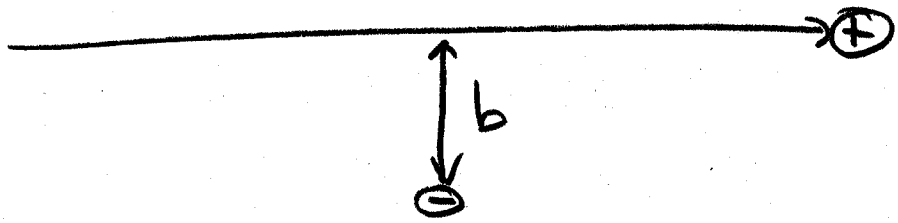
# Energy transfer by beam






Energy imparted to electron $= \left(\frac{1}{4\pi\varepsilon_0}\right)^2 \frac{z Z^2 e^4}{m v^2} \left(\frac{1}{b^2}\right)$

$$E = \frac{A}{b^2}$$

Maximum impact parameter for ionization is:

$$b_m = \sqrt{\frac{A}{E_{ION}}}$$

Recoil electron energy spectrum

If $b_2 < b_1 < b_m$

Electron gains energy $E$ at $b_1 = \sqrt{\frac{A}{E_1}}$

$E + dE$ at $b_2 = \sqrt{\frac{A}{E + dE}}$

Fraction of electrons between $E$ + $E + dE$

$$F(E)\,dE = \frac{\pi\left(b_1^2 - b_2^2\right)}{\pi b_m^2} = \frac{A}{b_m^2}\,\frac{dE}{E^2}$$