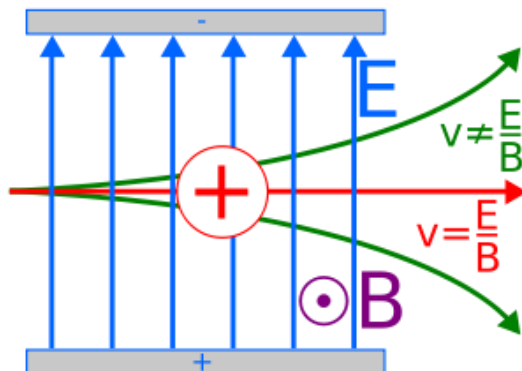


Answer on Question #45162-Physics-Electromagnetism

Explain the working of a velocity selector.

Answer



In the diagram the magnetic field points out of the page and this deflects the moving positive charges (q coulomb moving from left to right) in the downwards direction.

On the other hand, the electric field is pointing upwards and the lower plate is positive. This deflects the positive charges upwards.

If you balance the two forces the beam will be undeflected.

The electric force is $F_e = Eq$. The magnetic force is $F_b = Bqv$ where B is the magnetic flux density and v is the speed of the charges.

Equating the two forces will give you the expression shown.

It means that only charges with a velocity v will be undeflected. The selector has a small opening at the end on the right that allows only those undeflected charges through. This means those getting through all have the same velocity and by varying E or B (usually E) you can select what velocity that is.