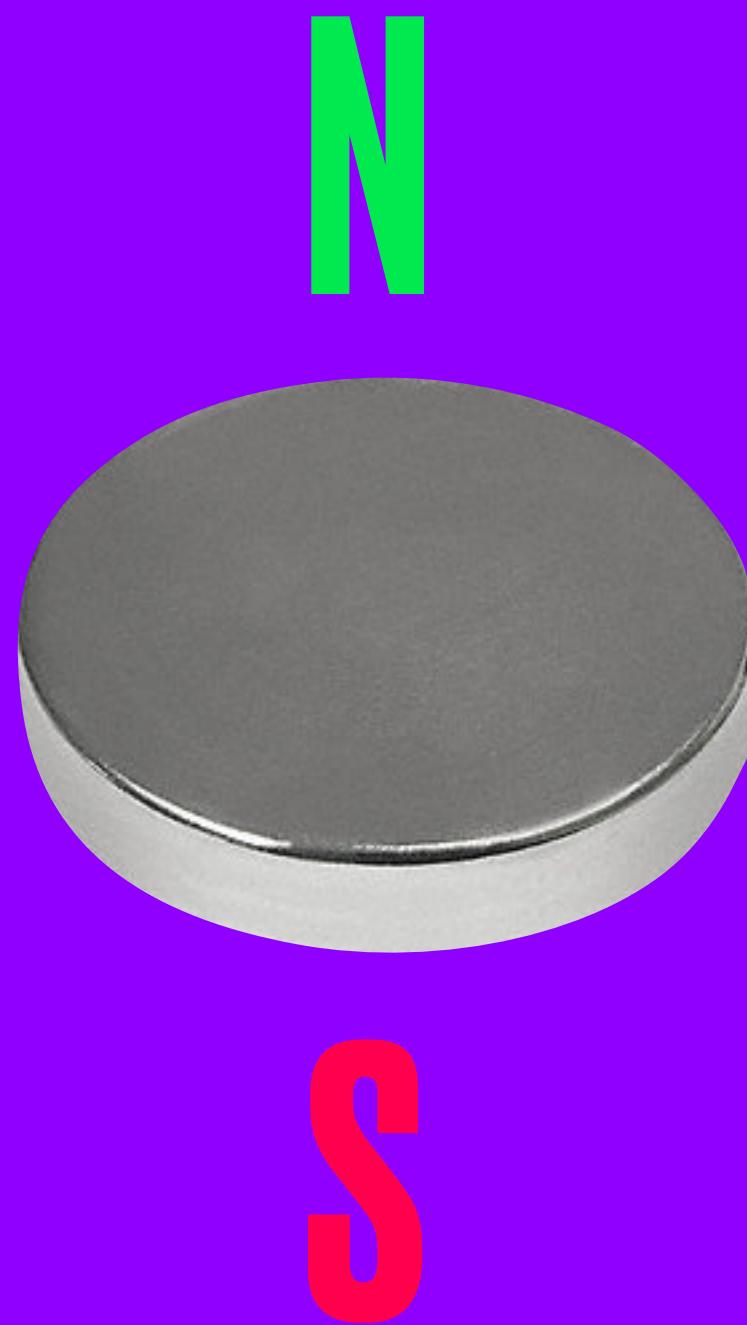


# COILS AMPLIFY THE MAGNETIC FIELD

DIFFERENT SHAPED  
COILS HAVE  
DIFFERENT SHAPED  
MAGNETIC FIELDS.



**OPPOSITES ATTRACT  
SAMES REPEL**



Take a bit of time and explore the relationship of the magnets you have. Feel them repel, feel them connect. Try them on things in your environment.

