

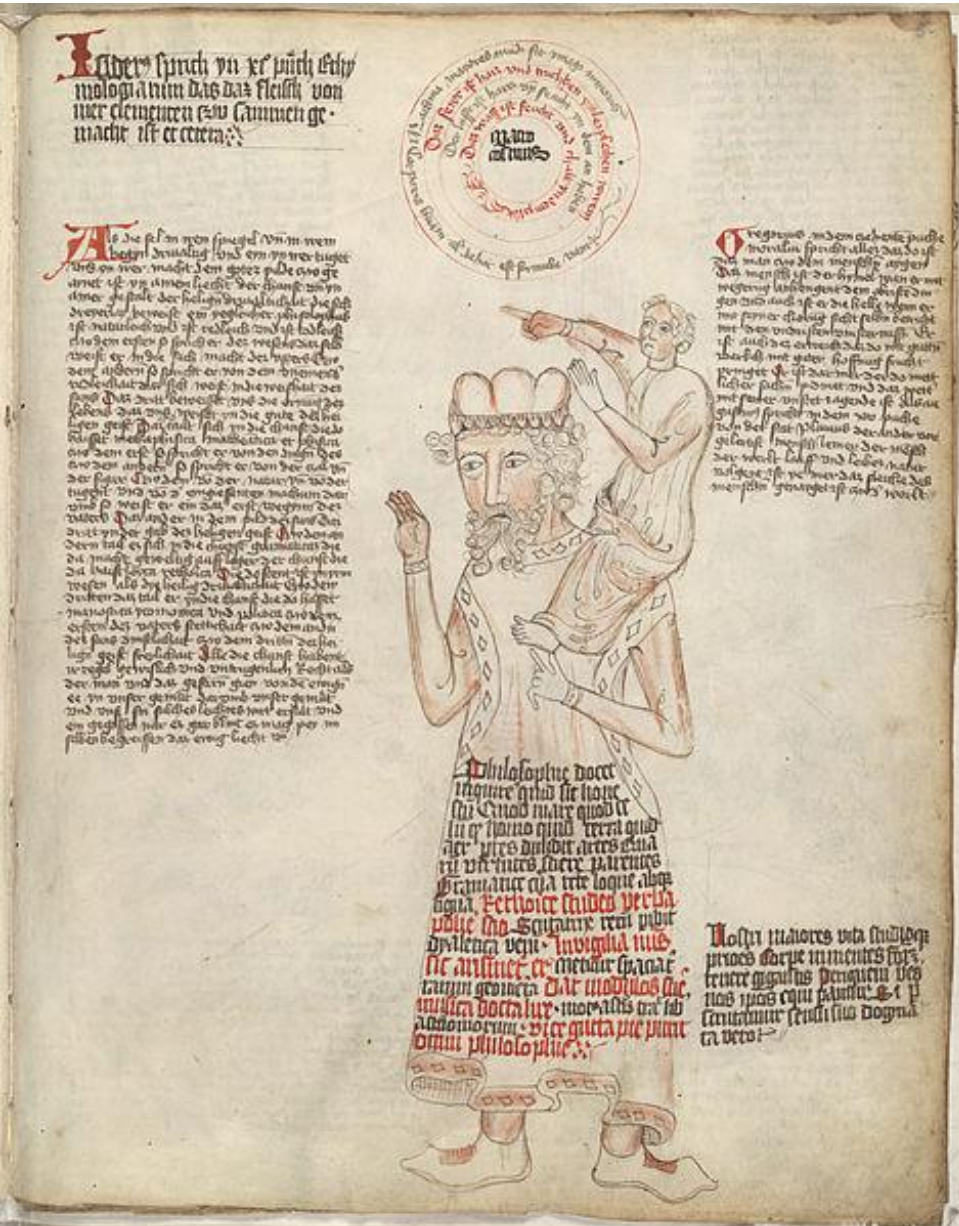
“If I have seen further it is by standing on ye sholders of Giants”

(Isaac Newton, da una lettera a Robert Hooke del 5 febbraio 1676)

“Da William Gilbert a James Clerk Maxwell. L'era dell'elettricità”

Prof. Claudio Goletti

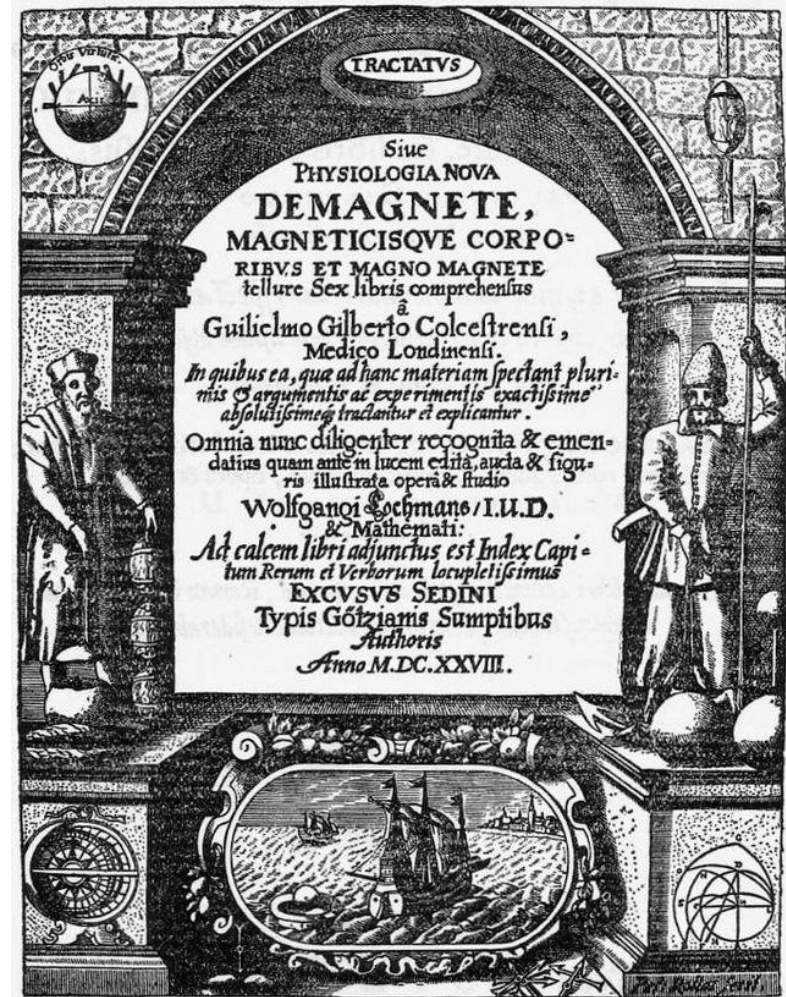
Dipartimento di Fisica
Università di Roma Tor Vergata

