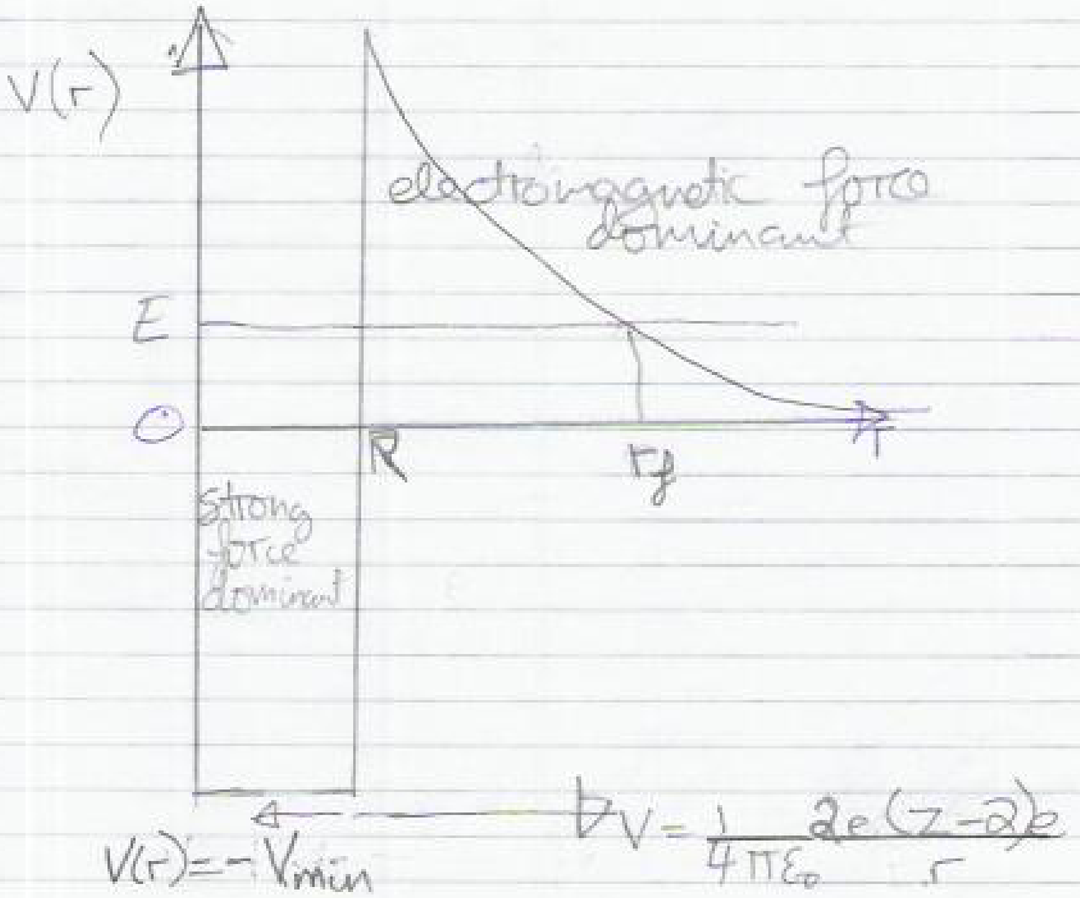

This could have been expressed in rather fewer words

We suppose that inside the nucleus the α-particle has kinetic energy E+V. The problem becomes one of barrier penetration, a problem which occurs like this. Each particle is described by a wavefunction or probability amplitude, ψ. The magnitude of ψ^2, $|\psi|^2$ represents the probability density of the particle (how likely it is to be in a particular region of space). It turns out that if we trap a particle in a potential as above, with insufficient kinetic energy to escape the well, then if the energy of the particle inside the well is greater than the potential energy outside, there is a non zero possibility of finding the particle outside the well. We can estimate this probability by solving FT. Eq 9.21, which we write here as

$$\frac{|\psi(r_f)|^2}{|\psi(R)|^2} = T \exp\left(-2\int_R^{r_f} \frac{\sqrt{2m(V(r)-E)}}{\hbar}\, dr\right)$$