

Announcements

- ▶ MCAT physics session tonight 7-8 pm, here in Olin 268.
- ▶ Hand-ins due after spring break on **Tuesday**, March 17 at 4:30 pm.
- ▶ Our next exam is Thursday, March 19 (the week we are back from break). You will be allowed to bring a new 3" × 5" index card with you.
- ▶ If you are observing Ramadan, please send me an email so that we can make appropriate arrangements for the exam.
- ▶ Spring Break should be a break. Take time to rest and recover to come back refreshed!

Applications of Quantum Mechanics (partial list)

- ▶ Chemistry: binding energies, orbitals.
- ▶ Modern electronics: computers (semiconductor transistors), cameras (electro-optical circuits), fiber optics communications, etc.
- ▶ Electron microscopy
- ▶ Spectroscopy (identifying molecular compositions). Used extensively in biology, chemistry, geology, astronomy.
- ▶ Medicine: radioactivity and radiation damage, MRI imaging, PET scans, CAT scans, etc.
- ▶ Radioactive dating in geology
- ▶ Modern technology: e.g., lasers, superconductors
- ▶ Future technological breakthroughs. E.g., quantum computers or nanoscale “robots” that could destroy tumors.

Lecture 13 — Concept Test 1

I have a green laser with wavelength 532 nm and a red laser with wavelength 633 nm. Both lasers emit the same power (3 mW) of light. Which laser emits a greater number of photons per unit time?

1. the green laser
2. the red laser
3. both emit the same number
4. not enough information

Lecture 13 — Concept Test 2

For a particular cavity, there are 4400 photons in the $j = 1$ mode. How many photons are in the $j = 100$ mode?

1. 1

3. 440 000

5. 4300

2. 100

4. 4400

6. 44

Lecture 13 — Concept Test 3

Photons with energy 3 eV hit a metal surface with a binding energy of 5 eV. What is the maximum energy of electrons ejected from the surface by this process?

1. 2 eV

2. 3 eV

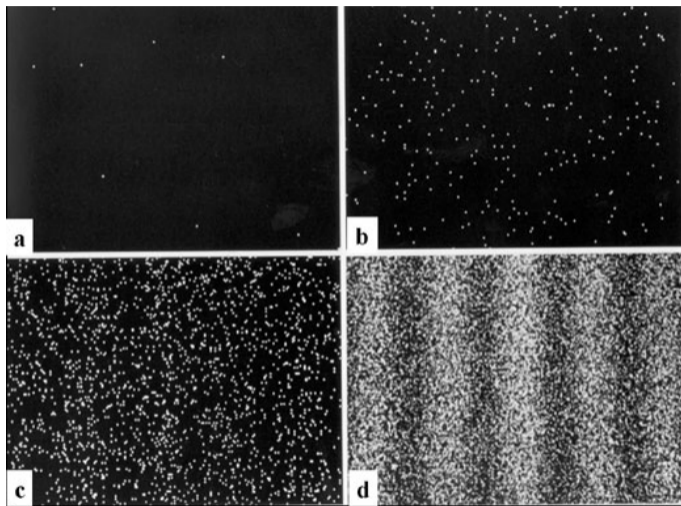
3. 5 eV

4. 8 eV

5. 15 eV

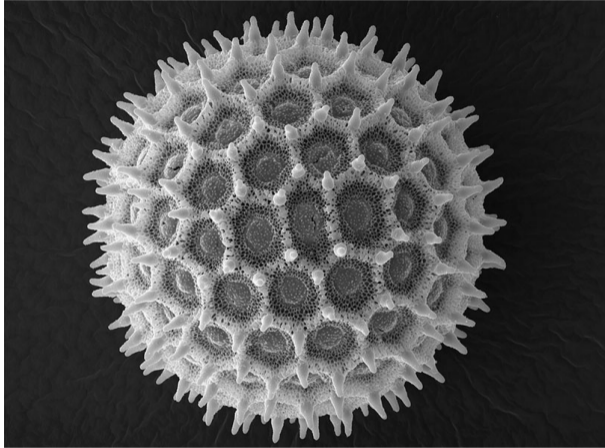
6. There aren't any electrons ejected.

Electron Double Slit Experiment



<https://www.hitachi.com/rd/research/materials/quantum/doubleslit/index.html>

Electron Microscope Image (Morning Glory Pollen)



<https://www.dartmouth.edu/emlab/gallery/index.php>