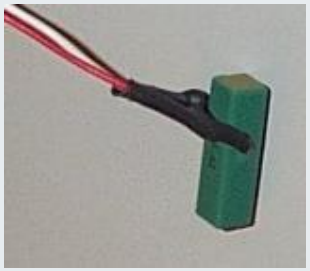

qbio
quantitative
biology

Electronics (passive components)

Capacitor/capacitance: electronic device used to store electrical energy in the form of charges

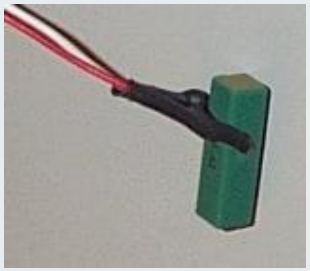
$$C = \frac{Q}{\Delta V} \; [F]$$



Electronics (passive components)

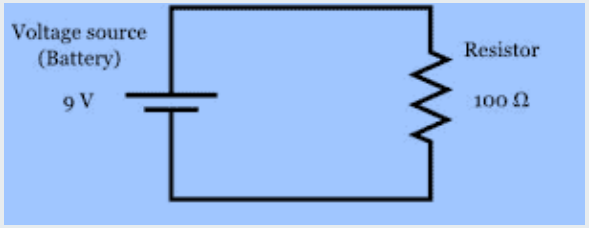
Capacitor/capacitance: electronic device used to store electrical energy in the form of charges

$$C = \frac{Q}{\Delta V}\ [F]$$



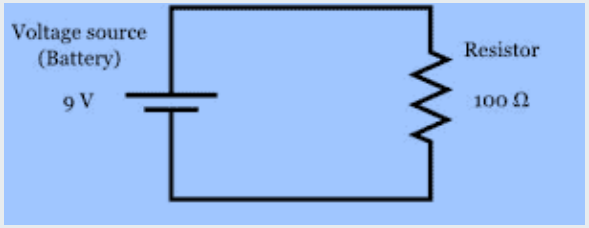
Resistor/resistance: electronic device used to resist or block the flow of current in a circuit

$$R = \frac{\Delta V}{i}\ [\Omega]$$

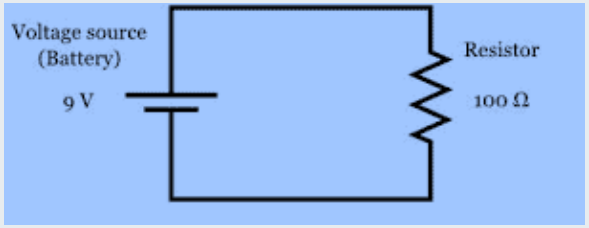


$$P = R\ i^2\ [W] \rightarrow P = 810\ mW\ (heat)$$

An electrical circuit…



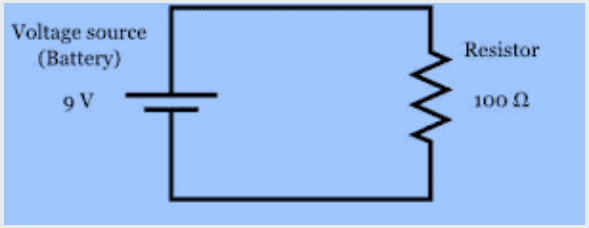
The Voltage source

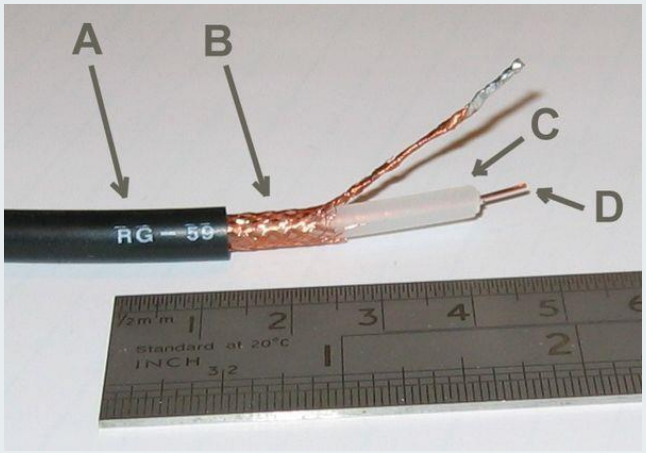


DC – direct current

AC – alternating current

Electric cables (coaxial cables)





