

G485: Fields, Particles and Frontiers of Physics

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1 Electric and Magnetic Fields

1.1 Electric Fields

Objects which have electric charge create a field around themselves called an electric field which can exert forces on other charged particles. The strength of an electric field is measured force per unit positive charge. Electric fields can be represented graphically by drawing lines showing the direction of the field at different points. Arrows always point from positive to negative. (N C^{-1}).

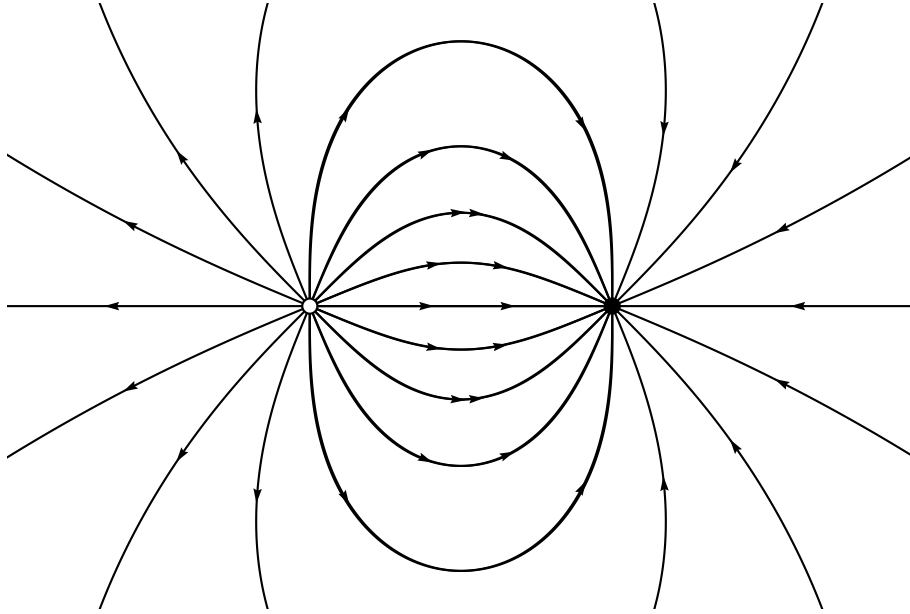


Figure 1: The electric field between a positive charge (left) and a negative charge (right)

The force on a charged particle due to an electric field is given by Coulomb's law:

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

i and therefore the electric field strength (force per unit charge) is given by:

$$E = \frac{Q}{4\pi\epsilon_0 r^2}$$

Between two parallel plates the electric field is uniform and given by $E = \frac{V}{d}$

Figure 2: The electric field between a positive charge (left) and a negative charge (right)