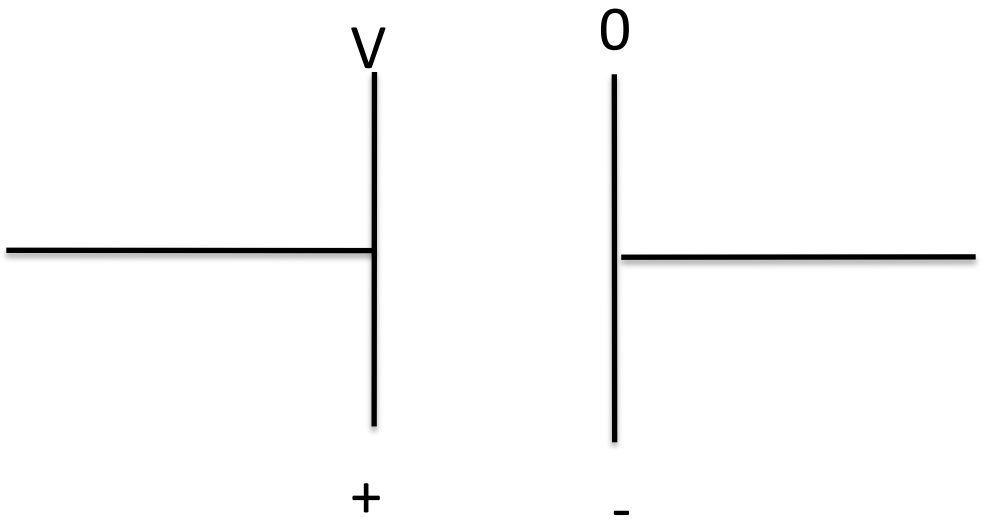
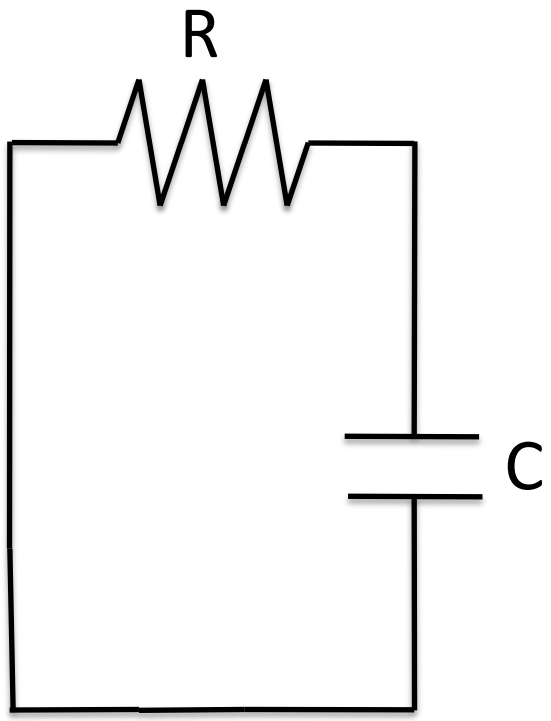
Capacitors