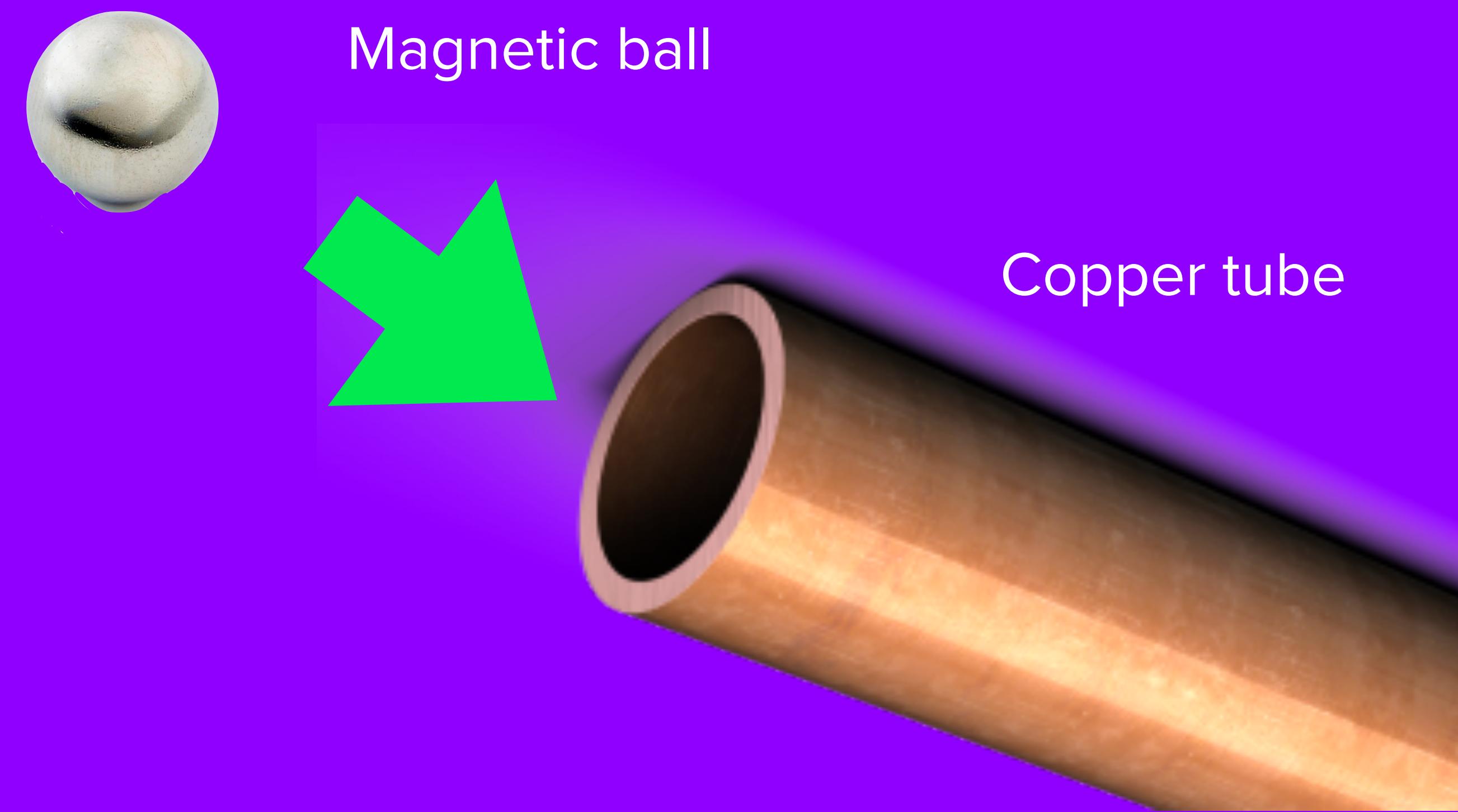
# BREAK

**O-FALL**



The falling magnet creates an electrical current, and by Lenz Law the Current generated create a magnetic fields that opposes the falling magnet.

Example



**1-JUMP**



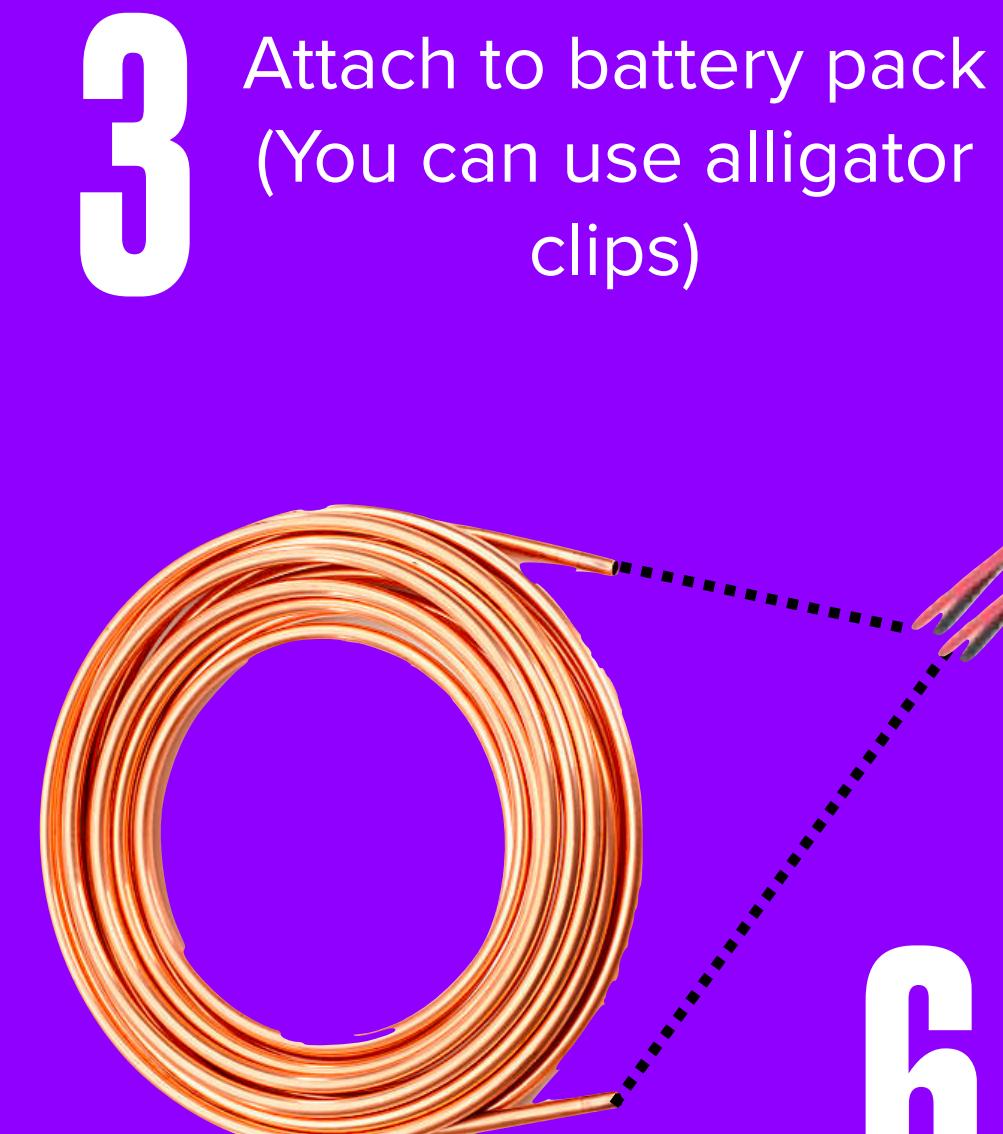
1 Wind a coil of wire, about 10 or more loops around a marker. Leave about an inch on each end and use sandpaper to remove the coating on the ends