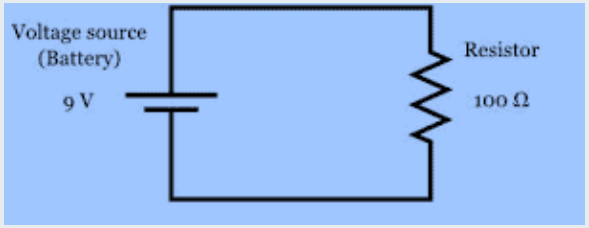
Carry high frequency signal
Low losses

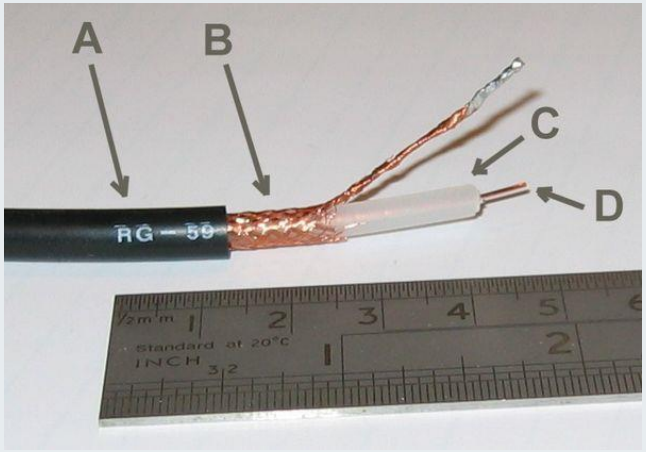
Velocity factor

$$v_F = \frac{1}{\sqrt{\varepsilon}} \approx 60 - 90\%$$

$$\text{Cable delay} = \frac{L \text{ X } v_{light}}{v_F}$$

Electric cables (coaxial cables)





Carry high frequency signal
Low losses

Velocity factor

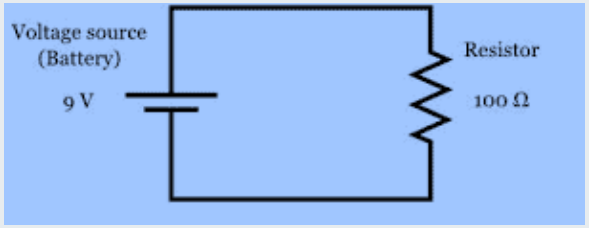
$$v_F = \frac{1}{\sqrt{\varepsilon}} \approx 60 - 90\%$$

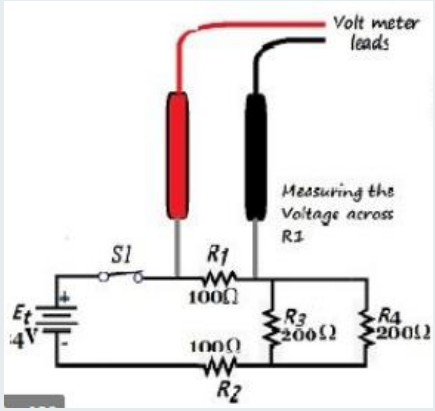
$$\text{Cable delay} = \frac{L \text{ X } v_{light}}{v_F}$$

BNC connector
(Bayonet Neill–Concelman connector)

