SCOPRIRE INDUZIONE ELETTROMAGNETICA : PERCORSO MULTIMEDIALE INTERATTIVO

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Motivatiozione

Tutta la storia gira attorno…

un segno „meno”

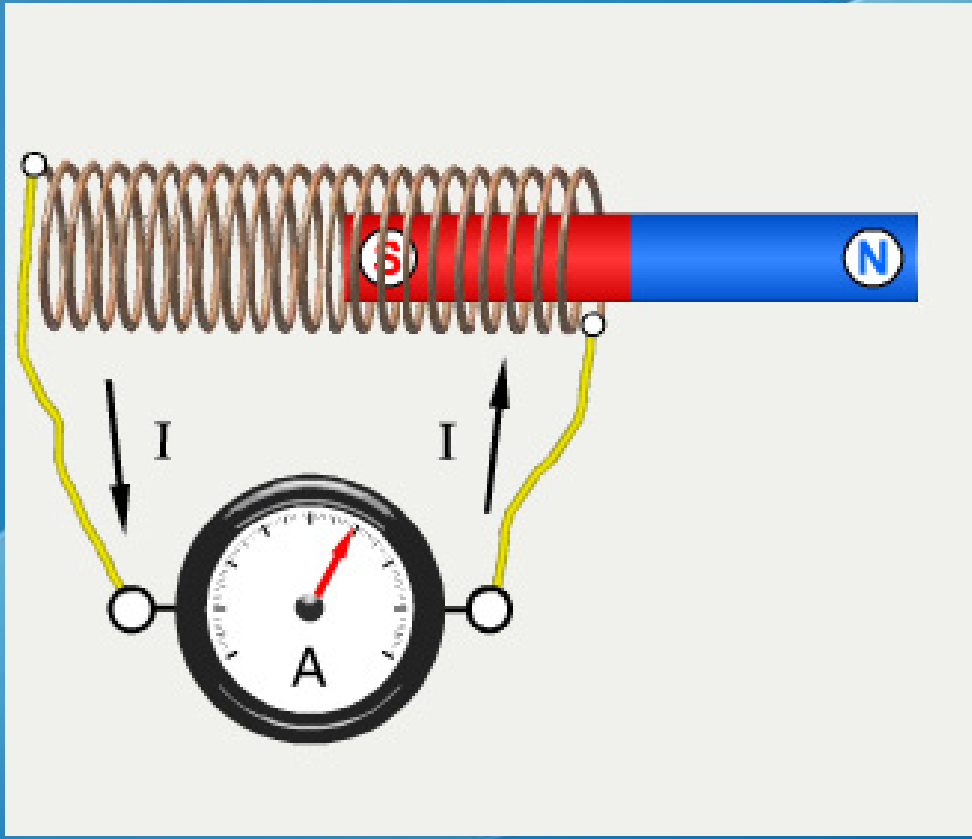
$$\mathcal{E} = - \, d\Phi/dt$$

Situzione
Previsione
Esperimento
Analisi:

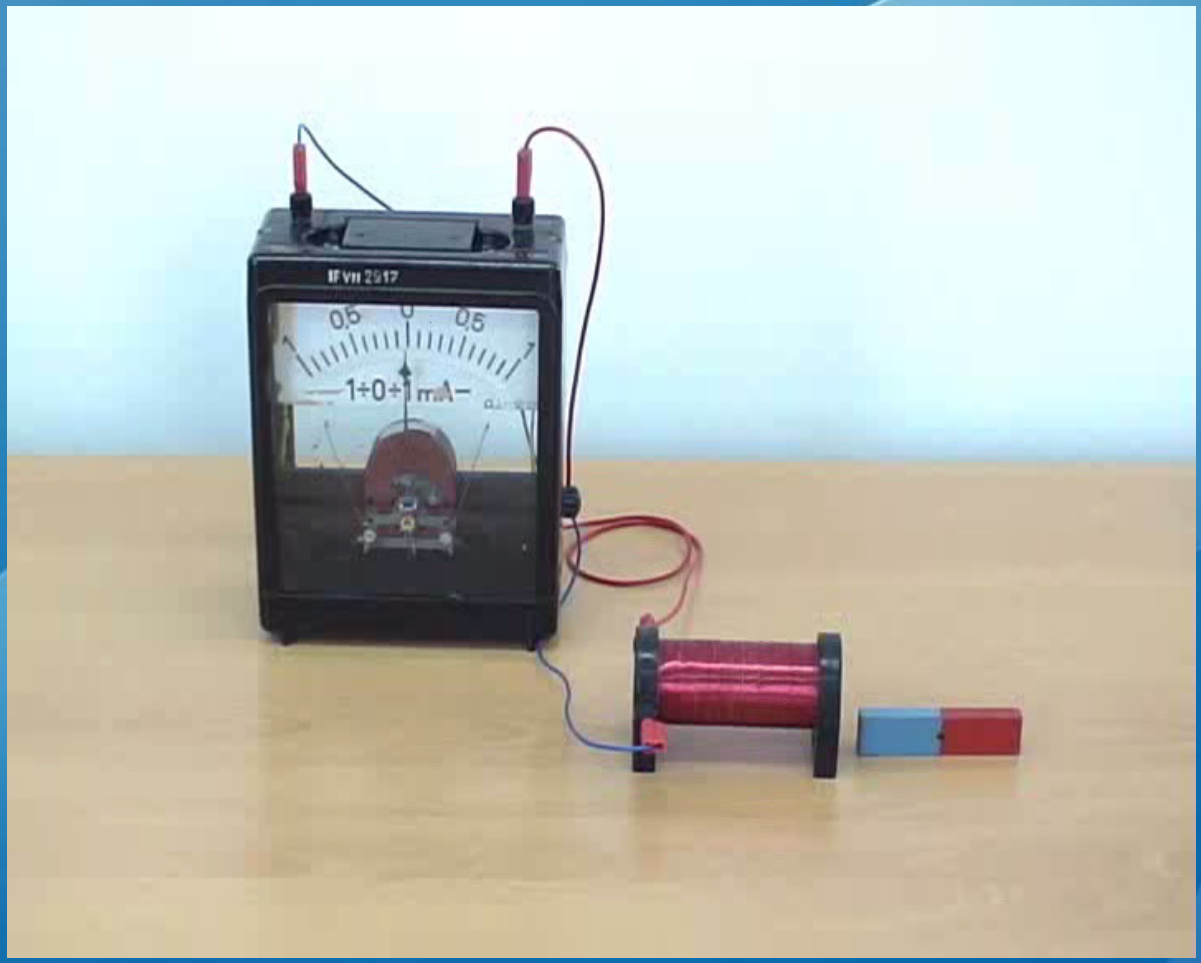
1) situazione

come insegnare la legge di Faraday – Lenz – von Neaumann?

