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The mass spectrometer experiment applies both the knowledge of electric and magnetic field to determine the mass of an atom. First, a gas of atoms is ionized by firing a beam of particles at the gas which either adds electrons to the atoms or removes electrons from the atoms depending on the type of particle beam used. Next, the ions are sent through a tube in which they are subjected to electric and magnetic fields. Both of these fields exert a force on the ions and the strengths of the two forces are proportional to the ion's charge. The electric force causes the ions to change speed, while the magnetic fields bend their path. Magnetic force is always perpendicular to velocity, so that it does no work on the charged particles. Here, the magnetic force supplies the Centripetal force;

$$F_c = \frac{mv^2}{r}$$

, noting that $\sin\theta = 1$, we see that

$F = qvB$. Because the magnetic force F supplies the Centripetal force, $qvB = \frac{mv^2}{r}$

$$r = mv/qB$$

By Newton's 2nd Law of Motion, $F = ma$ rearranged as $m = F/a$, dividing the total force acting on the ions by their resulting acceleration to determine the ion's mass.

2. An Electric field is a region of space around a charged particle or object in which an electric force would be exerted on another charged particle or object.

$$\vec{E} = \frac{\vec{F}}{q}.$$

The electric field is radially outward from a positive charge and radially inward a negative point charge.

A Magnetic field is a region of space that describes the magnetic influence on moving electric charges, electric currents and magnetized materials. A charge moving in a magnetic field experiences a force perpendicular to its own velocity and to the magnetic field.

Electric current is a stream of charged particles such as electrons or ions moving through an electrical conductor or sp[...] It is measured as the net rate of flow of electric char[...] past a region.

$$I = \frac{V}{R}, \quad I = \frac{Q}{t}.$$