$$Q = CV$$

Go to board

RC Circuits



At t=0, capacitor has some voltage across it

$$Q = CV$$

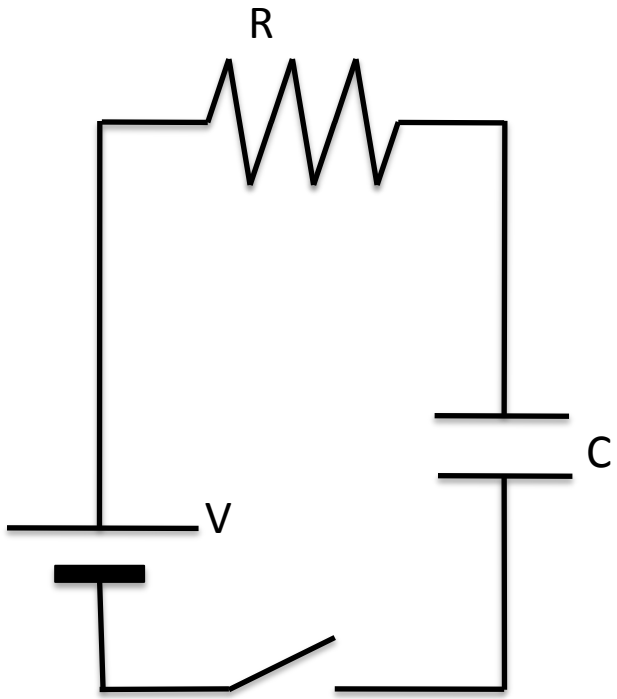
$$\frac{dQ}{dt} = I(t)$$

$$-C\frac{dV}{dt} = I(t)$$

$$-C\frac{dV}{dt} = \frac{V(t)}{R}$$

$$-\frac{dV}{dt} = \frac{V(t)}{RC}$$

$$-\frac{dV}{V} = \frac{dt}{RC}$$



Kirchhoff's law $$V - IR - \frac{q}{C} = 0$$

$$V - \frac{dq}{dt}R - \frac{q}{C} = 0$$

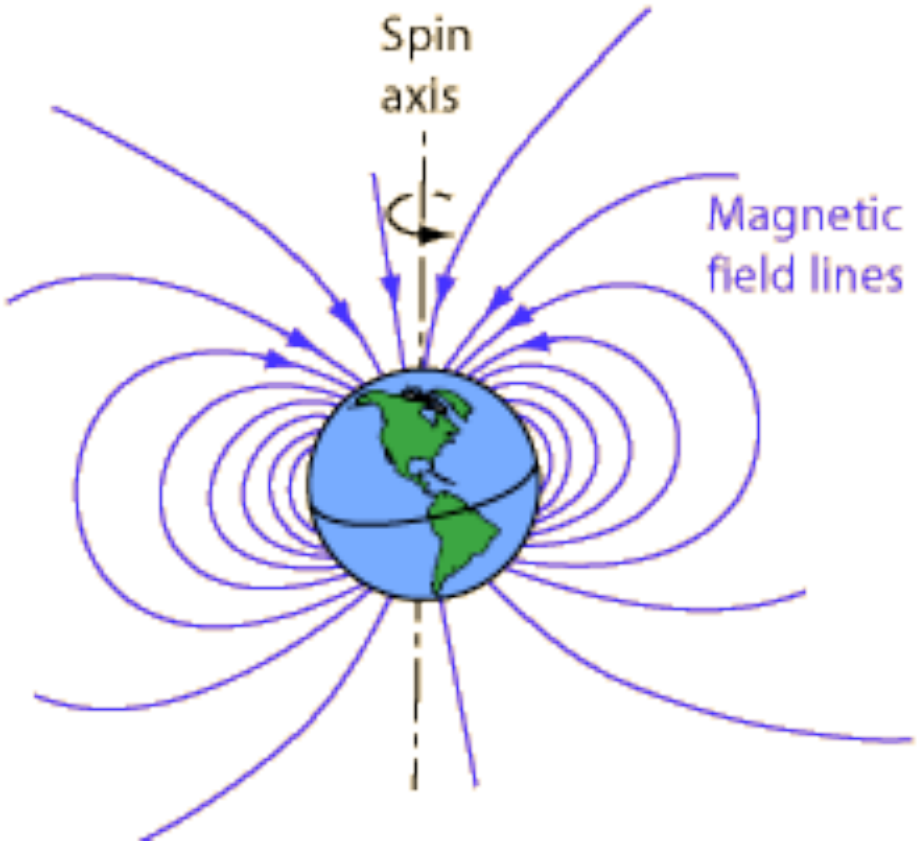
$$\frac{dq}{dt} = \frac{V}{R} - \frac{q}{RC}$$