2 Take a magnetic ball or rare earth magnet, and experience how **not magnetic** the coil is!  
**Before** applying the power!



3 Attach to battery pack  
(You can use alligator clips)



# LET'S SEE IT IN ACTION!

4 Batteries in battery hold



5 If there's an ON switch, its on!



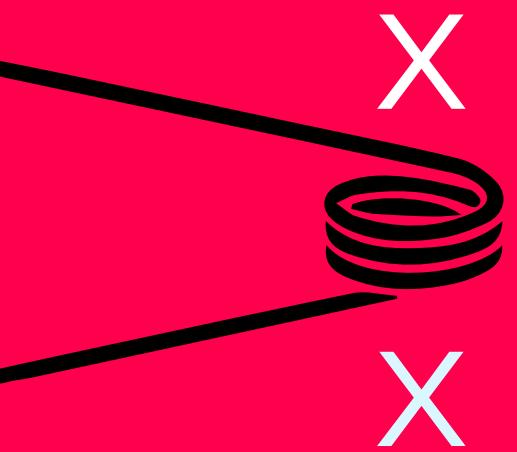
6 Move the coil near the magnet, it should pick it up! How cool?

# DOT DISPLAY

Kobakant Example



By default, all magnets have **North** and **South** Pole. Our magnet wire and coil do not have a magnetic field, until we put electricity through them.



No Magnetic Field

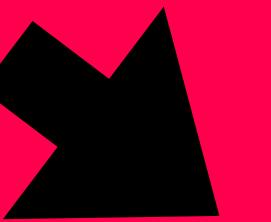
Connected to +



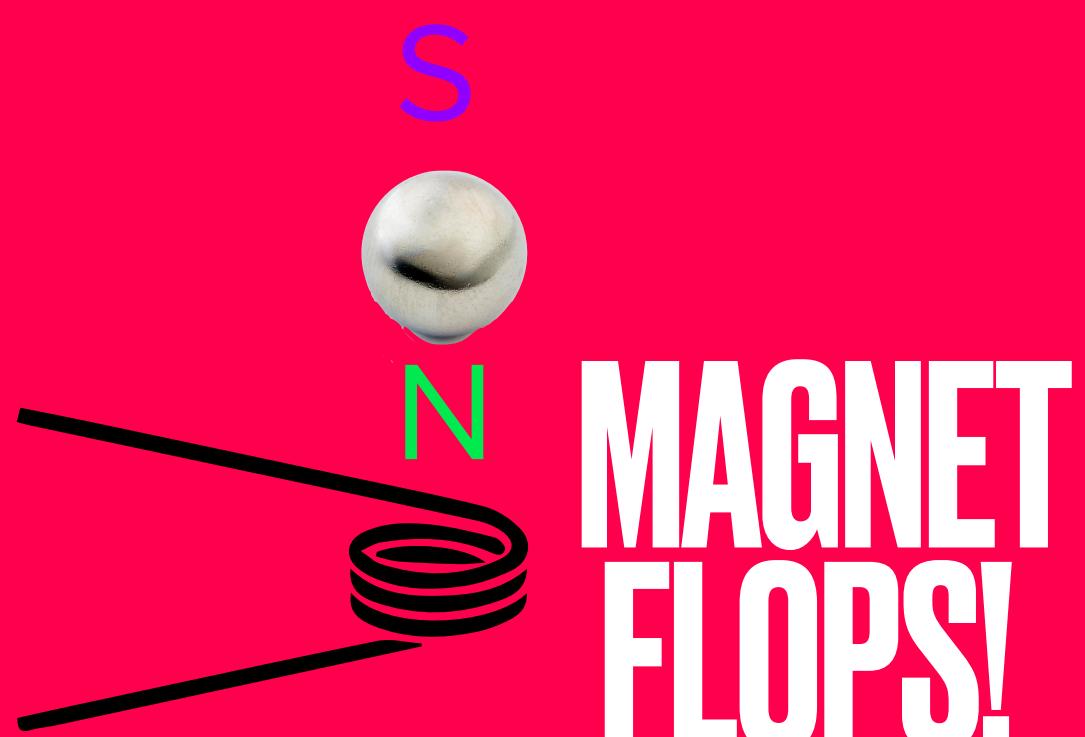
Connected to -

## MAGNET FLIPS!

By swapping the red and black wires, you can make your magnet flip. This example uses this technique to make a dot indicator if you paint half your magnet a different color