2) previsione



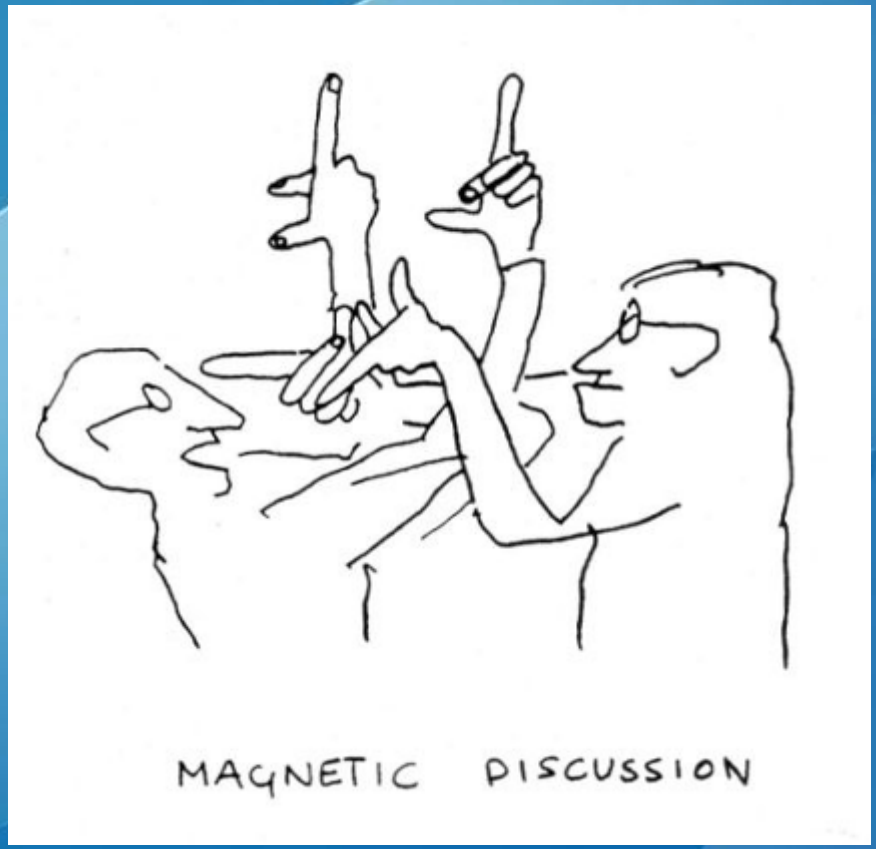
3) esperimento



4) analisi

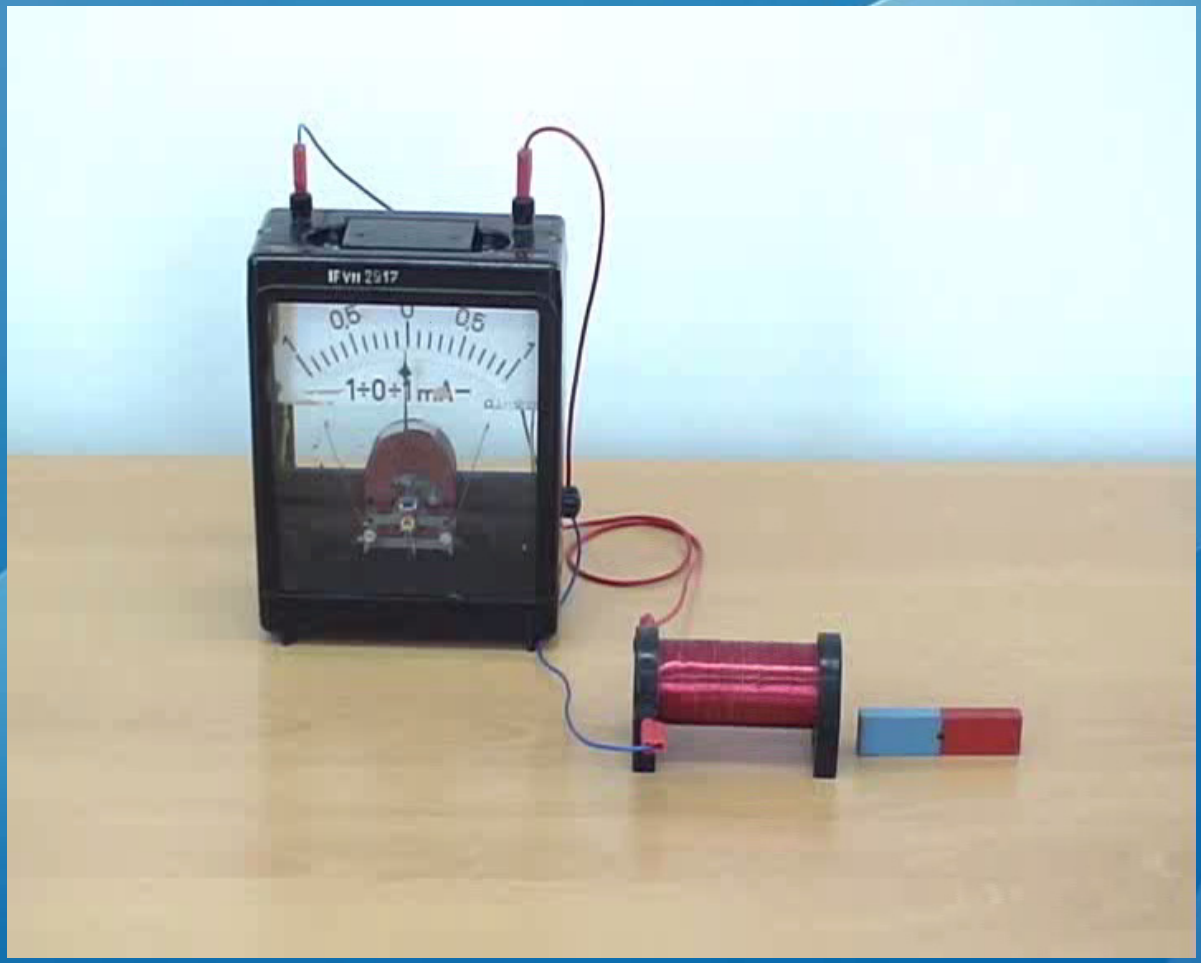
$\mathcal{E} = - d\Phi/dt$

$\mathbf{F} = i\,\mathbf{L} \times \mathbf{B}$



Bruno Touschek

4) oppure: „inserendo polo blu, la freccia va a sinistra”

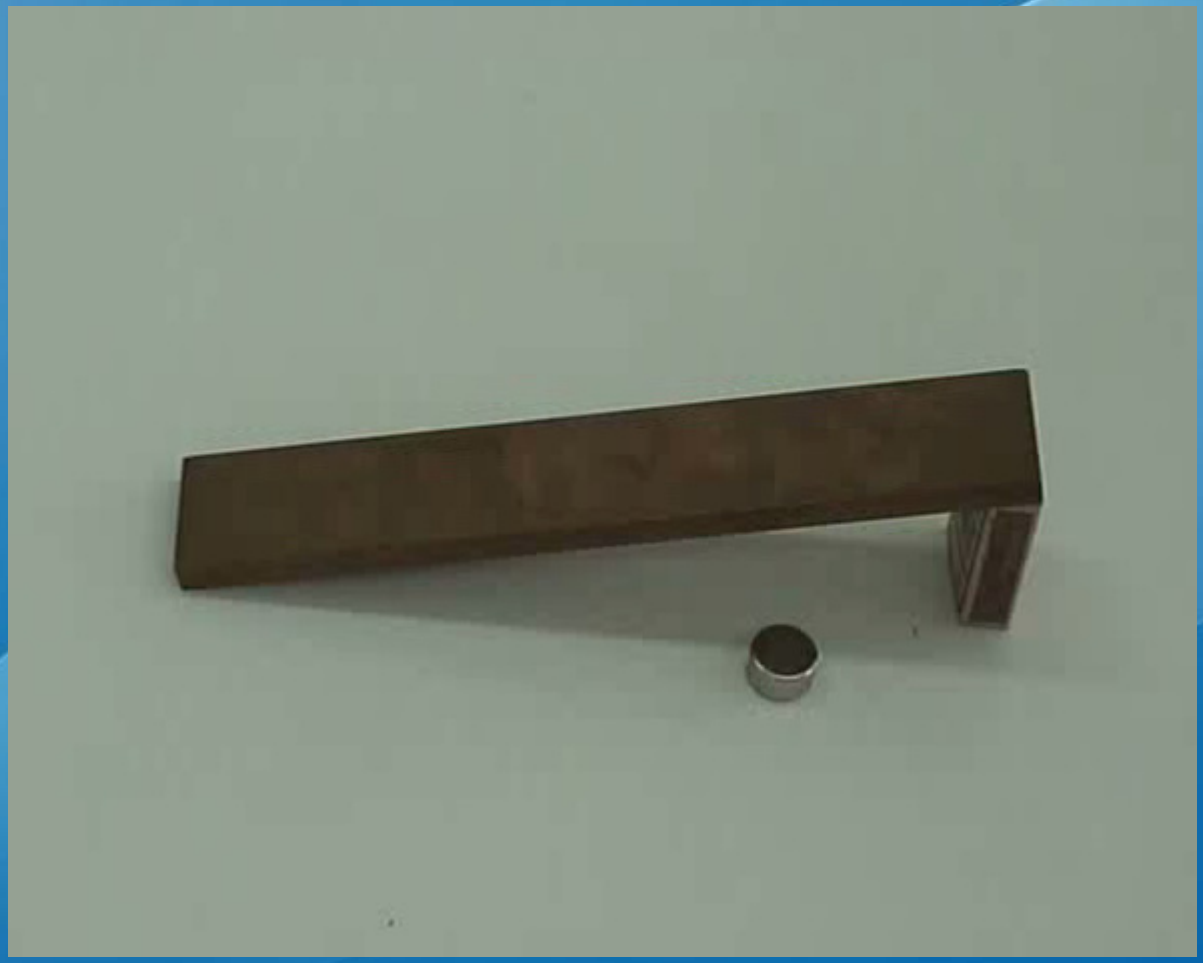


Dobbiamo realmente insegnare tutto che sappiamo?

Dobbiamo realmente insegnare in modo che abbiamo imparato noi?

Statisticamente la probabilita' della risposta giusta e' 1/8? 1/16? ??

