

Phys 308 Homework and “Dailies” schedule

Last update: April 26, 2016

⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡

Daily #16: Due Tuesday, April 5: Find the drift velocity in a wire of cross-sectional area 1mm^2 carrying 1A of current and having a Hall coefficient ($R_H=1/nq$) of $10^{-10}\text{m}^3/\text{C}$.

Compare to $v_{rms} = 10^5\text{m/s}$.

Daily #17: Due Thursday, April 7: Most metals have Hall coefficients very close to $10^{-10}\text{m}^3/\text{C}$. If the atoms in a typical metal were arranged in simple cubic order, determine the distance between the atoms, in Angstroms.

HW #8: Due Friday, April 8: Problems 7:1, Purcell handout, 6:71 (“Rowland”).

⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡

EXAM #3: No new daily due Tuesday, April 12.

HW #9: Due Friday, April 15 Problems 7: 5, Purcell handout, 6:73 (“Hall”).

⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡

Daily #19: Due Tuesday, April 19: Show that the inductance of a solenoid of radius R is $L = \mu_0 n^2 \pi R^2$.

Daily #20: Due Thursday, April 21: Show that the divergence of the curl of a vector function is zero for “normal” functions. Define “normal”.

HW #10: Due Friday, April 29:

1. Derive the units of J_m and q_m from Maxwell's Equations in the presence of magnetic charges.
2. (a) If magnetic charges existed but electric charges did not, determine the source equations for static electric and magnetic fields. (Check out Prob. 7.60B.)
2. (b) Consider the analogues (in this hypothetical Universe) of the Lorentz force Right-Hand Rules: are they Right-Hand Rules, and what do they describe? (The force on what?) (Use the results of Prob. 7.64B.)

Plus, Fresnel handout: Questions 3, 4.

⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡

Daily #21: Due Tuesday, April 26: Verify the identity for the curl of the curl of a vector function. Do this by writing it all out in component form.

Daily #22: Due Thursday, April 28: Show that $\tan \theta = n$ for Brewster's angle. (Start with $n \cos \alpha - \cos \beta = 0$, eliminate all cosines using Pythagoras, β using Snell, and solve for $\sin \alpha$ as a function of n only. Use Pythagoras to calculate $\cos \alpha$, then take the ratio to get the tangent.)

⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡

Daily #24: Due Thursday, May 5: Sketch the electric field near a particle with $\gamma = 100$. What angle does the electric field line [EFL] at 45° transform to? What is the particle's speed?

⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡

Bonus Daily #25: Due Tuesday, May 10: Given $\beta_0'^2 = \frac{\beta_0 - \beta}{1 - \beta\beta_0}$, show that

$$\sqrt{1 - \beta_0'^2} = \frac{\sqrt{1 - \beta^2} \sqrt{1 - \beta_0^2}}{1 - \beta\beta_0}, \gamma_0' = \gamma_0 (1 - \beta\beta_0).$$

⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡⚡

BONUS HW #11: Due Tuesday, May 10: Purcell, Ch. 5: 1, 4, 13.