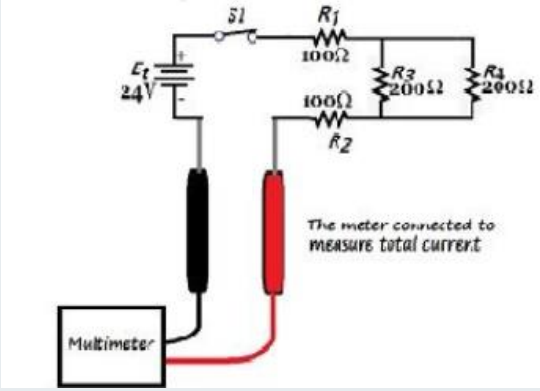
SMA connector (for RF applications)

Readout – Multimeters and oscilloscope



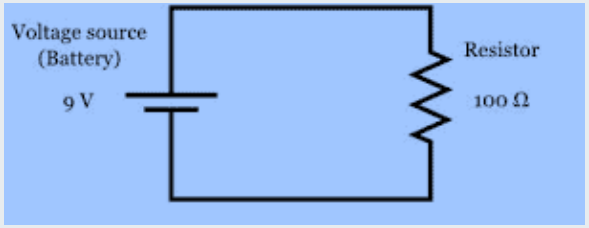


Voltage measurement

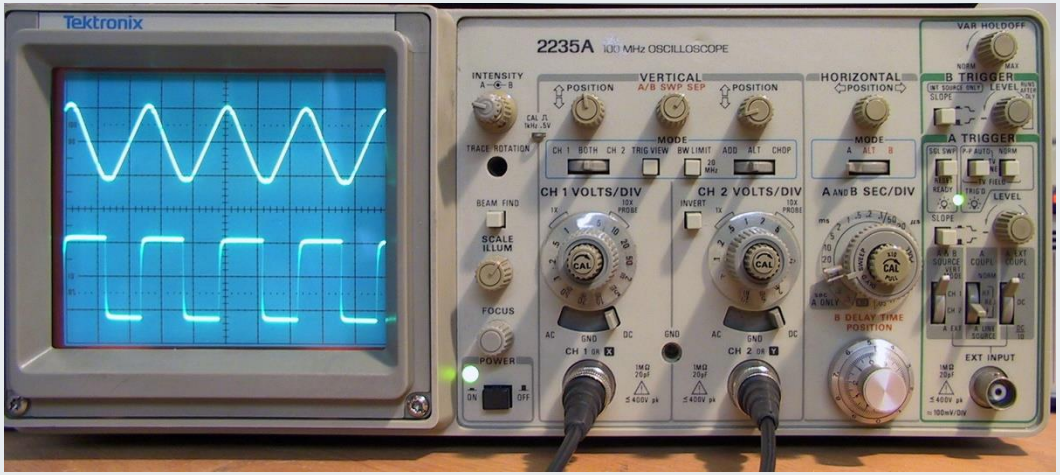


Current measurement

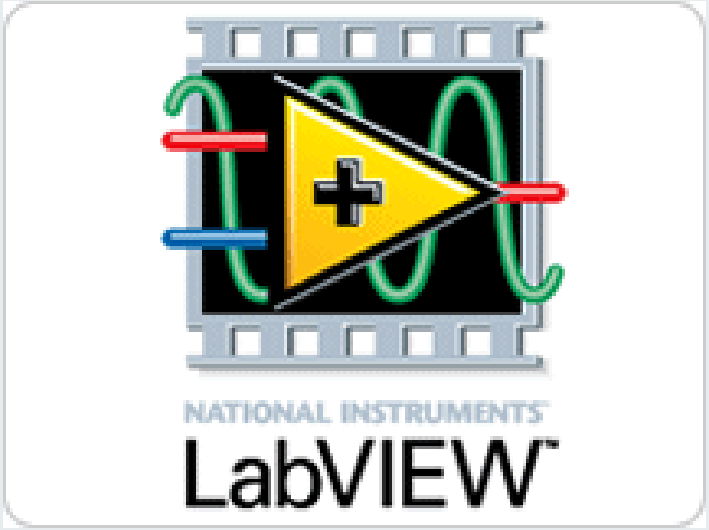
Readout – Multimeters and oscilloscope



Voltage measurement



An alternative: LABVIEW



Translational stages

Micrometric screws
(differential screws)