Connected to -



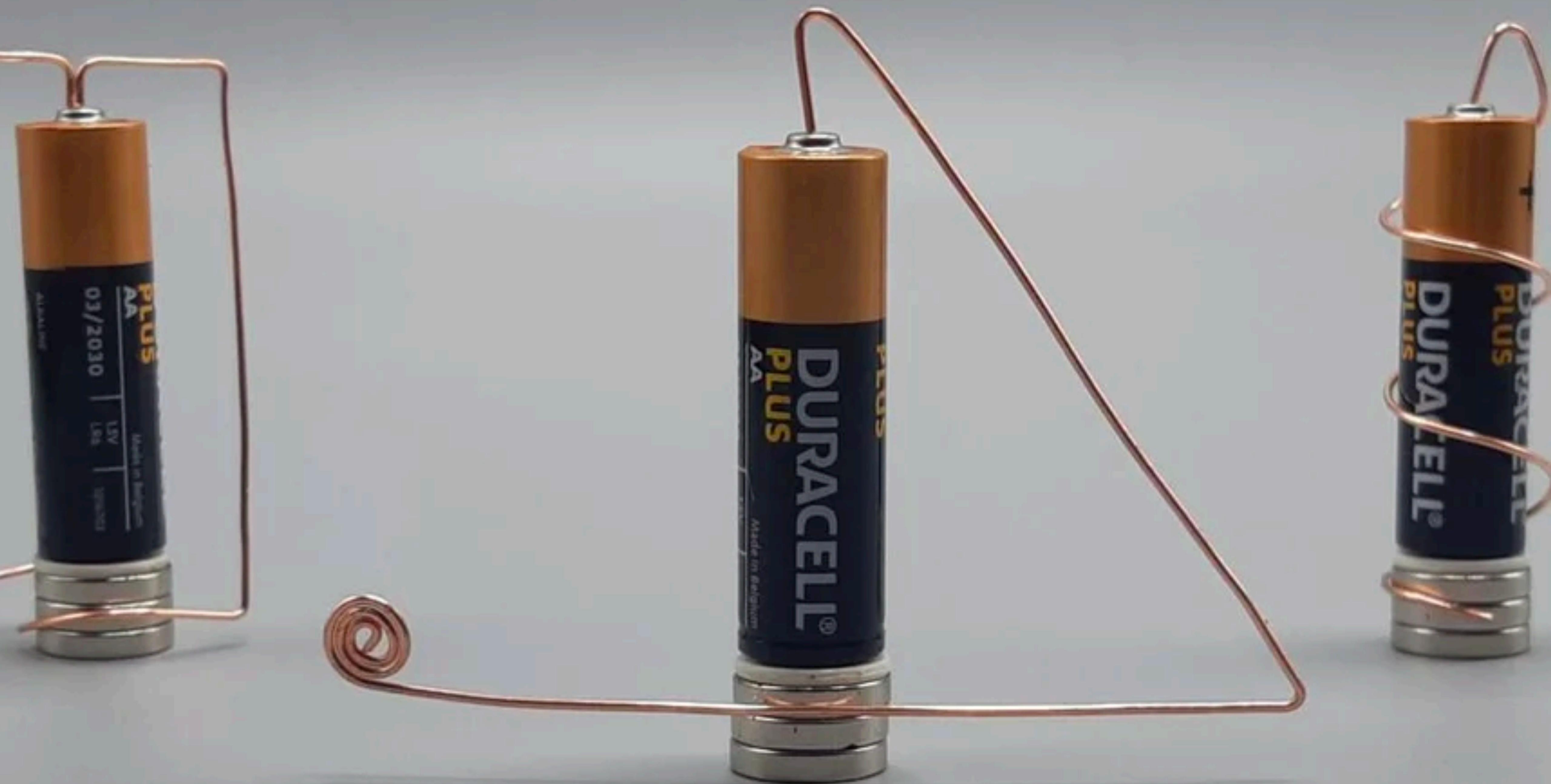
Connected to +

## MAGNET FLOPS!

You can put a magnetic ball on the coil, and you can roll it around any way you want.