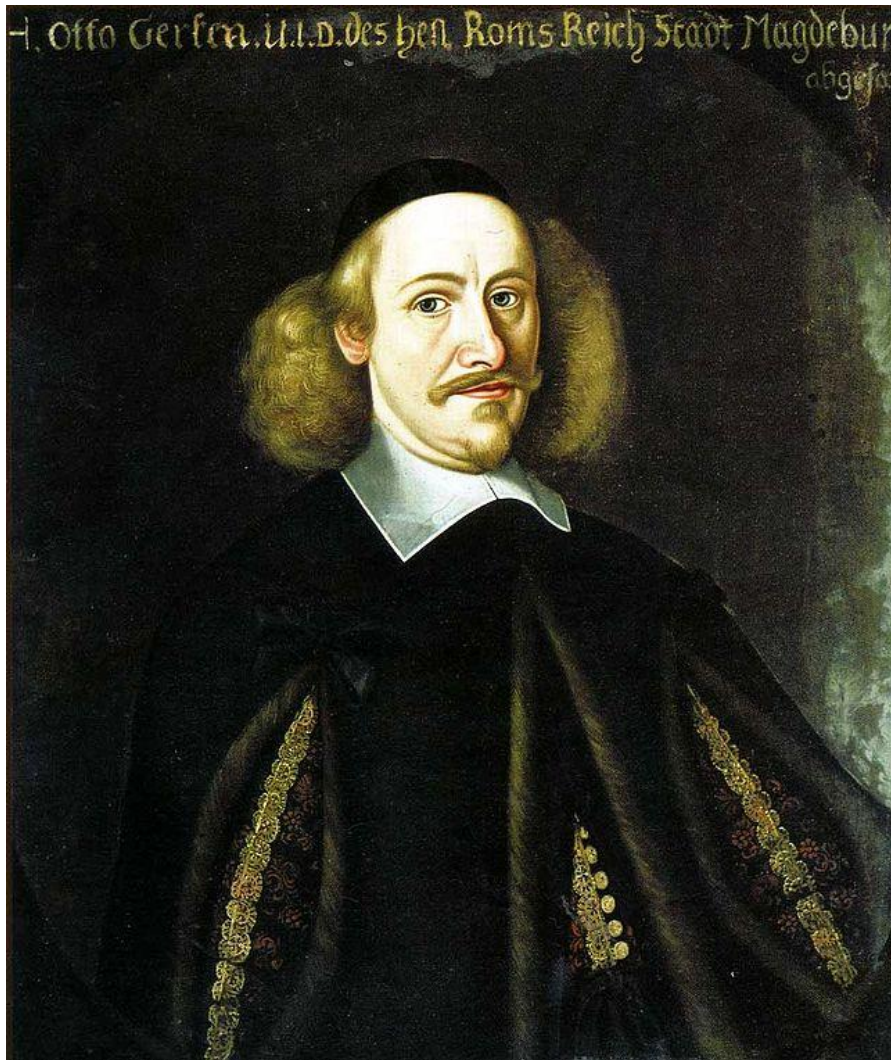


goletti@roma2.infn.it

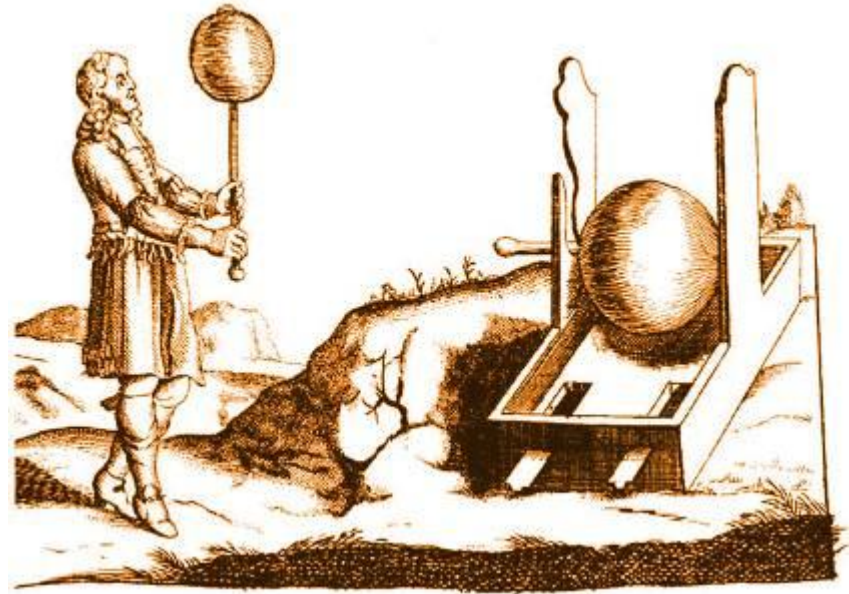


William Gilbert (1544-1603)





Otto von Guericke (1602-1686)



Costruì Il primo generatore elettrostatico (1663) per dimostrare che cariche elettriche di segno uguale si respingono a vicenda.

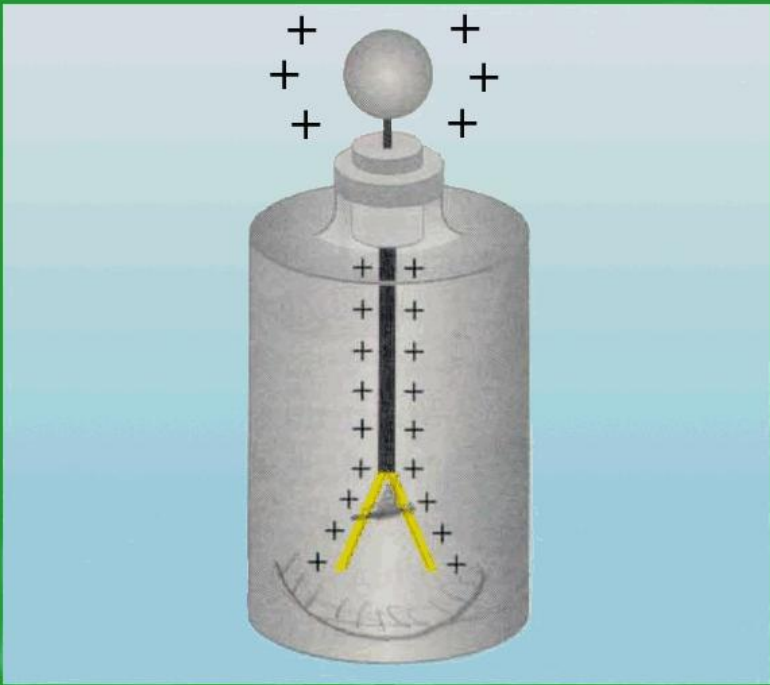
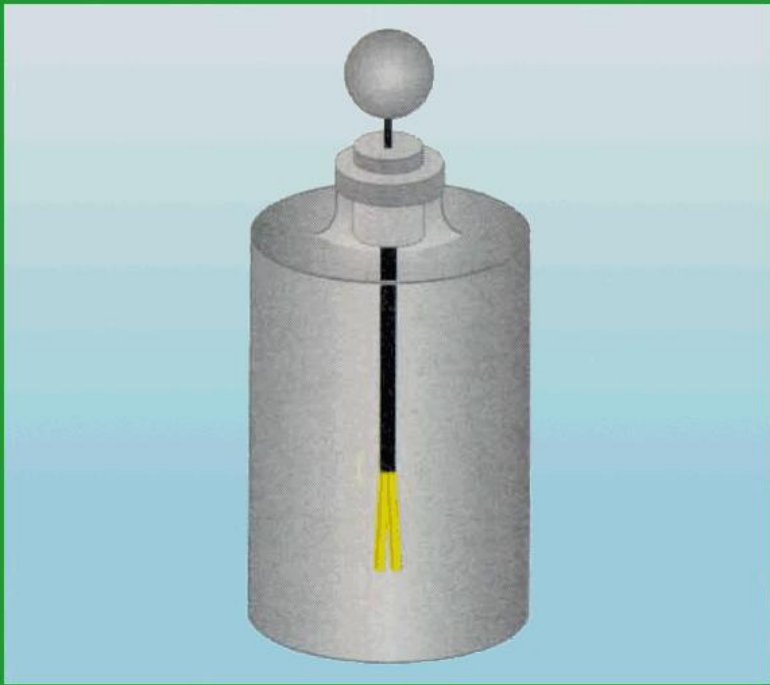
Era costituito da una grande sfera in vetro all'interno della quale era alloggiata una sfera di zolfo montata su un'asta. Mettendo in rotazione la sfera esterna mediante una leva, lo sfregamento fra le due sfere generava elettricità statica. La sfera interna poteva essere rimossa per essere utilizzata come sorgente di carica elettrica per lo svolgimento di esperimenti sull'elettricità.