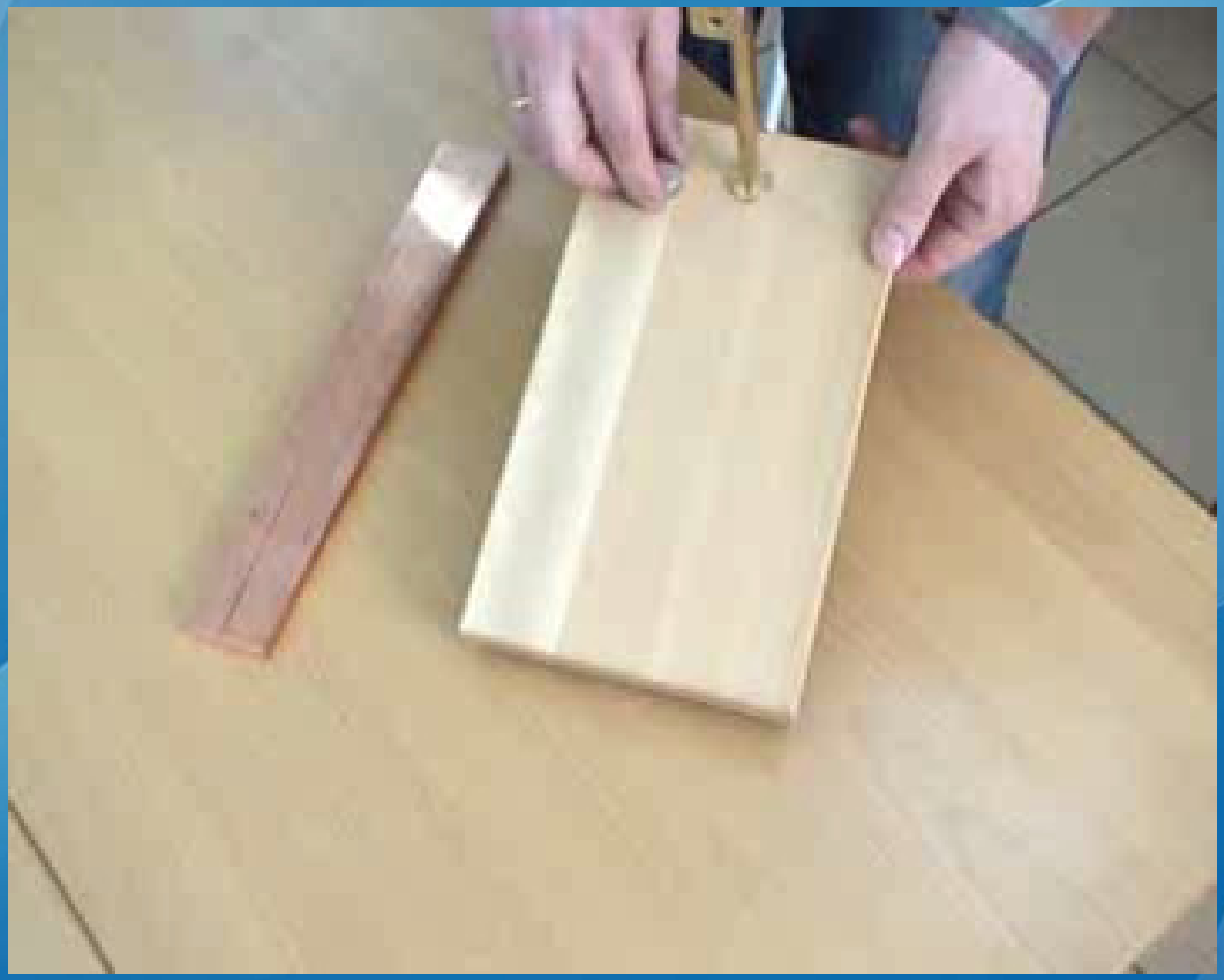
What happens?



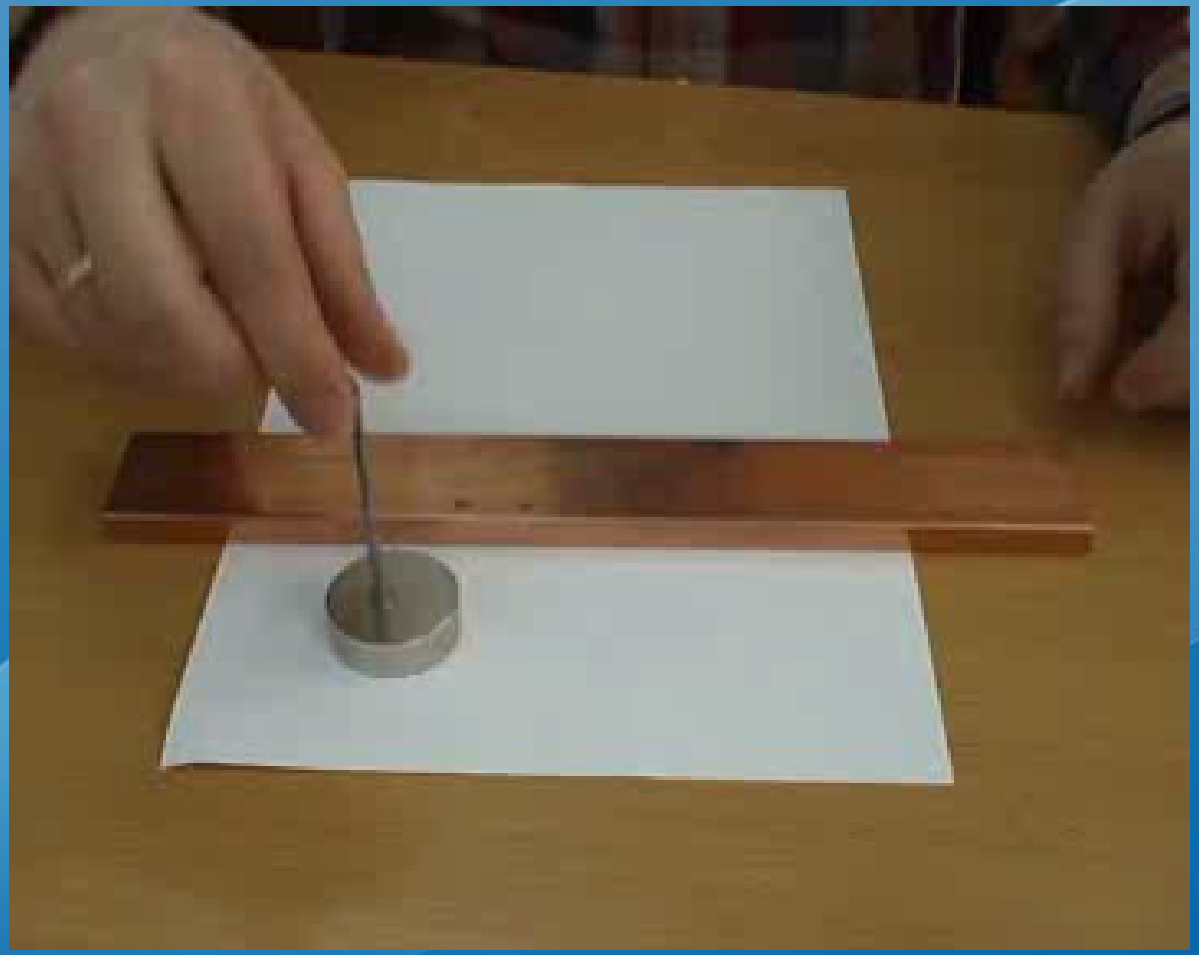
Credits: Wim Peeters

What happens (again)

What happens (check)

