

Physics 489 S 04 Lecture 15
Examples of Bands in Crystals

Taken from Selected Sources: Seitz, Ashcroft & Mermin, Kittel, Slater, Cohen and Chelikowsky, recent articles on La_2CuO_4

1. Bringing atoms together to form bands
Band widths increase as distances decrease
Counting of bands
2. Nearly Free Electron Examples: Na, Al
Semiconductors: Si, Ge, GaAs, ZnSe
Counting of electrons
3. More tightly bound electrons
Ionic solids: NaCl
Noble Metals, Transition metals- d electron bands tend to be narrow
4. Cu-O bands in superconductors like La_2CuO_4
Counting electrons
Simple band near Fermi Energy
5. Experimental methods
Photoemission developed into a much higher resolution tool since the discovery of HiTc materials
Mapping bands using measured energies and momenta
Optical measurements
6. Comments on present status of theory to PREDICT bands
Very difficult to take into account many-body effects accurately
Continued in next lectures