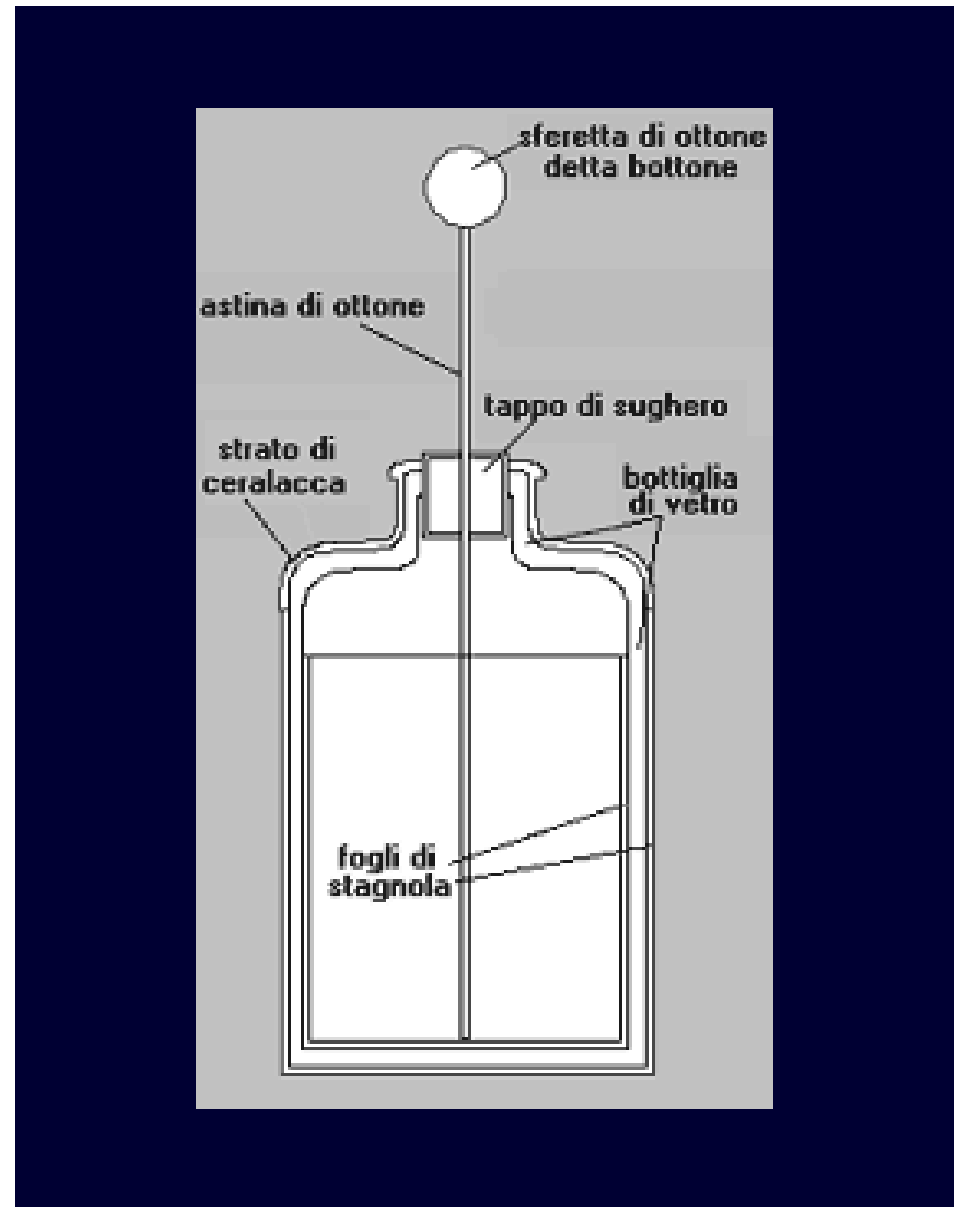


**Charles François de Cisternay du Fay
(1698 – 1739)**

Il suo nome rimane legato ad una scoperta fondamentale dell'elettrologia (1733): 'esistenza di cariche di segno opposto.





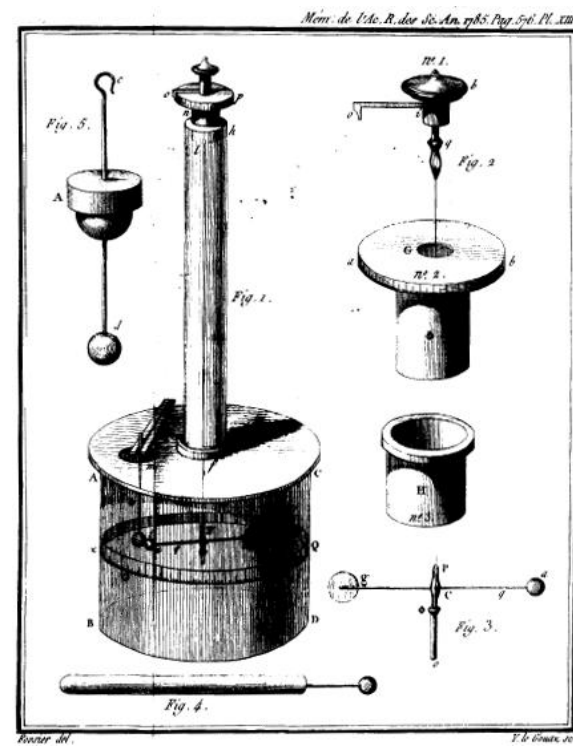




Benjamin Franklin (1706-1790)