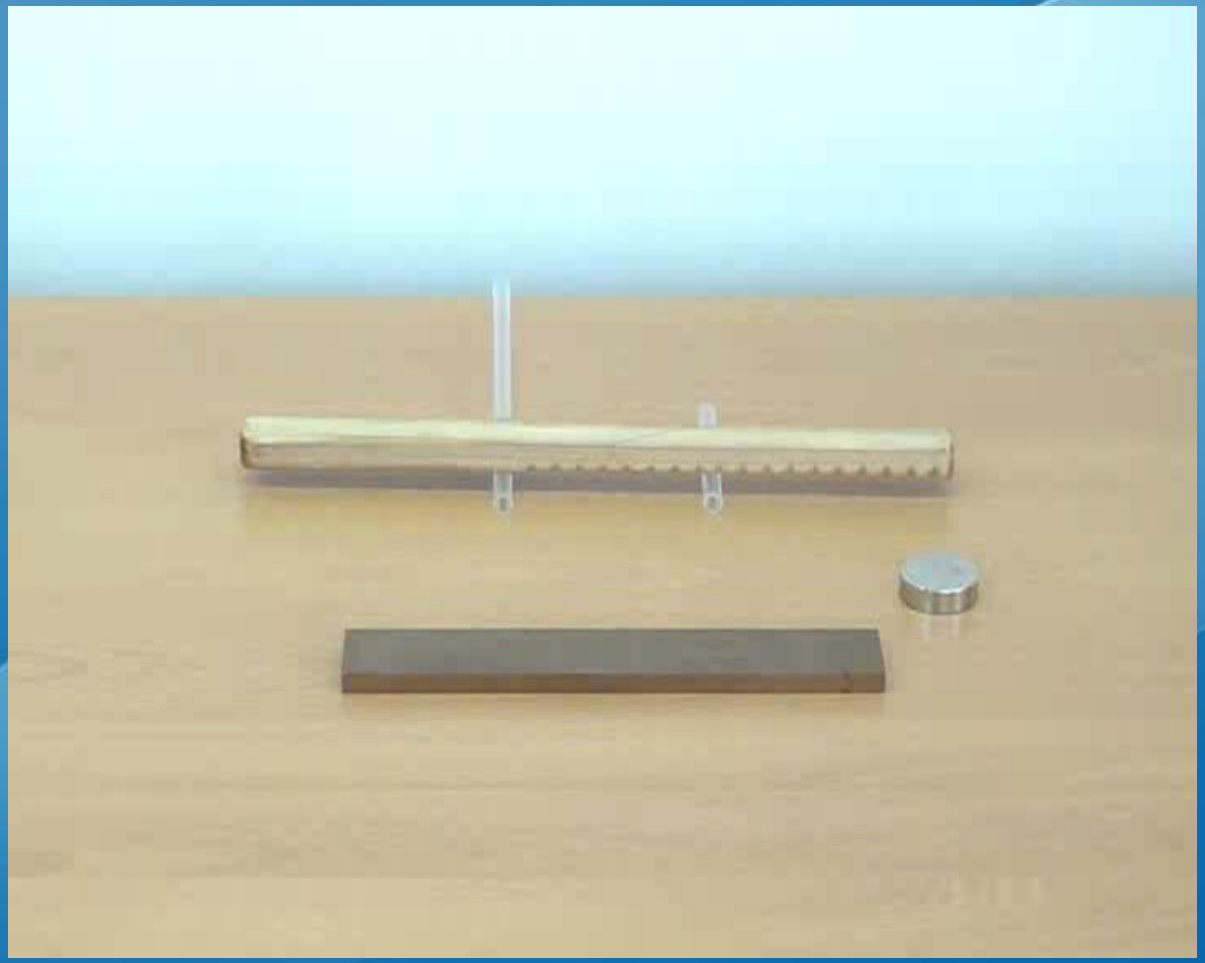


Does it attract/ repel?

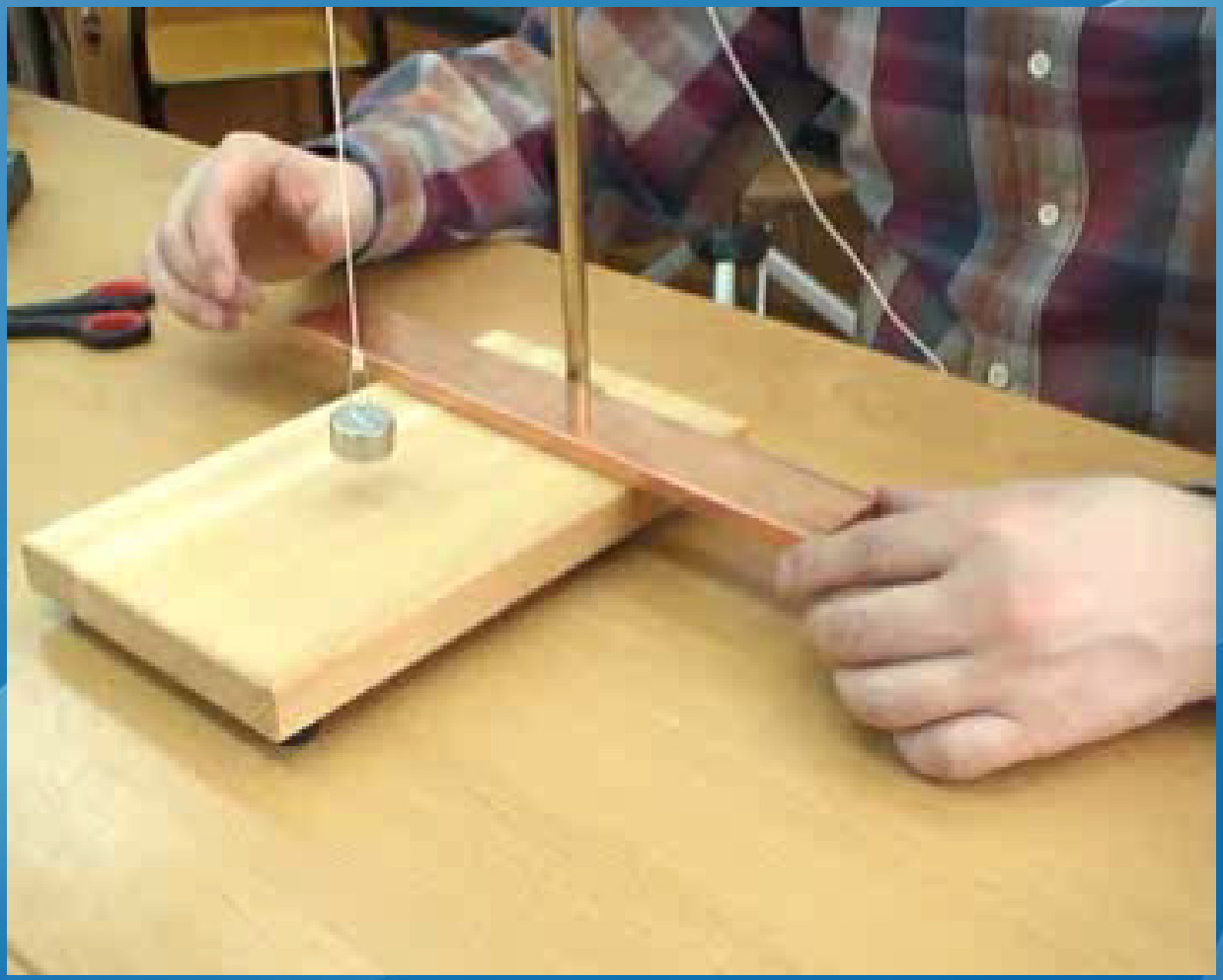


Credits: Wim Peeters

Does it attrack/ repel?



It opposes!



