PHY 335, Unit 3 Diode circuits and DC Power

Mini Lecture topics:

- **Metals and semiconductors**

- **p-n junctions**

- **DC power supply, ripple**

1. Measure the diode I-V from –15 V to about +0.6 V with the two DMMs (apply forward voltage with caution).

2. Display I-V on the scope. Use the same circuit as in unit 1 with a known resistance $R_{shunt} = 100\Omega$ and the +6V AC output of your power supply.

3. Design, build and test a diode-based asymmetrical clamp (also called "clipping circuit") to limit the upper value of the input voltage to + 5.6 V. Use the the signal generator (SG) as the input signal. You may use the power supplt for helper voltages. [Typically, one clamps all input voltages in a circuit for protection against overvoltage.] How would you modify this circuit to also clamp the lower value of the input at -5 V? Draw this modified circuit in your lab report (assume you have an additional power supply of any voltage you choose) – you don't need to build it.

4. Design and build a full-wave rectifier to deliver >12 V DC with less than 0.5 V ripple at 1mA current draw from a load, using one of the 12 V AC outputs of the power supply (and the 0V output). Choose the load resistor to have >1mA average current, and a capacitor large enough to limit the ripple to <0.5V. Test this rectifier with the scope.

5. (Bonus) Build a Villard cascade voltage multiplier. (Do not exceed 60V!)