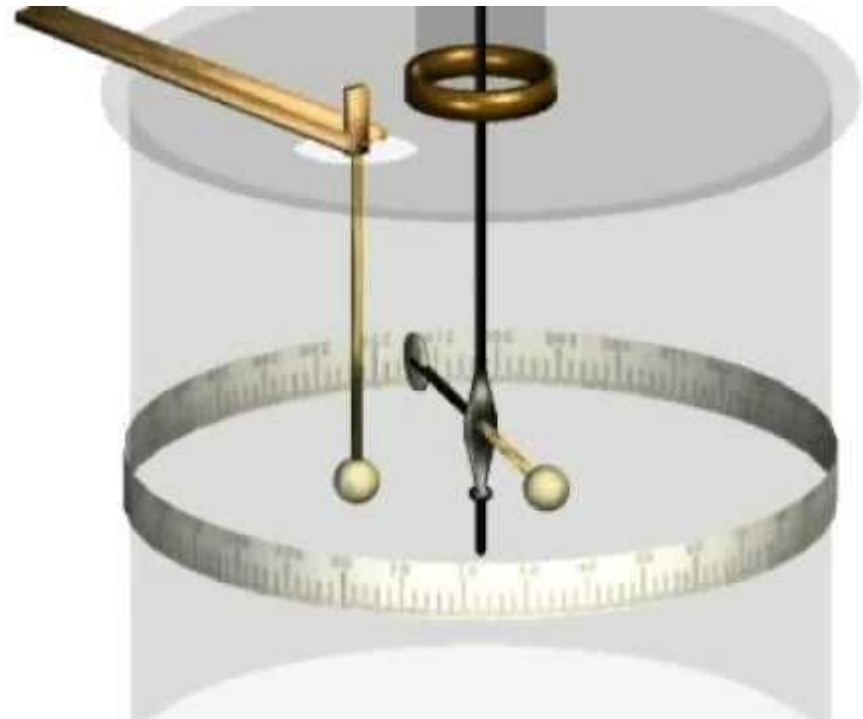






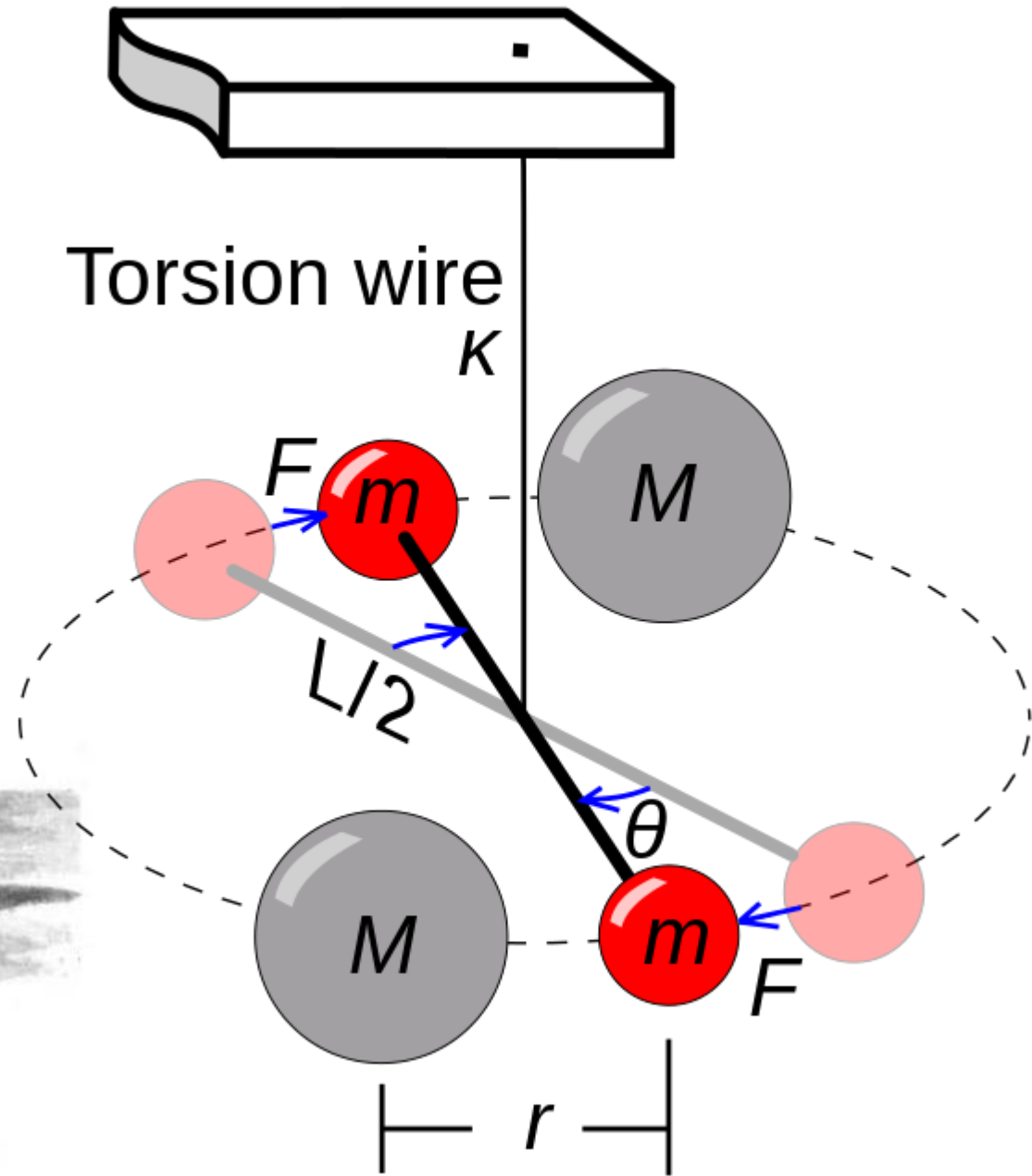
Charles Augustin de Coulomb (1736-1806)

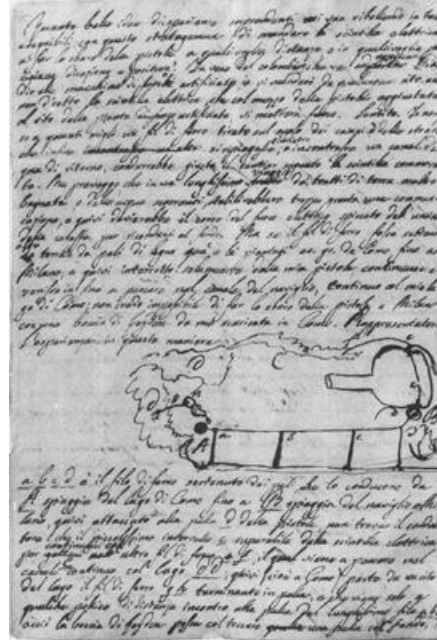
$$F = \frac{1}{4\pi\epsilon_0} \frac{q_1q_2}{r^2}$$





H. Cavendish





Alessandro Giuseppe Antonio Anastasio Gerolamo Umberto Volta
(Como, 18 febbraio 1745 – Camnago Volta, 5 marzo 1827)

10000 LIRE DIECIMILA

PAGABILI A VISTA AL PORTATORE

IL GOVERNATORE

Carlo A. Campi

IL CASSIERE

Spz. al.



