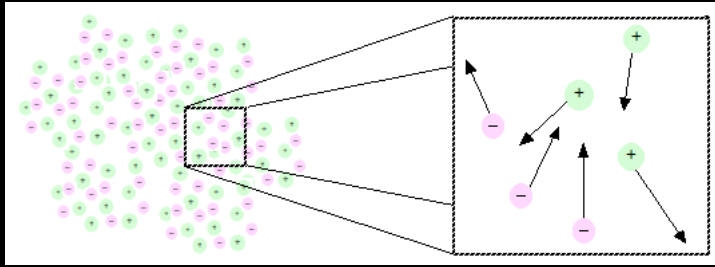


Basic properties of plasmas

1. Local charge neutrality

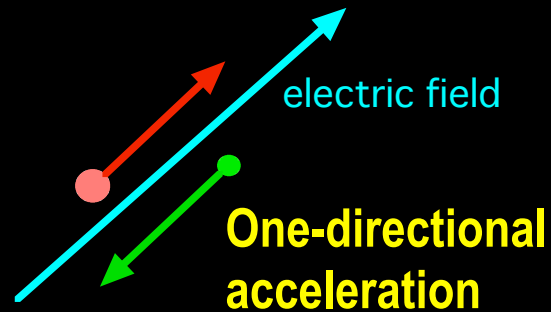


The numbers of positive charges and negative charges **are almost the same** in every local region.

2. Interaction with electric field (**Coulomb force: $F_C = q E$**)

Red... ion (+)

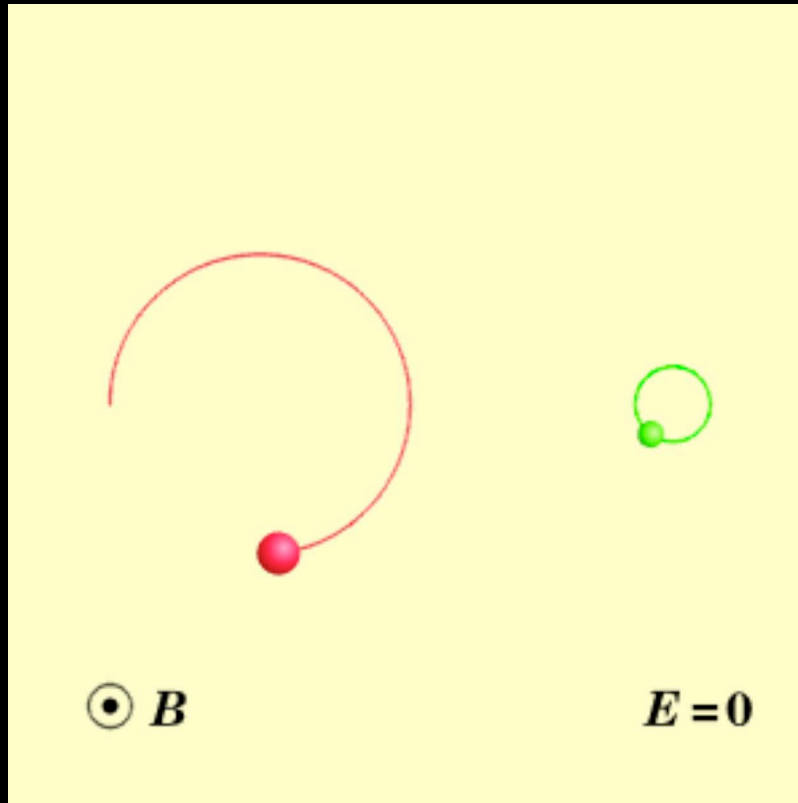
Green... electron (-)



Charged particles are accelerated along electric field.

$$\frac{d\mathbf{v}}{dt} = \frac{q}{m} \mathbf{E}$$

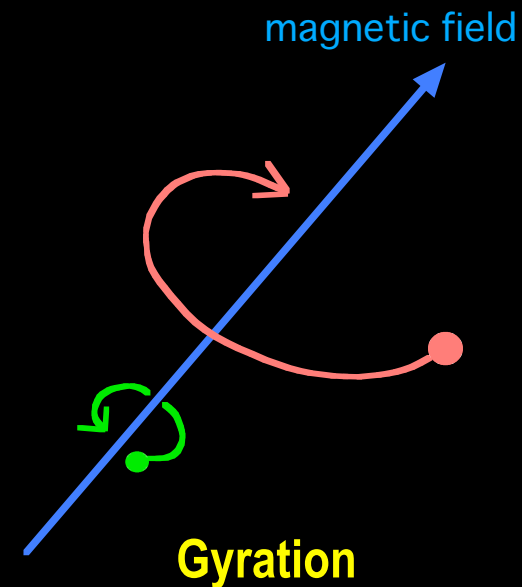
3. Interaction with magnetic field (**Lorentz force:** $F_L = q \mathbf{v} \times \mathbf{B}$)



B_{\perp} -plane

Red... ion (+)

Green... electron (−)



Charged particles gyrate around magnetic field.

$$\frac{d\mathbf{v}_{\perp}}{dt} = \frac{q}{m} \mathbf{v}_{\perp} \times \mathbf{B}$$