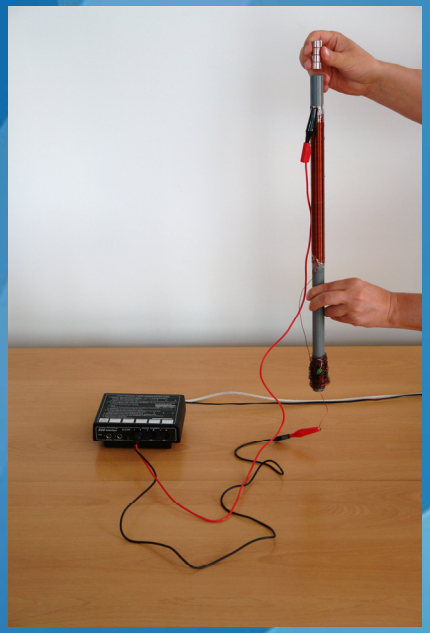
Variable **field** ↔ current

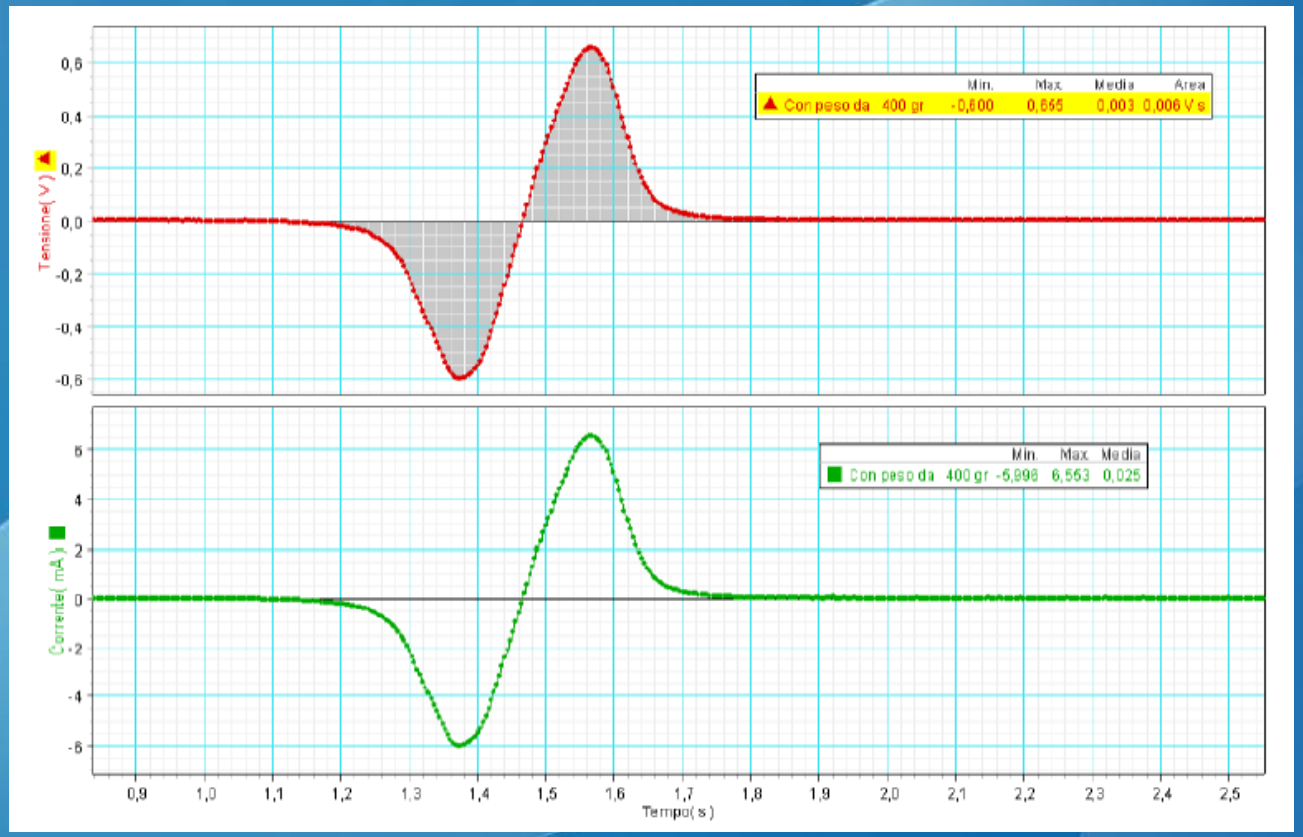
Variable field ↔ current

Induced current, simpler

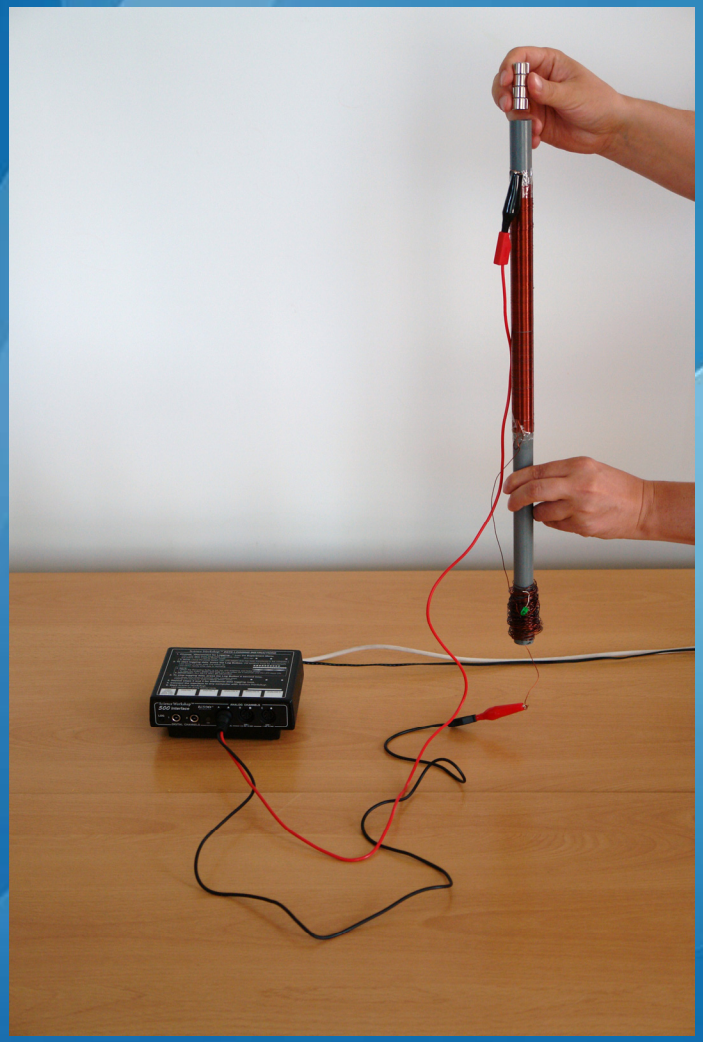
Induced current, simpler

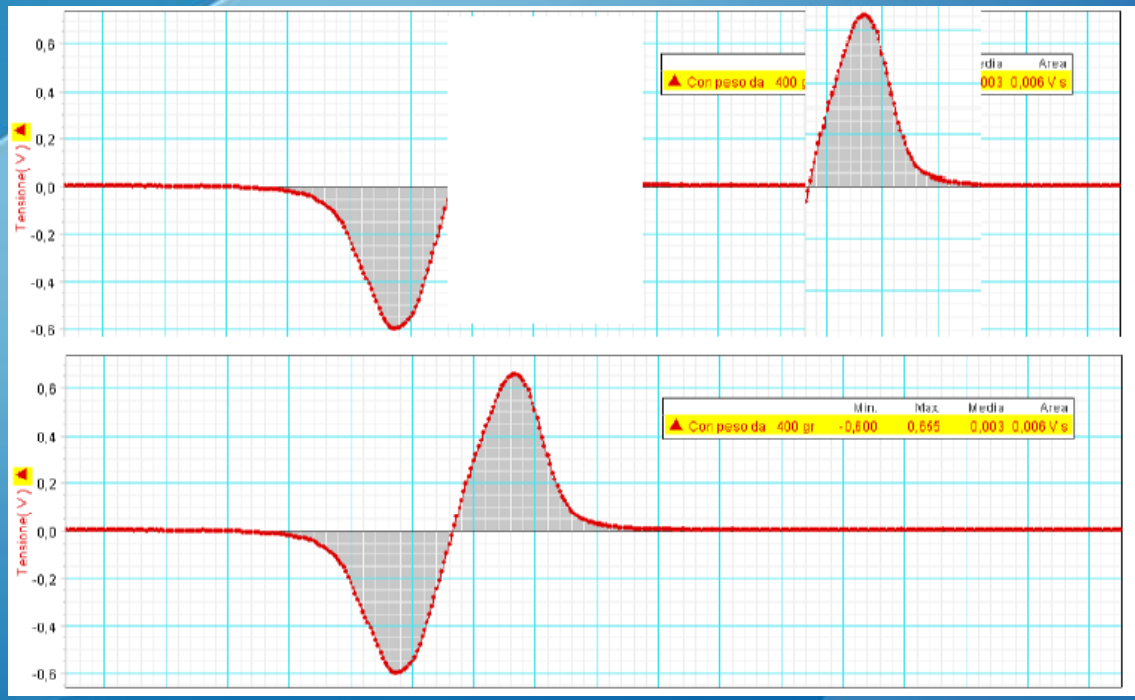
Induced current, more precise





Induced current, more precise





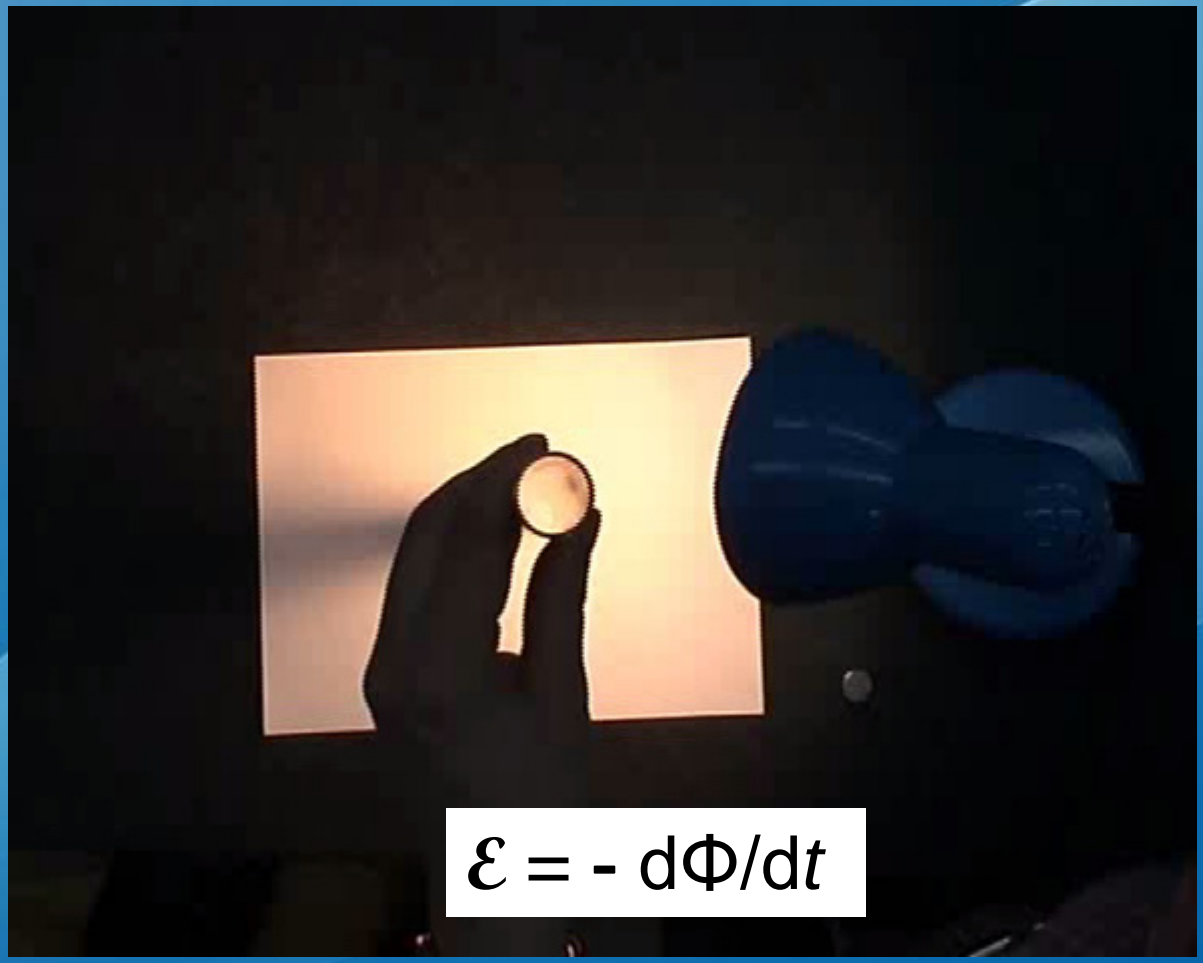
