PHYS 261H — Fall 2013

Extra-Credit Problem

Due Nov 13

One of your colleagues noticed that my derivation in class (which is essentially the same as the textbook's) of the relation between an electron's drift velocity and its mean collision time,

$$\vec{v}_d = -\frac{e\tau}{m_e}\vec{E},\tag{1}$$

was not rigorous. A discussion of the subtleties involved can be found in Ref. [1]. Go over the argument and fill in the details, in particular the calculation of what in this reference is called Δt. (You can find some guidance in reference 3 of Ref. [1], but the material is more advanced than our course, hence the optional character of this homework.)

References

[1] D.E. Tilley, *Am. J. Phys.* **44** (1976) 597.