**2-SPIN**



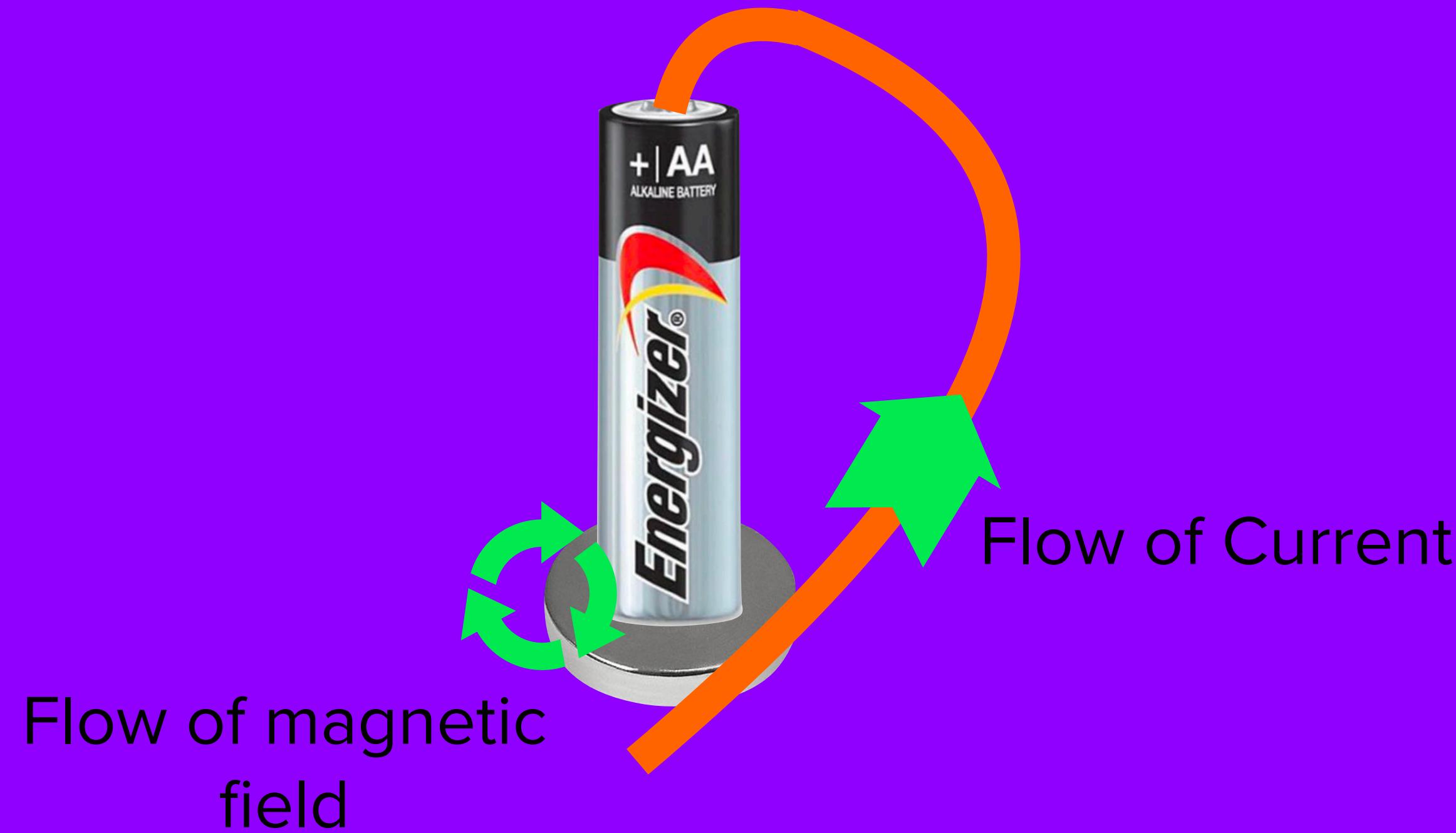


# ANATOMY OF A HOMOPOLAR MOTOR

Example



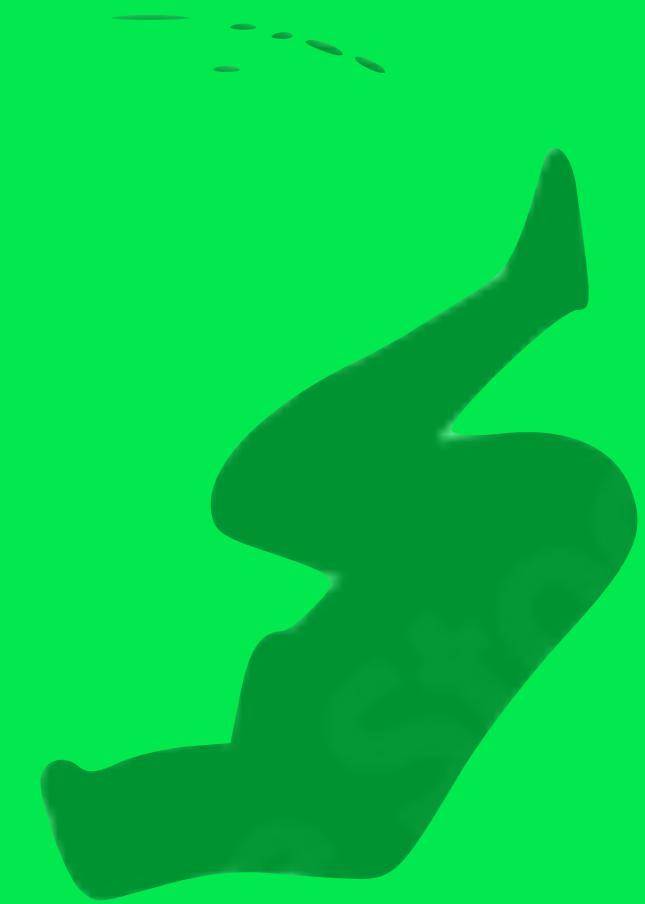
# HOW DOES IT WORK?