$$\frac{dq}{dt} = \frac{CV - q}{RC}$$

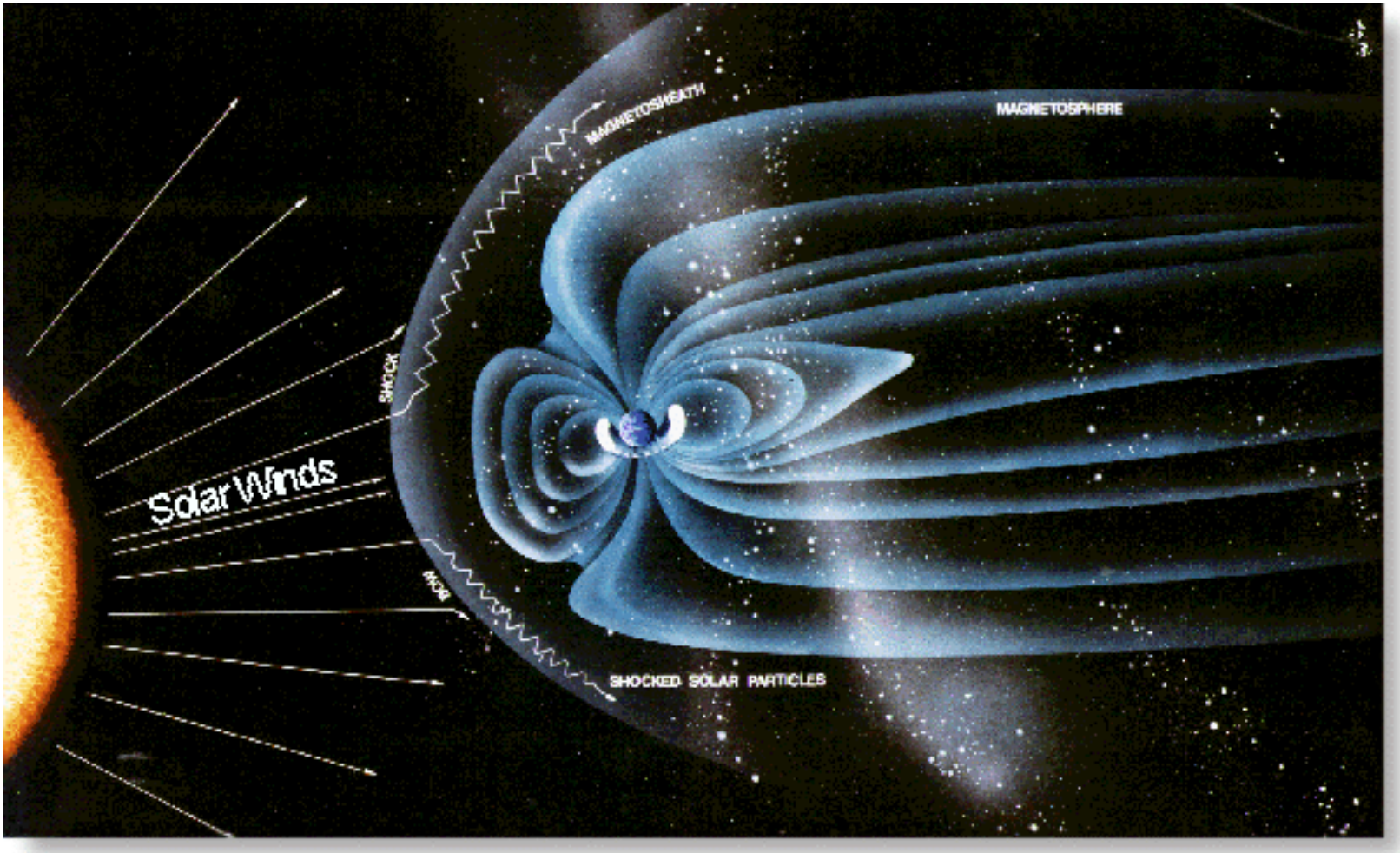
$$q(t) = CV(1 - e^{-\frac{t}{RC}})$$

$$I(t) = \frac{CV}{RC}e^{-\frac{t}{RC}} = \frac{V}{R}e^{-\frac{t}{RC}}$$

Magnetic Fields


Spin
axis
Magnetic
field lines

Forces on moving charge


MAGNETOSHEATH
MAGNETOSPHERE
SHOCK
Solar Winds
BOW
SHOCKED SOLAR PARTICLES