Induced current, slowly

rurka1.flv

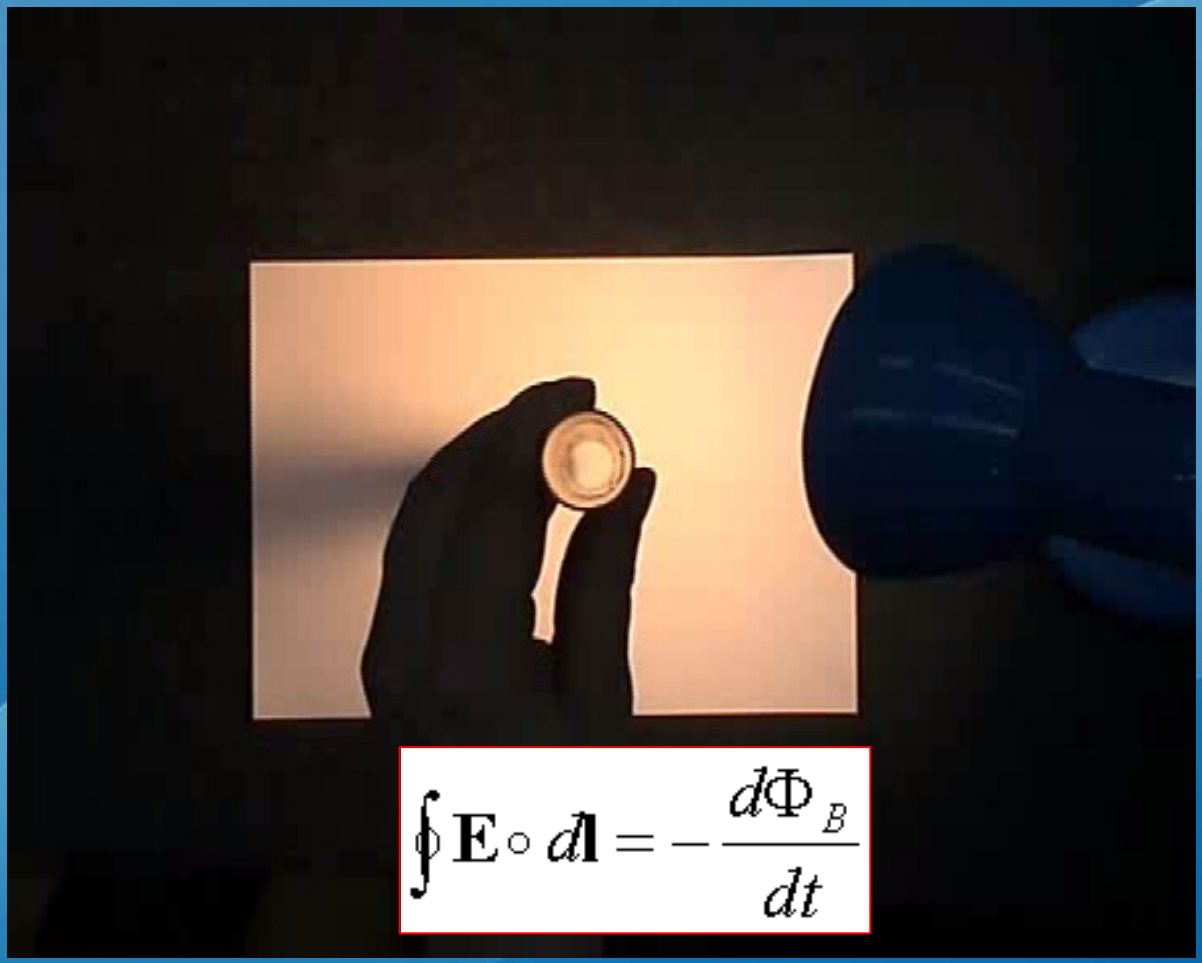
rurka2.flv

Induced current = magnet

Induced current = opposite magnet

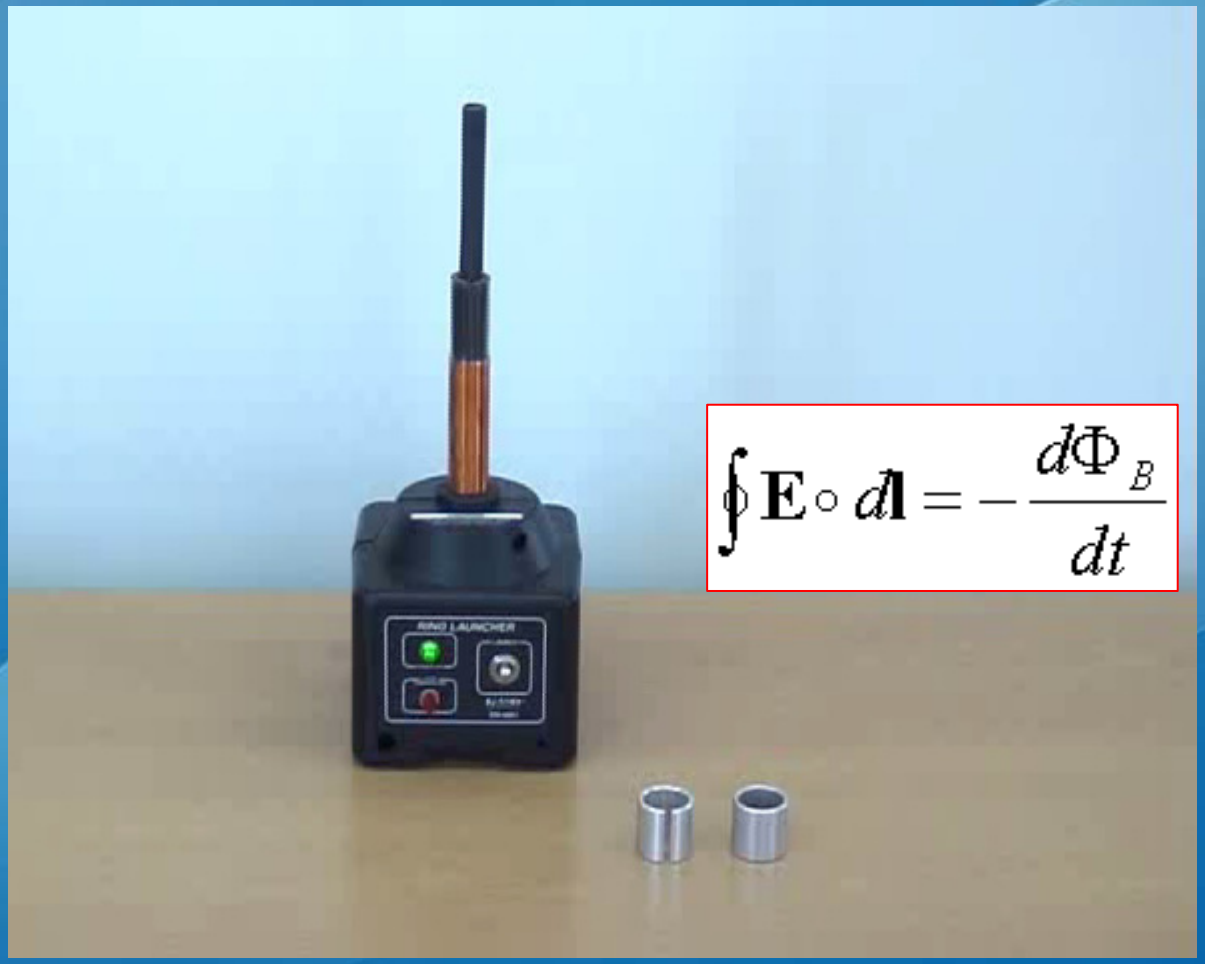


Induced current = opposite magnet



$$\oint \mathbf{E} \circ d\mathbf{l} = -\frac{d\Phi_B}{dt}$$

Induced current = magnet



$$\oint \mathbf{E} \circ d\mathbf{l} = -\frac{d\Phi_B}{dt}$$

FvNL law?