# UNCONVENTIONAL HOMOPOLAR MOTOR

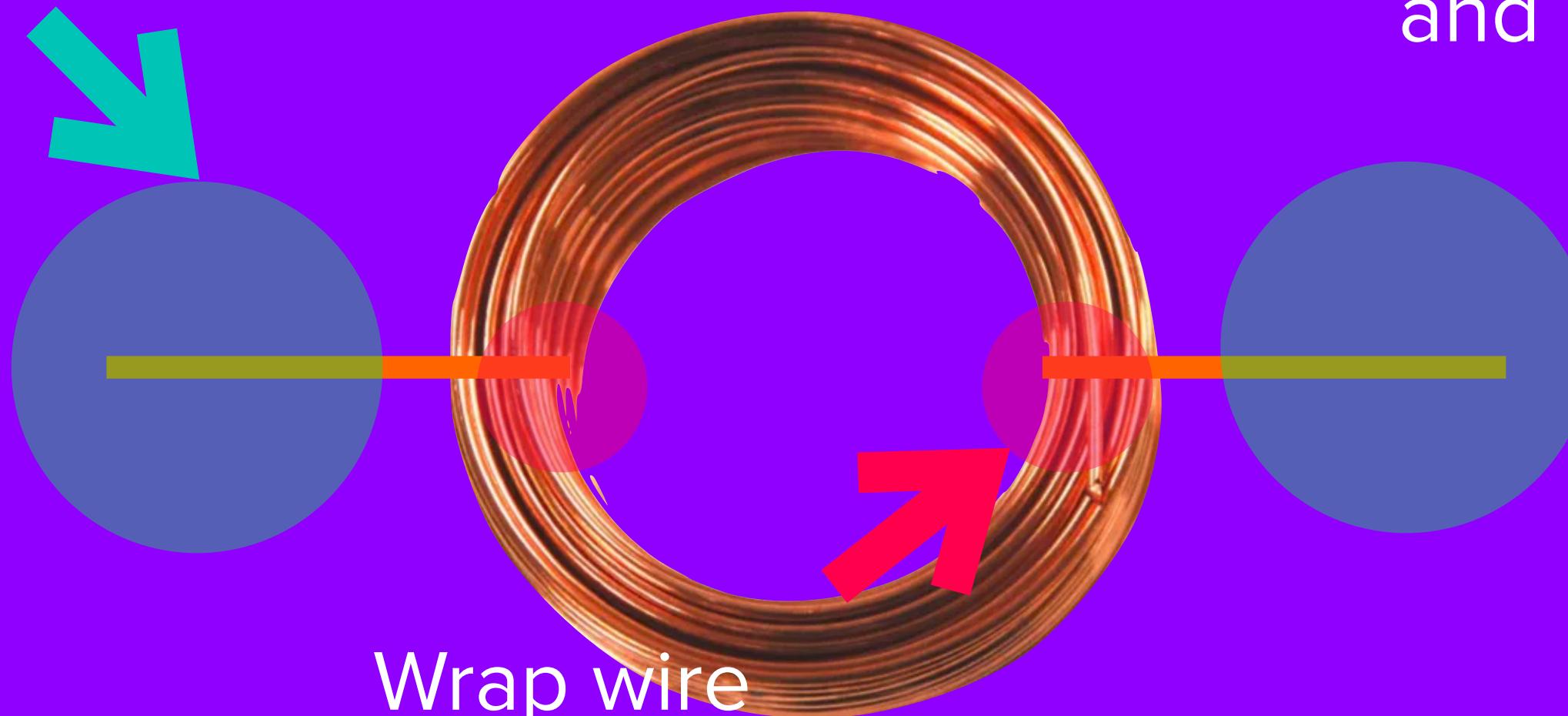


# 3-FLIP



# CONSTRUCT A NEW COIL

Remove  
coating  
here

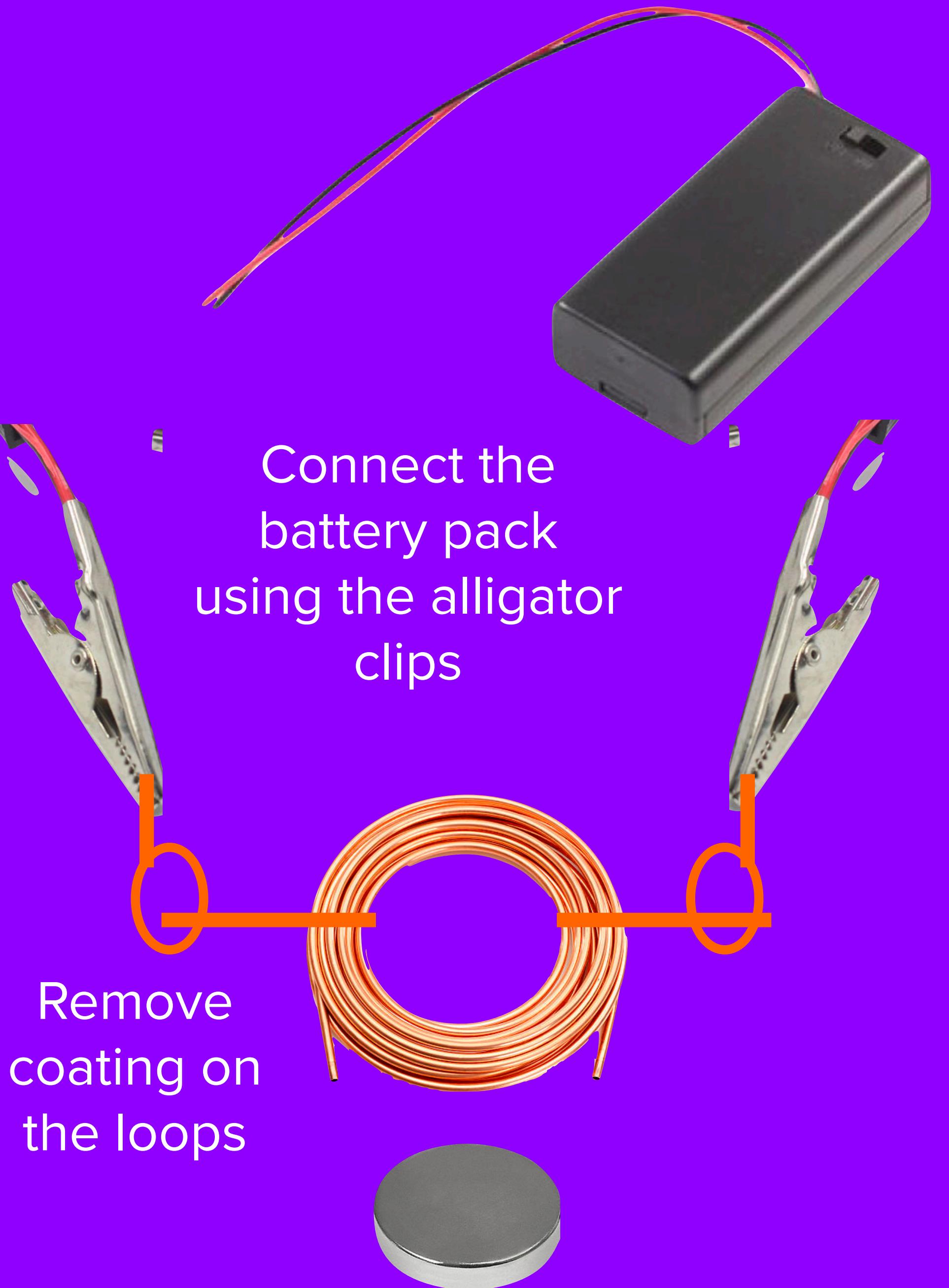


Wrap wire  
around here to  
help hold the  
