

Purpose 1. To study the effect of electric and magnetic fields on charged particles and to measure the charge to mass ratio of an electron. (1/2)  $m v^2 = e V$  (3) Combining equations (2) and (3) gives  $e / m = ( 2 V / B^2 r^2)$  (4) Thus, when the accelerating voltage  $V$ , the magnetic field  $B$ , and the radius of the circular path  $r$  are known, the value of the  $e/m$  ratio can be computed and is given in units of C/kg by equation (4) if  $V$  is in volts,  $B$  in Teslas and  $r$  in meters. Theory When an electron moves in a magnetic field  $B$  whose direction is perpendicular to the velocity  $v$  of the particle, it is acted on by a force  $F$  perpendicular to  $B$  and  $v$  with a magnitude given by: |The force  $F$  is equal to the mass of the particle times the centripetal acceleration  $e v B = m v^2 / r$  (2) where  $r$  is the radius of the circle and  $m$  is the mass of the electron. More practice in error analysis. 2.  $F =$