

NORTHERN ILLINOIS UNIVERSITY

PHYSICS DEPARTMENT

Physics 374 – Junior Physics Lab

Spring 2021

Hall Effect Lab

Online Simulation lab due: Feb. 16 (before class starts)

Raw Data analysis due: Feb. 23

Oral defense of lab due: Sometime between Feb. 24<sup>th</sup> to March 1<sup>st</sup> (to be scheduled)

**Simulation**

Watch the YouTube video: <https://www.youtube.com/watch?v=TvL28UeVXuI>.

Then go to: <https://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=4> to perform the simulation (you will need to create an account). Do the lab for a germanium crystal and choose one other material. Make plots of (you may use Excel or any other useful program available):

- (1) Magnetic field verses current (fit the plot with a straight line and find the fitting parameters of slope and intercept).
- (2) Hall voltage verses current.
- (3) Hall voltage verses magnetic field.
- (4) Find the Hall coefficient and the carrier concentration (all calculated values should have an uncertainty assigned to it: *for example:*  $R_H = 0.78 \pm 0.05$ ).

**Raw Data from 4 Student Labs**

On Blackboard, I have put raw data from 4 student labs done in the past (Groups A, B, C, and D). Analyze that data to get the Hall coefficient, carrier concentration, band gap energy, and any other useful physical parameters. Plots can use Excel or any other program desired. Do a thorough data reduction and error analysis.