

**PHY 752 Solid State Physics  
11-11:50 AM MWF Olin 107**

**Plan for Lecture 10:**

**Reading: Chapter 10.3-10.4 in MPM; Survey of some electronic structures**

- 1. Metals**
- 2. Insulators**
- 3. Semiconductors and semimetals**

2/06/2015

PHY 752 Spring 2015 -- Lecture 10

1

---

---

---

---

---

---

---

---

---

---

---

---

**Course schedule for Spring 2015**

(Preliminary schedule -- subject to frequent adjustment.)

Lecture date	MPM Reading	Topic	Assign.	Due date
1 Mon: 01/12/2015	Chap. 1 & 2	Crystal structures	#1	01/23/2015
2 Wed: 01/14/2015	Chap. 1 & 2	Some group theory	#2	01/23/2015
Fri: 01/16/2015	No class	NAWH out of town		
Mon: 01/19/2015	No class	MLK Holiday		
3 Wed: 01/21/2015	Chap. 1 & 2	Some group theory	#3	01/23/2015
4 Fri: 01/23/2015	Chap. 1 & 2	Some more group theory	#4	01/26/2015
5 Mon: 01/26/2015	Chap. 7.3	Some more group theory	#5	01/28/2015
6 Wed: 01/28/2015	Chap. 6	Electronic structure; Free electron gas	#6	01/30/2015
7 Fri: 01/30/2015	Chap. 7	Electronic structure; Model potentials	#7	02/02/2015
8 Mon: 02/02/2015	Chap. 8	Electronic structure; LCAO	#8	02/04/2015
9 Wed: 02/04/2015	Chap. 8	Electronic structure; LCAO and tight binding	#9	02/06/2015
10 Fri: 02/06/2015	Chap. 8	Band structure examples	#10	02/09/2015

2/06/2015

PHY 752 Spring 2015 -- Lecture 10

2

---

---

---

---

---

---

---

---

---

---

---

---

What can you learn from a electronic band diagram?

- Metal or insulator?
- Band width
- Optical properties
- Transport properties

2/06/2015

PHY 752 Spring 2015 -- Lecture 10

3

---

---

---

---

---

---

---

---

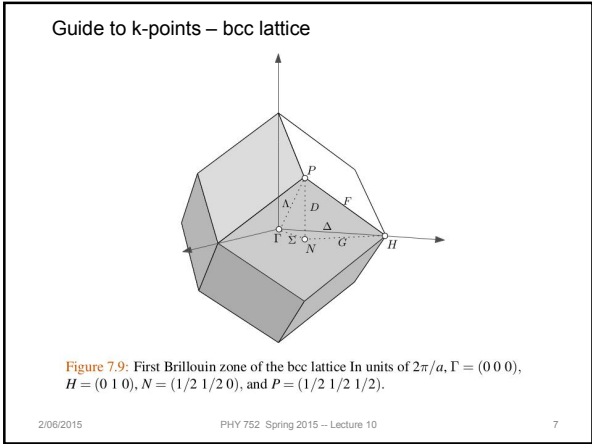
---

---

---

---






---

---

---

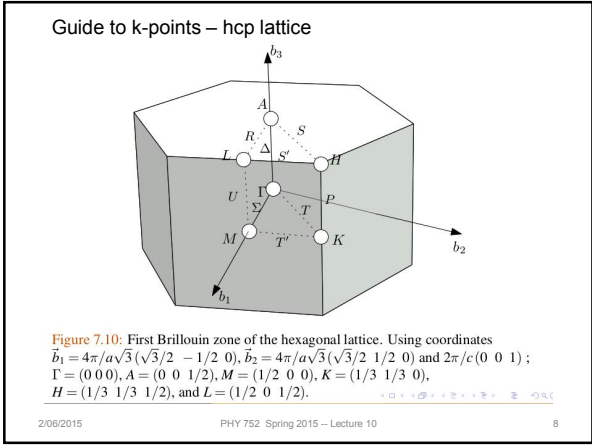
---

---

---

---

---




---

---

---

---

---

---

---

---

Comments on energy scale

- In principle, the zero of energy is **TOTALLY arbitrary**
- It is common to set the zero of energy at the top of the valence band for insulators and at the Fermi level for conductors

2/06/2015 PHY 752 Spring 2015 – Lecture 10 9

---

---

---

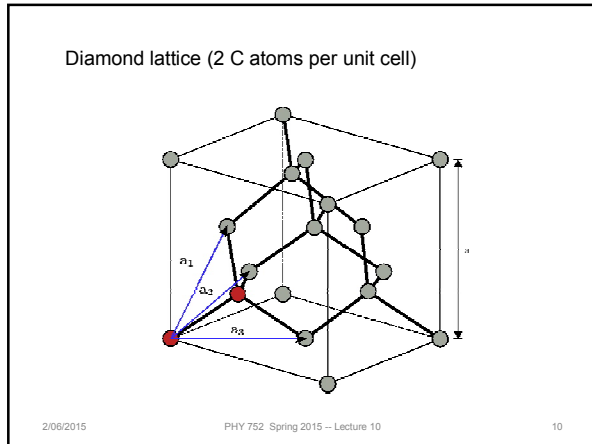
---

---

---

---

---




---

---

---

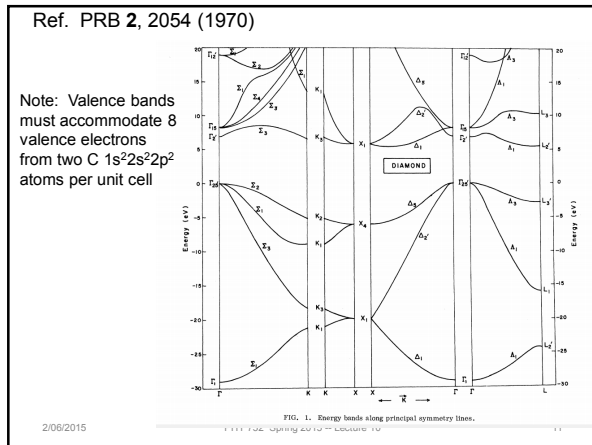
---

---

---

---

---




---

---

---

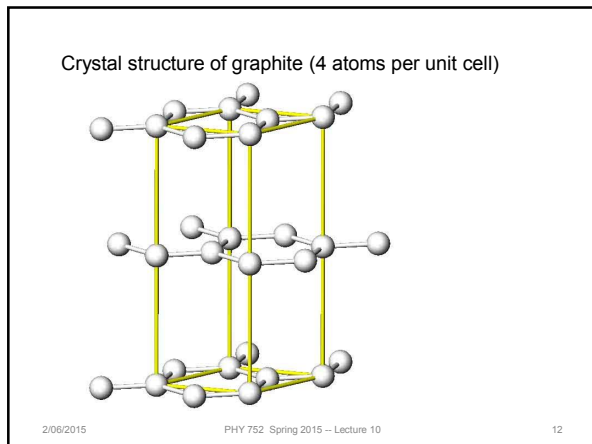
---

---

---

---

---




---

---

---

---

---

---

---

---