coil shape

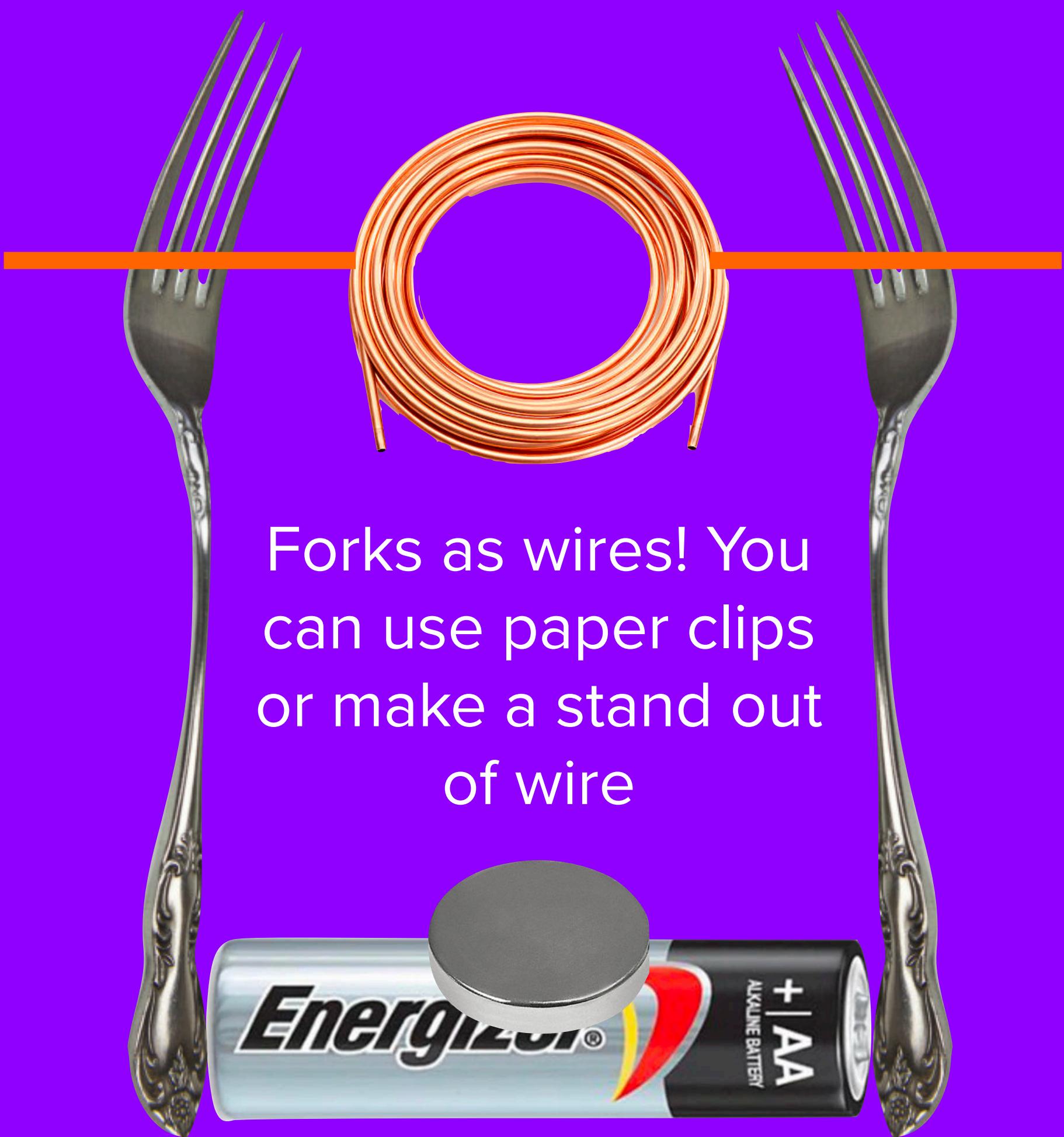
The coil for this example should have the leads coming out of the sides. Wrap the wire around the edge so that it holds its shape and remove the coating off the ends of the wire