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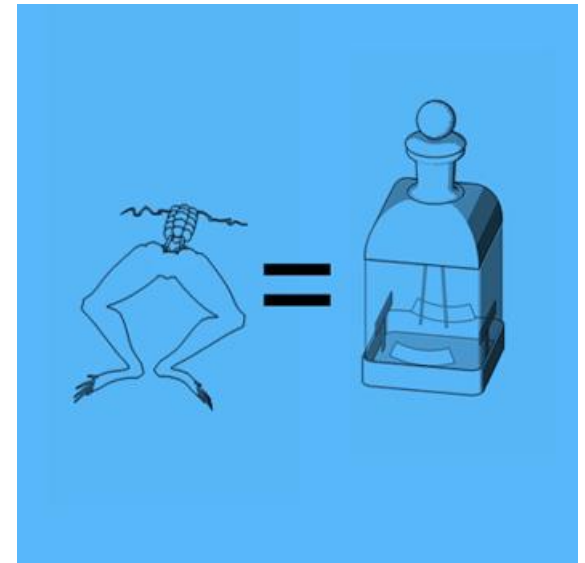
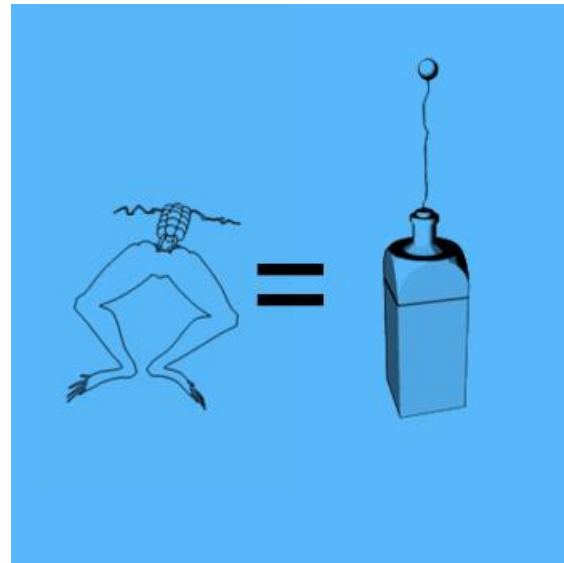
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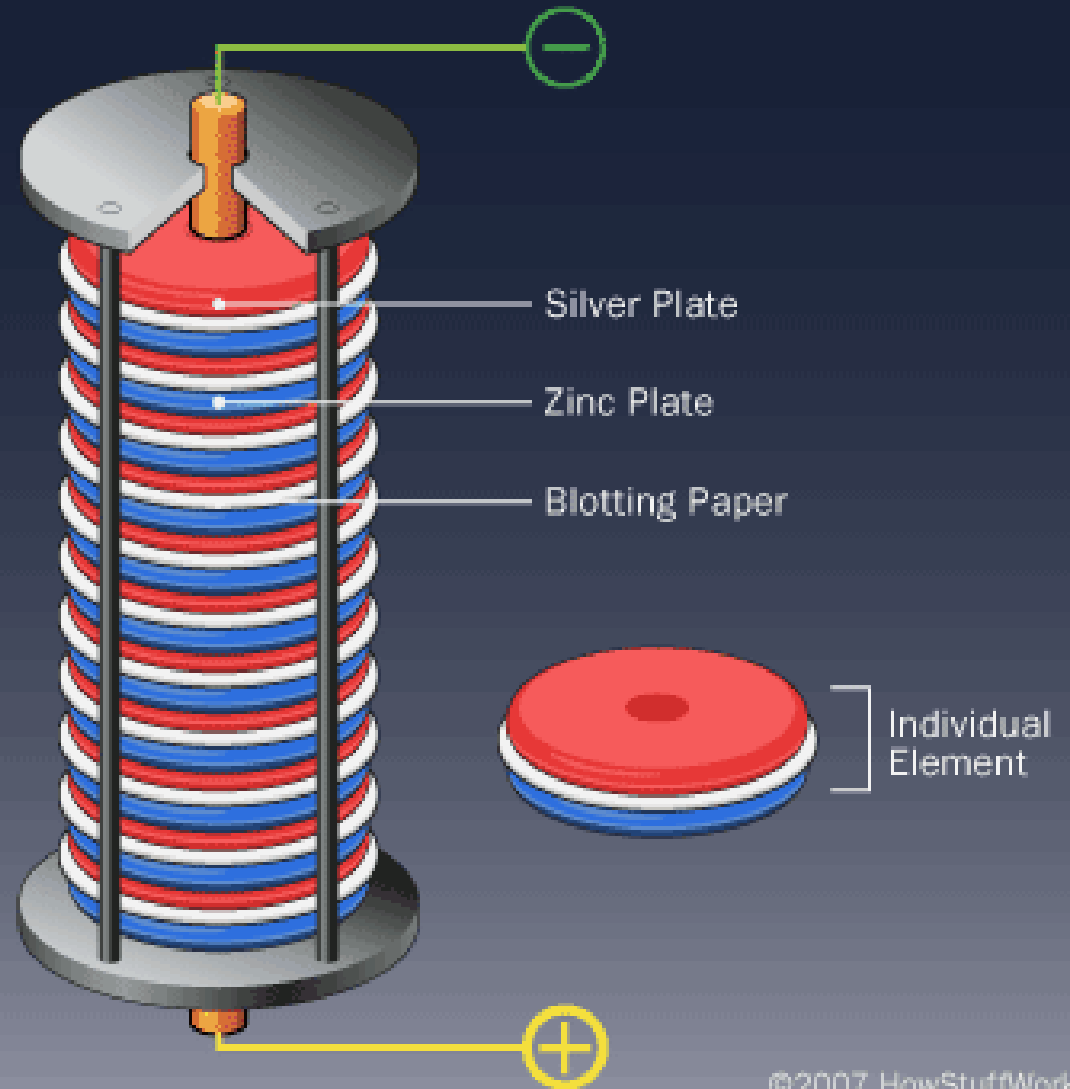
VOLTA

