

**Assignment 8**  
**PHGN361**

**Homework due April 5**

1. A linear material of density  $\rho$  *atoms/m*<sup>3</sup> is exposed to an electric field in a parallel plate capacitor. Derive an expression for  $\chi_e$  in terms of the polarizability  $\alpha$  of an atom. The capacitance is measure to be  $C_0$ . Derive a relationship for  $\alpha$  in terms of the measured capacitance (and its parameters). You have then succeeded in determining an atomic property from a macroscopic measurement of capacitance!
2. Can the electric field at the edge of a capacitor with rectangular plates end abruptly (as you move out of the capacitor)? Explain your reasoning.
3. Problem 1.56
4. Read section 5.2, 5.3, and 5.4.1.
5. Problem 5.10, 5.18, 5.25, 5.27