Translational stages

Micrometric screws
(differential screws)

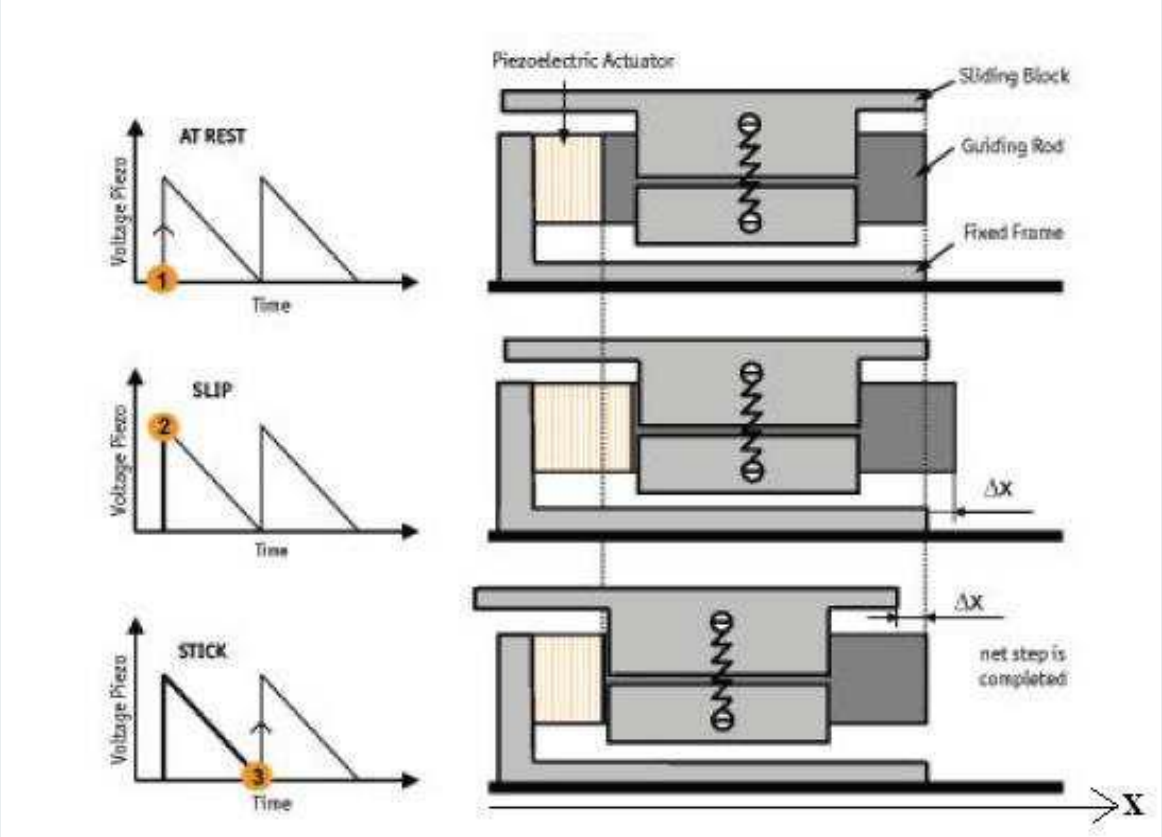
Piezoelectric elements

Problems:
Short displacement (<100 um)
Hystheresis
Creep

Translational stages

Micrometric screws
(differential screws)

Inertial Motors



Contacts

Luca Costa
luca.costa@cbs.cnrs.fr

Team Integrative Biophysics of Membranes (IBM)

https://integrativebiophysicsofmembranes.wordpress.com/