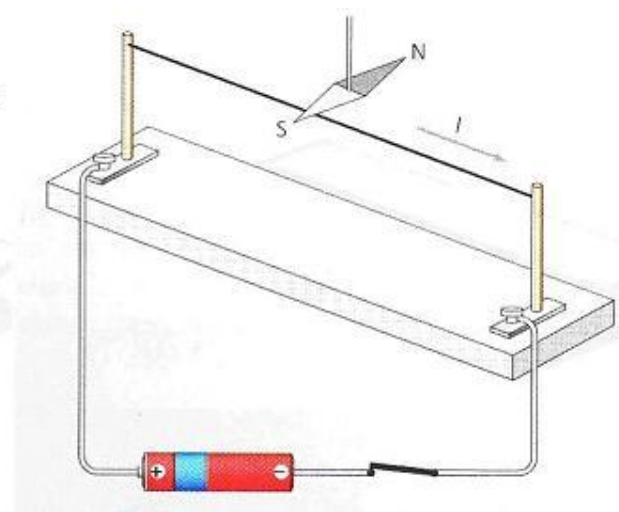
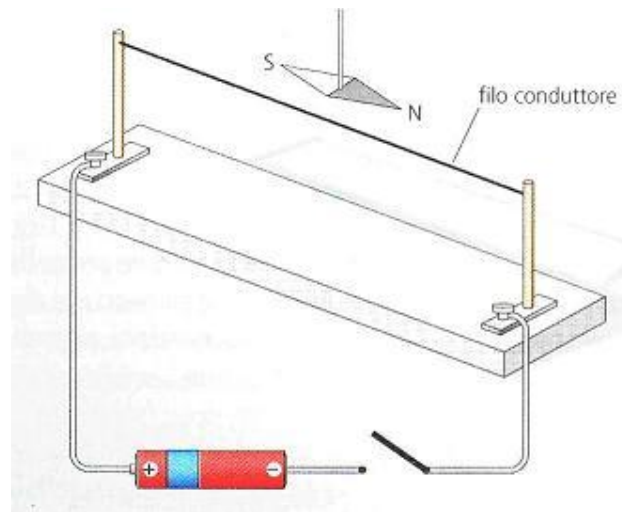
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How Batteries Work The Voltaic Pile





Hans Christian Ørsted (1777-1851)

EXPERIMENTA

CIRCA EFFECTUM

CONFLICTUS ELECTRICI IN ACUM

MAGNETICAM.

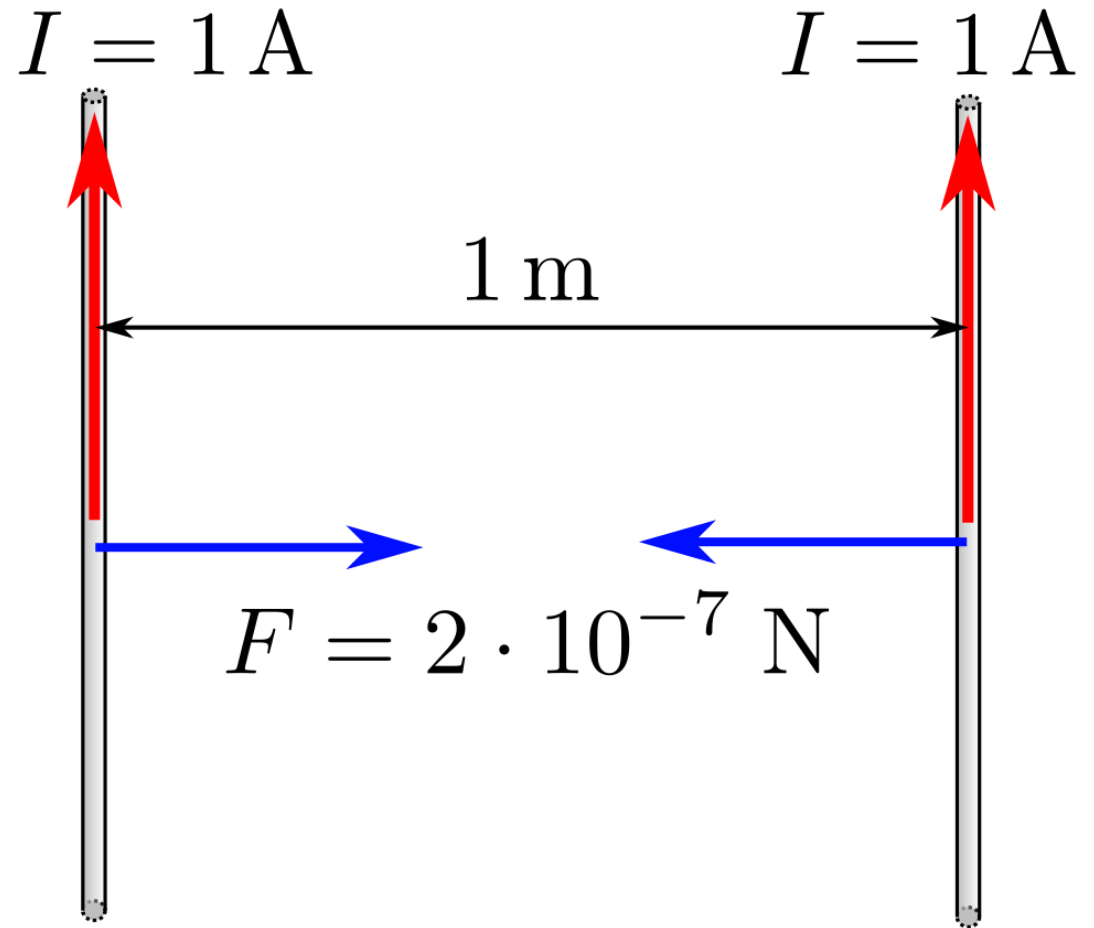
Prima experimenta circa rem, quam illustrare aggredior, in scholis de Electricitate, Galvanismo et Magnetismo proximo superiori hieme a me habitis instituta sunt. His experimentis monstrari videbatur, acum magneticam ope apparatus galvanici e situ moveri; idque circulo galvanico cluso, non aperto, ut frustra tentaverunt aliquot abhinc annis physici quidam celeberrimi. Cum autem haec experimenta apparatu minus efficaci instituta essent, ideoque phaenomena edita pro rei gravitate non satis luculenta viderentur, socium adseivi amicam EMSCH, regi a consillis justitiae, ut experimenta cum magno apparatu galvanico, a nobis conjunctim instructo, repeterentur et suggererentur. Etiam vir egregius WLENGEL, eques auratus ord. Dan. et apud nos praefectus rei gubernatoriae, experimentis interfuit, nobis socius et testis. Praeterea testes fuerunt horum experimentorum vir excellentissimus et a rege summis honoribus decoratus HAACH, cujus in rebus naturalibus scientia jam diu inclavuit, vir acutissimus REINHARDT, Historiae naturalis Professor, vir in experimentis instituendis sagacissimus JOCHIM, Medicinae Professor, et Chemicus experientissimus ZEISE, Philosophiae Doctor. Saepius equidem solus experimenta circa materiam propositam institui, quae autem ita mihi contigit detegere phaenomena, in conventu horum virorum doctissimorum repetivi.