- Saves energy!

- e.g. does not allow the falling magnet to fall
- does not allow the rising magnet to be risen
- does not allow the magnet to be inserted
- does not allow the magnet to be withdrawn

It is always opposite!

Interactive teaching
e.g. magnets, magnetic fields, Earth

- Descartes' experiments with flowing magnets

P3130389.MOV

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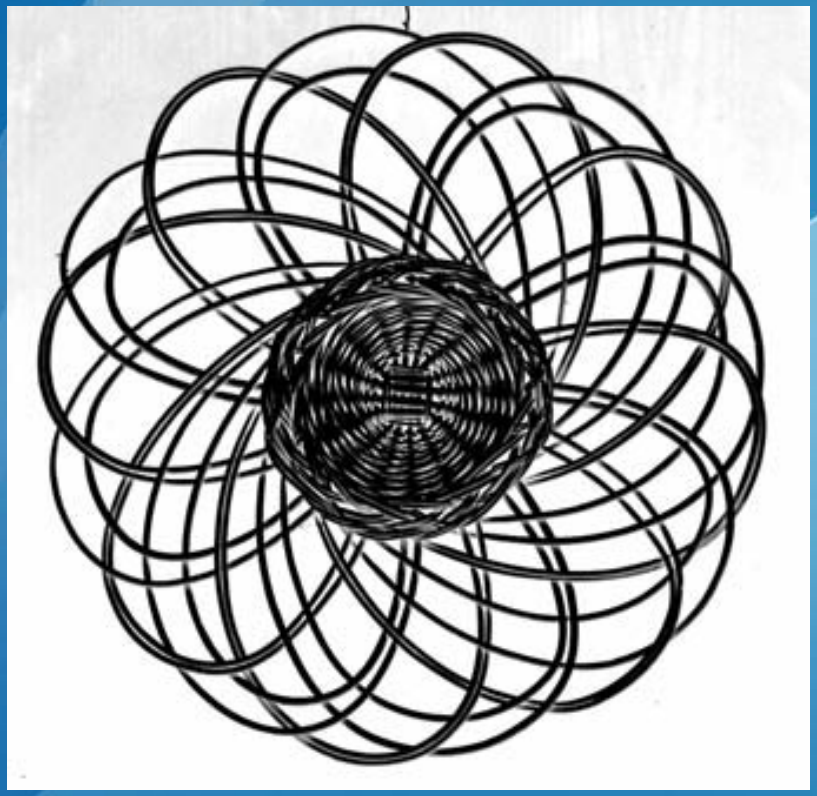
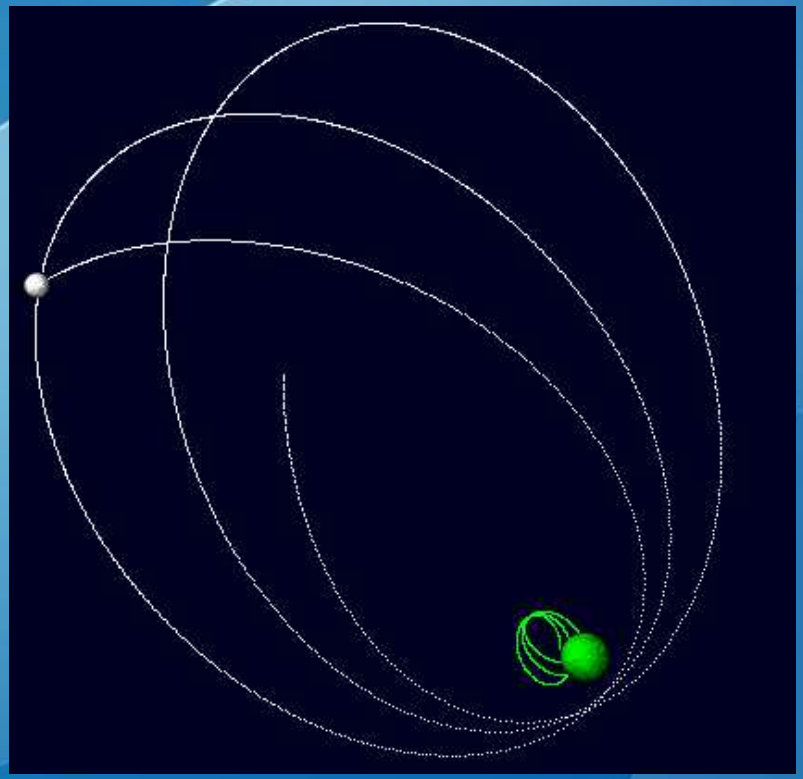
Interactive discovering…

Udine, 12.03.2009

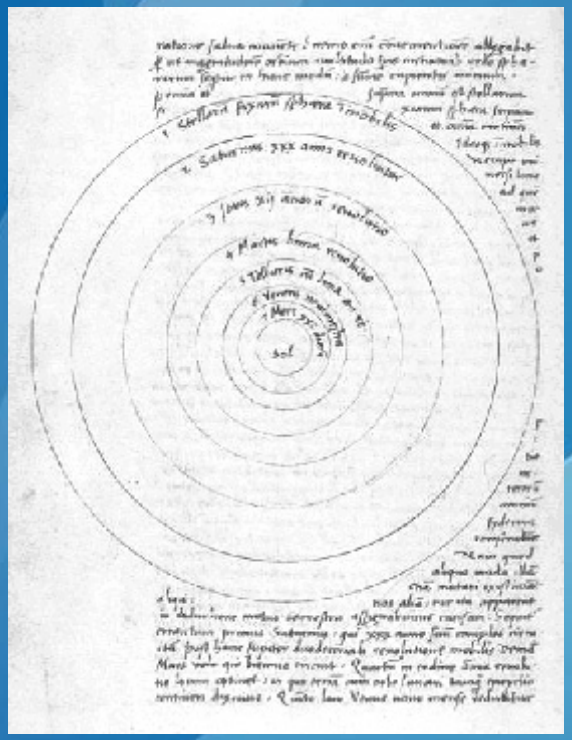
Multimedia nella Fisica Moderna: teoria di relativita' generale

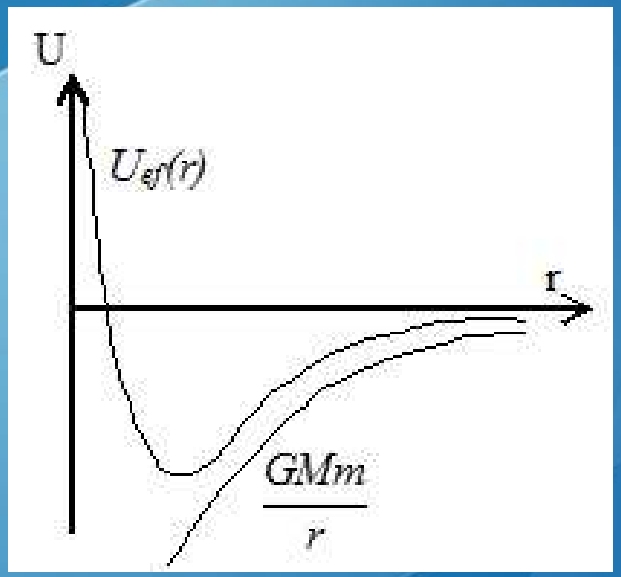




Teoria di relativita’ generale

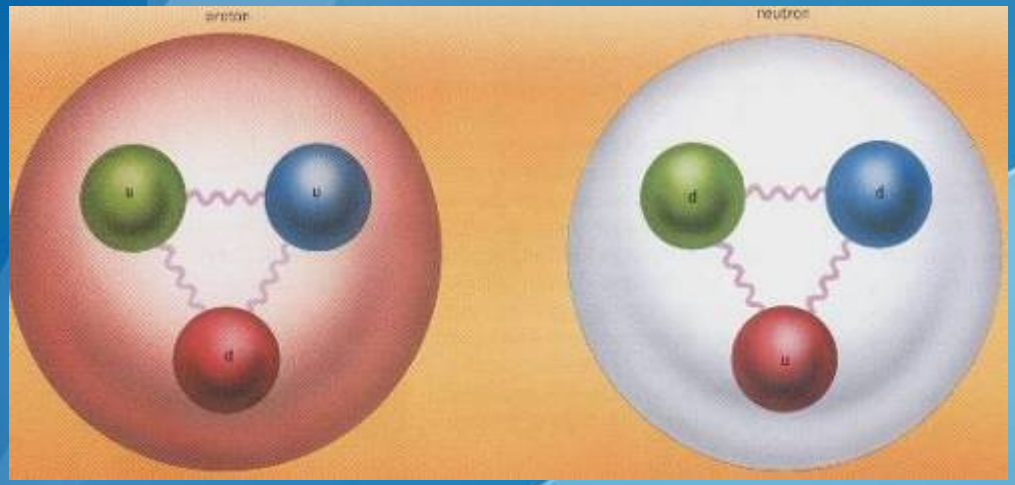
Oggetti reali, oggetti virtuali, schemi, equazioni

