# University of Virginia

# Department of Physics

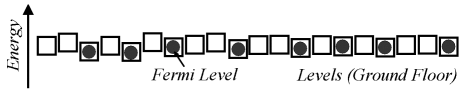
Physics 606: How Things Work II

Lecture #12 Slides:

## Xerographic Copiers II

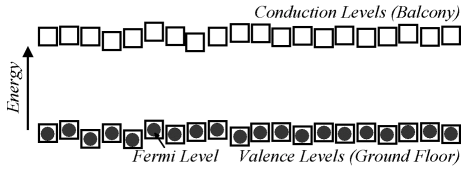
## Metals

- The Fermi level has empty levels just above it
- Like patrons in a partly fill theatre, electrons can move in response to electric fields



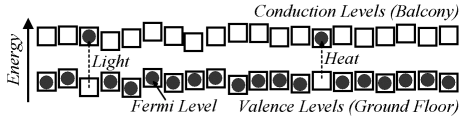

## Insulators

- The Fermi level has no empty levels nearby
- Like patrons in a full theatre, electrons can't move in response to forces




## Semiconductors

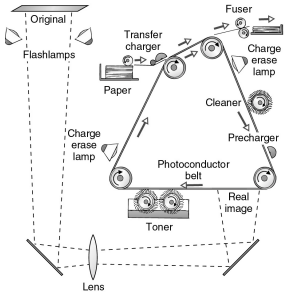
- Semiconductors are "poor insulators"
- Valence & conduction bands have narrow gap
- Like patrons in a theatre with a low balcony, electrons can hop into the balcony and move




## Photoconductors

- In the dark, a semiconductor is insulating
  - When polarized, it has an electric field in it
- In the light, a semiconductor may conduct
  - Will conduct if photon energy can bridge gap
  - Blue photons have more energy than red photons
  - If conducting, electric field makes charges move
  - In light, a "photoconductor" will depolarize

## Copier Structure




## Xerographic Process