In experimentis recensendis omnia praeteribo, quae ad rationem rei invenendam quidem conduxerunt, haec autem inventa rem amplius illustrare nequeunt; in eis igitur, quae rei rationem perspicue demonstrant, acquiescamus.

Apparatus galvanicus, quo usus sumus, constat viginti receptaculis cupreis rectangularibus, quorum et longitudo et altitudo duodecim aequaliter est pollicum, latitudo autem duos pollices et dimidium vix excedit. Quodvis receptaculum duabus laminis cupreis instructum est ita inclinatis, ut hae alicui cupreus, qui laminam zincam in aqua receptaculi proximi sustentat, portare possint. Aqua receptaculorum $\frac{1}{4}$ sui ponderis acidi sulphurici et pariter $\frac{1}{2}$ acidi nitrici continet. Pars cujusque laminae Zincae in aqua submersa Quadratum est, cujus latus circiter longitudinem 10 pollicum habet. Etiam apparatus minores adhiberi possunt, si modo filam metallicam candefacere valeant.



André-Marie Ampère (1775-1836)





AMÉDÉE DORE

NE ALPES LE 21 JUIN 1876
MORT A MONTPELLIER LE 10 JANV 1936
MEMBRE DE L'ACADÉMIE DES SCIENCES
DE FRANCE AUX SÉANCES DES 10 JANV 1936
ET 17 JANV 1936
DANS LES SÉANCES MATHÉMATIQUES MILITAIRES
MÉTAPHYSIQUES ET MORALES
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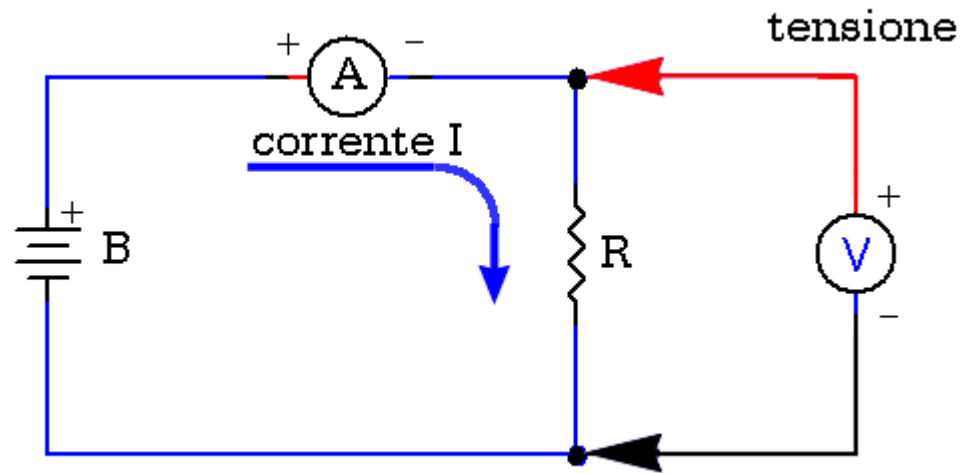
JEAN-MARIE DUVAL-CLAYTON
AMÉDÉE

NE ALPES LE 21 JUIN 1876
MORT A MONTPELLIER LE 10 JANV 1936
MEMBRE DE L'ACADÉMIE DES SCIENCES
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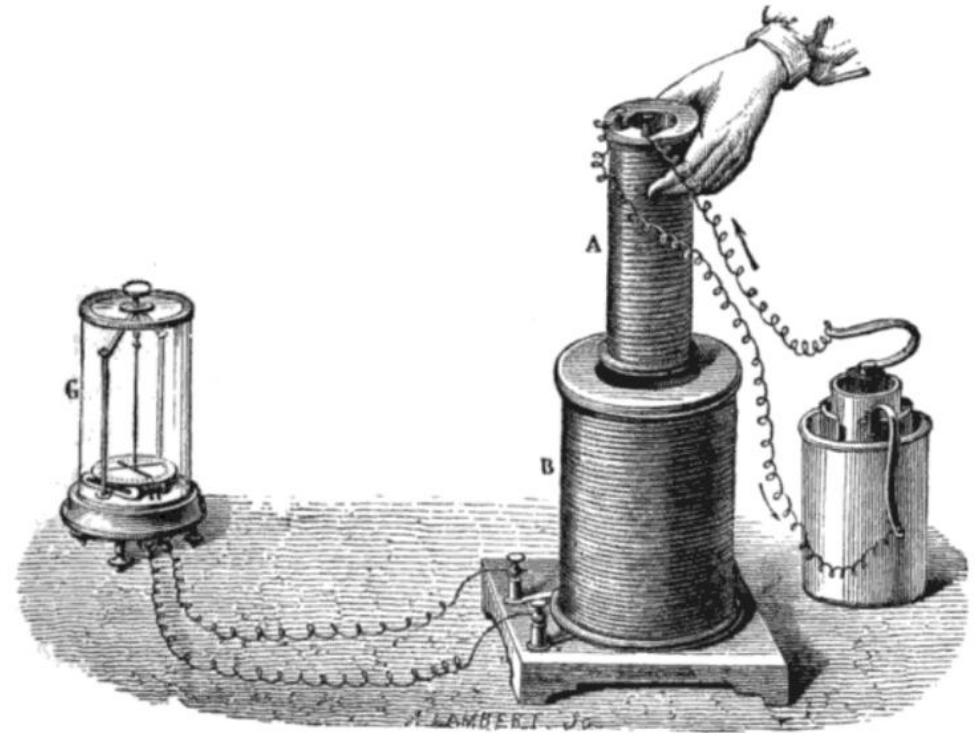
George Simon Alfred Ohm (1789-1854)