# SIMPLE DC MOTOR

Connect the  
battery pack  
using the alligator  
clips



Remove  
coating on  
the loops



Forks as wires! You  
can use paper clips  
or make a stand out  
of wire

By [kobakant.at](http://kobakant.at)



**4-RUN?**



# TRAIN

## Link

1

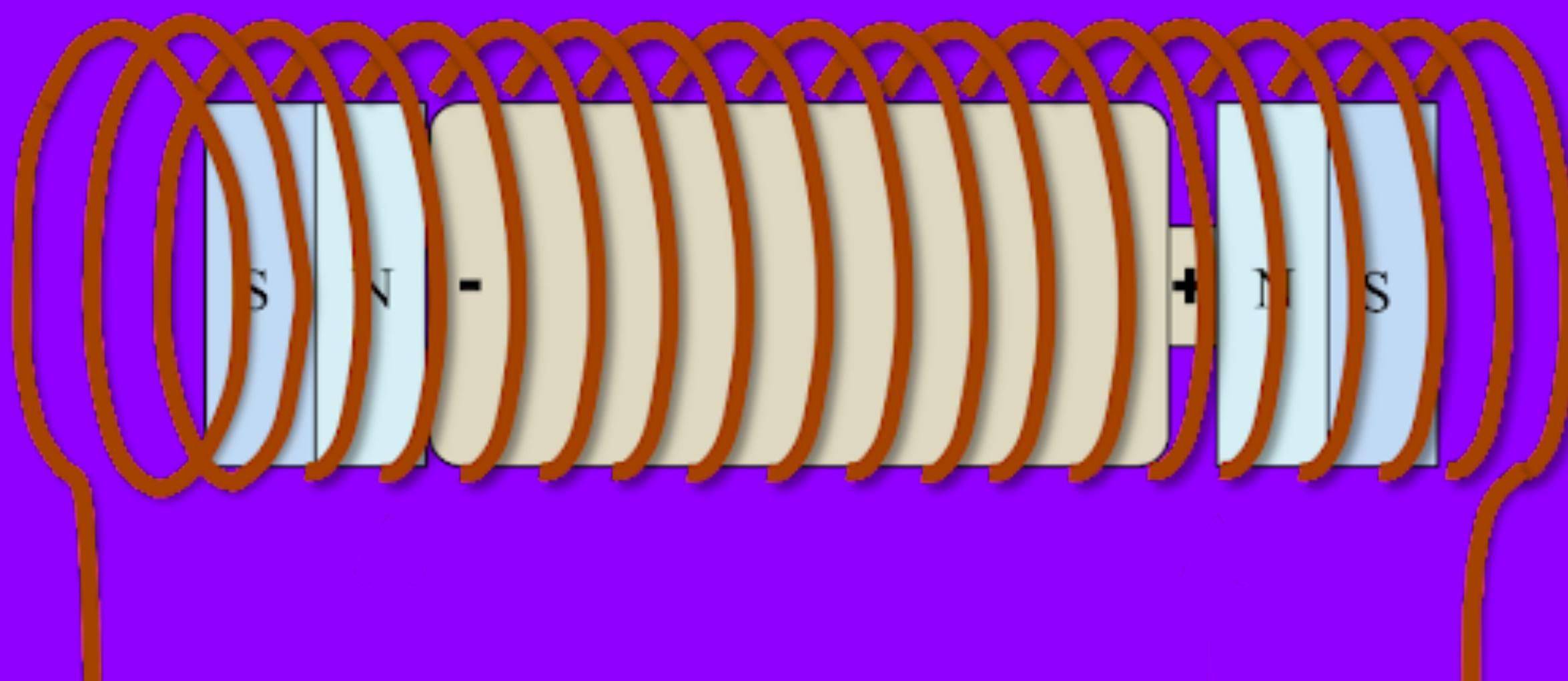
Create a long coil with no enamel coating

2

Put a AA battery with a magnet on each end inside

3

See it run!



# FURTHER READING

Kobakant Examples

Soft Robotics

507 Movements