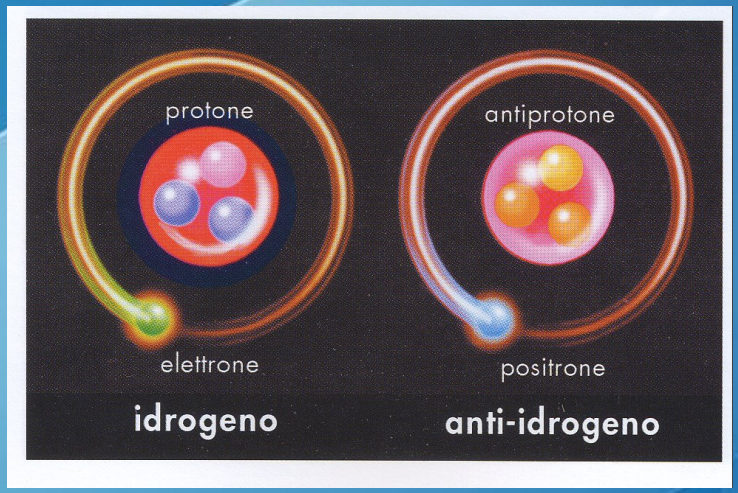


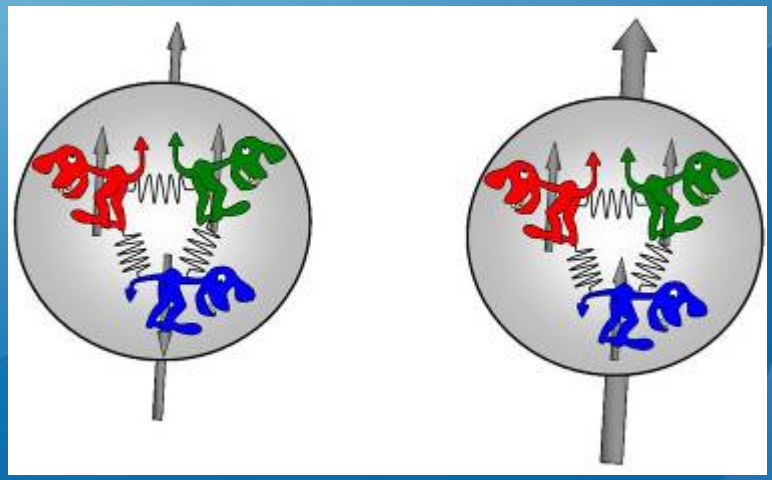


$$F_r = -\frac{GMm}{r^2} + m\left(\frac{d\varphi}{dt}\right)^2 r$$

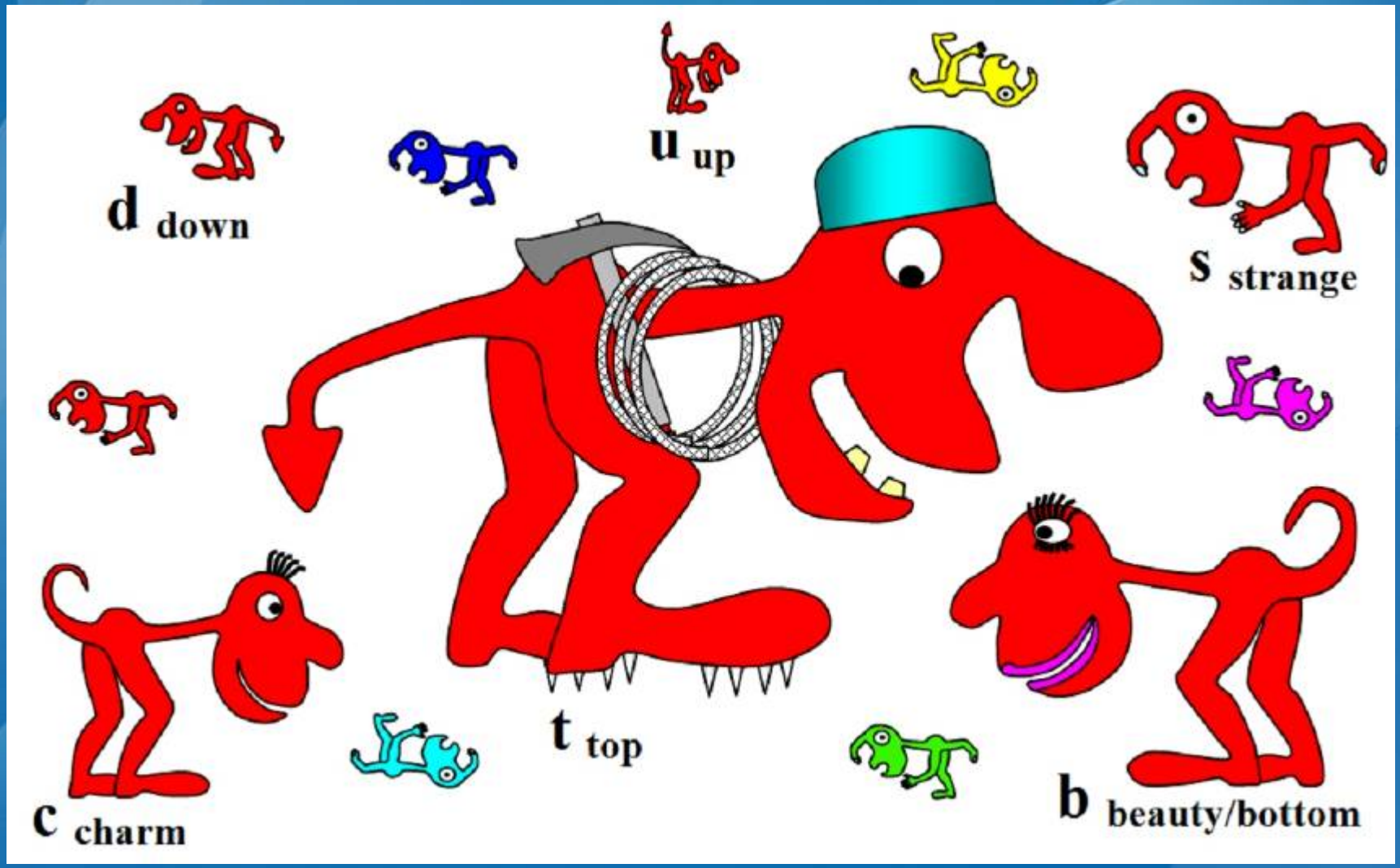
Protone, neutrone e i „quark”







Famiglia di quark



Neo-realismo:
„show, whatever you can imagine!”

Bisogna far vedere tutto che si puo’, e anche di piu’ (GK)

Hyper - constructivism

- Educational books }
- Educational TV } worsening of teaching results in 1995-2008 !
- Internet }

→ children know (almost) everything, i.e. in a 20-pupils group there is almost certain to get *a good* answer

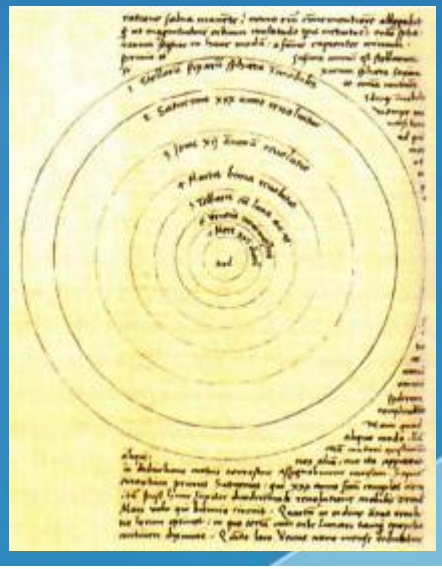
Hyper-constructivism:

- construct the knowledge *exclusively* on notions gathered from pupils
- and falsify it, if needed, by interactive (real or virtual) experiments
- to teach them:

➢ *reasoning,*
➢ *constructing mental categories,*
➢ using *fantasy*
➢ and *predicting*

Strategie educative per XXI secolo (GK):

- hyper-constructivism
- neo-realism



Grazie per l’attenzione!