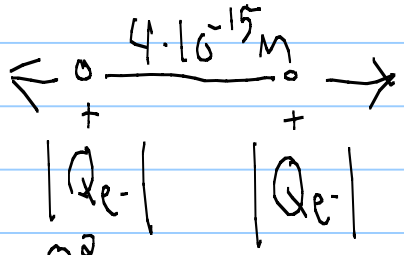
Homework 3 for Physics 221

Note Title 9/4/2008

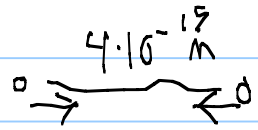
(1)



$$F_E = \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{r^2} = 8.99\cdot10^9 \frac{N\,m^2}{C^2}\cdot\frac{(1.6\cdot10^{-19})^2\,C^2}{(4\cdot10^{-15})^2\,m^2}$$

$$\approx 14\,N$$

(2)



$$F_G = G\frac{m_1 m_2}{r^2} = 6.67\cdot10^{-11}\frac{N\,m^2}{kg^2}\cdot\frac{(1.673\cdot10^{-27})^2\,kg^2}{(4\cdot10^{-15})^2\,m^2}$$

$$\approx 1.2\cdot10^{-35}\,N$$

Many people said that the results showed that gravity was far stronger than the electric force. Yes, this is basically true, but remember that the electric force is 0 for electrically neutral objects and that means pretty much all macroscopic objects.

A few people pointed out that, since the nucleus doesn't fly apart immediately, there must be some other force at work holding it together. These people might be on to something!