$$R = \frac{V}{I}$$

Resistenza **Vtaggio applicato** **Intensità di corrente**

$$R = \rho \cdot \frac{L}{A}$$

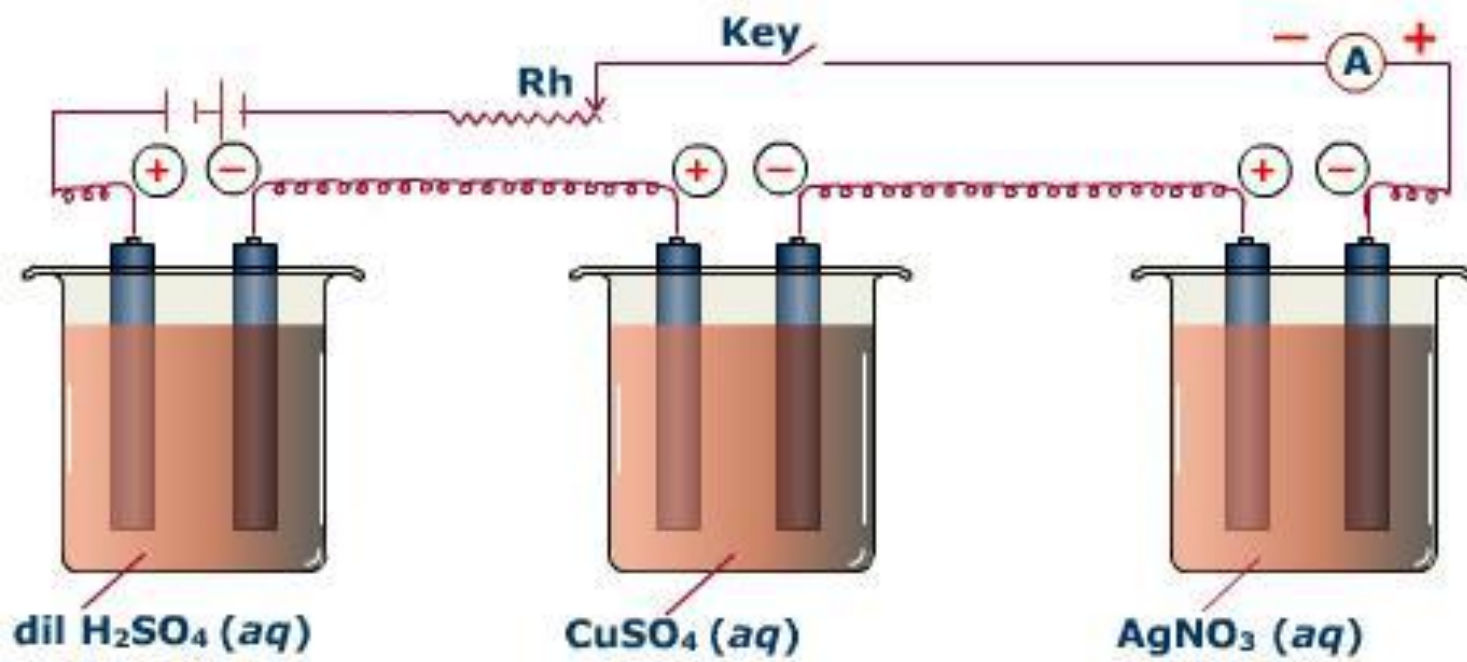


Michael Faraday, (1791 – 1867)



“Shock. The shock of this animal was very powerful when the hands were placed in a favorable position, i. e. one on the body near the head, and the other near the tail; the nearer the hands were together within certain limits the less powerful was the shock. The disc conductors conveyed the shock very well when the hands were wetted and applied in close contact with the cylindrical handles; but scarcely at all if the handles were held in the dry hands in an ordinary way.

***M. Faraday, "Notice of the character and direction of the electric force of the Gymnotus,"
Phil. Trans. Roy. Soc. 129 (1839), 1-12***





ALL THIS IS A DREAM. Still examine it by a few experiments. Nothing is too wonderful to be true, if it be consistent with the laws of nature; and in such things as these experiment is the best test of such consistency.

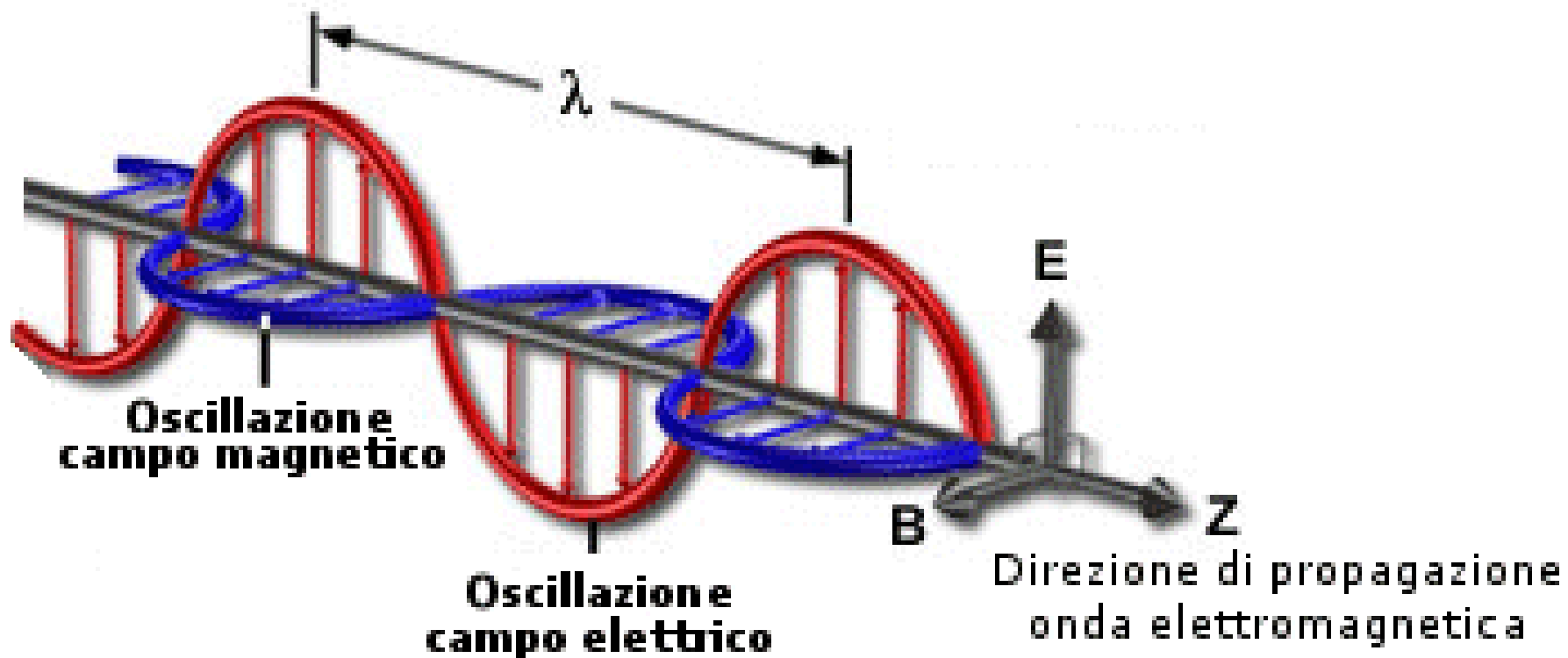
(Michael Faraday)

izquotes.com



$$\left\{ \begin{array}{l} \nabla \cdot \mathbf{E} = \frac{\rho_c}{\epsilon_0} \\ \nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t} \\ \nabla \cdot \mathbf{B} = 0 \\ \nabla \times \mathbf{B} = \mu_0 \mathbf{J} + \epsilon_0 \mu_0 \frac{\partial \mathbf{E}}{\partial t} \end{array} \right.$$

James Clerk Maxwell (1831-1879)



$$\nabla^2 \vec{E} - \mu\epsilon \frac{\partial^2 \vec{E}}{\partial t^2} = 0$$

$$v = \frac{1}{\sqrt{\epsilon\mu}} = \frac{1}{\sqrt{\epsilon_0 \cdot \mu_0}} \cdot \frac{1}{\sqrt{\epsilon_r \cdot \mu_r}}$$