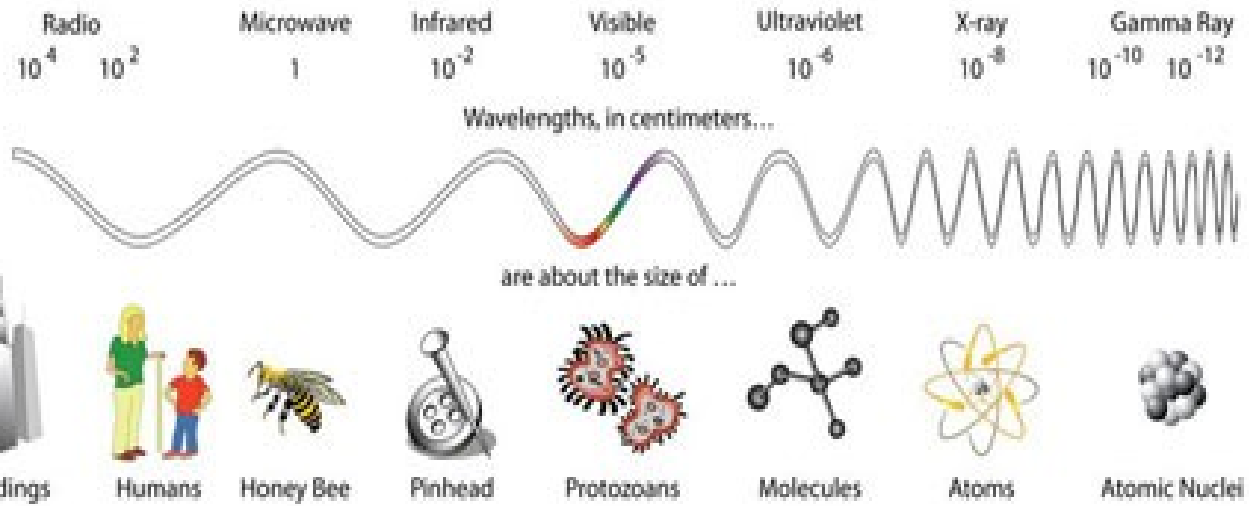


Forms of Light



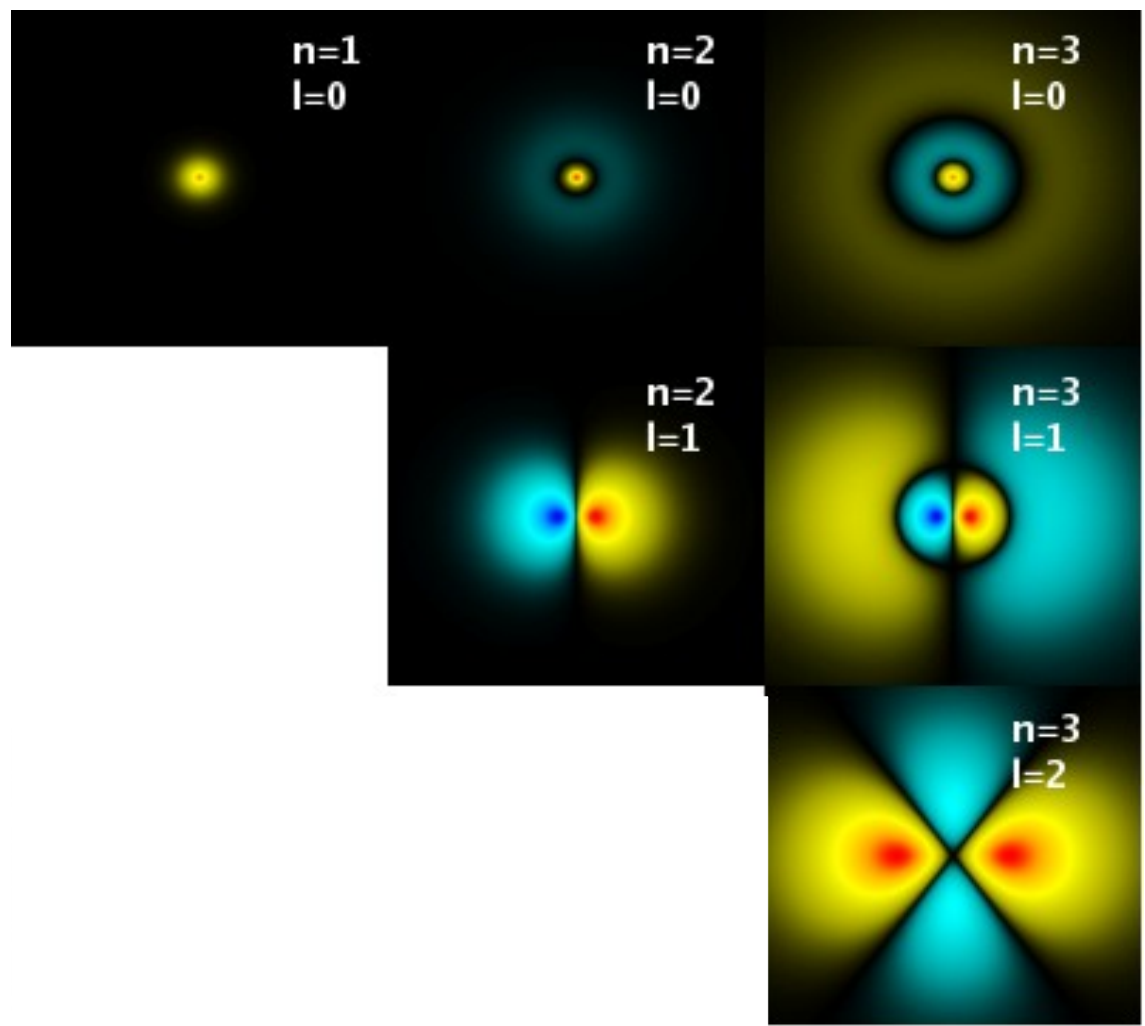
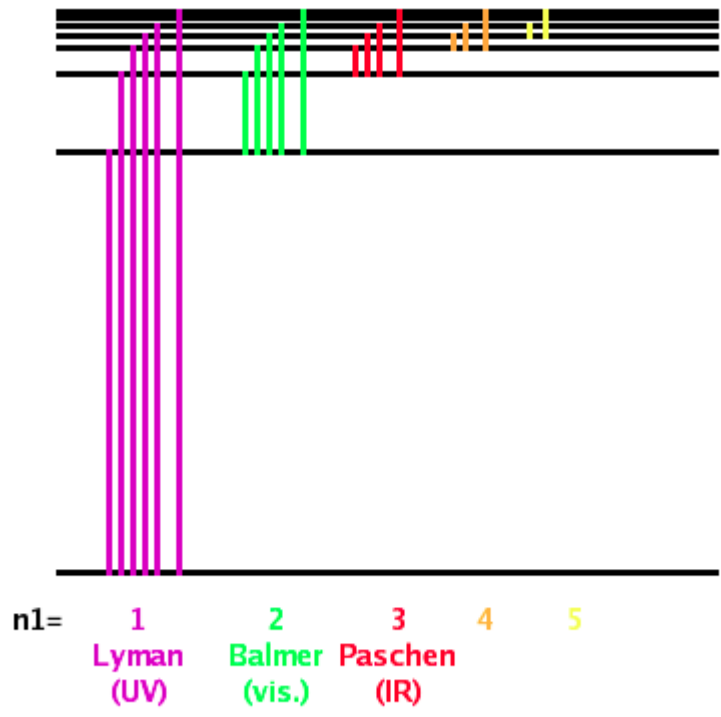
PHYSICS CATS

Luce e livelli energetici negli atomi.

MODEL ENERGY LEVELS IN ATOMS

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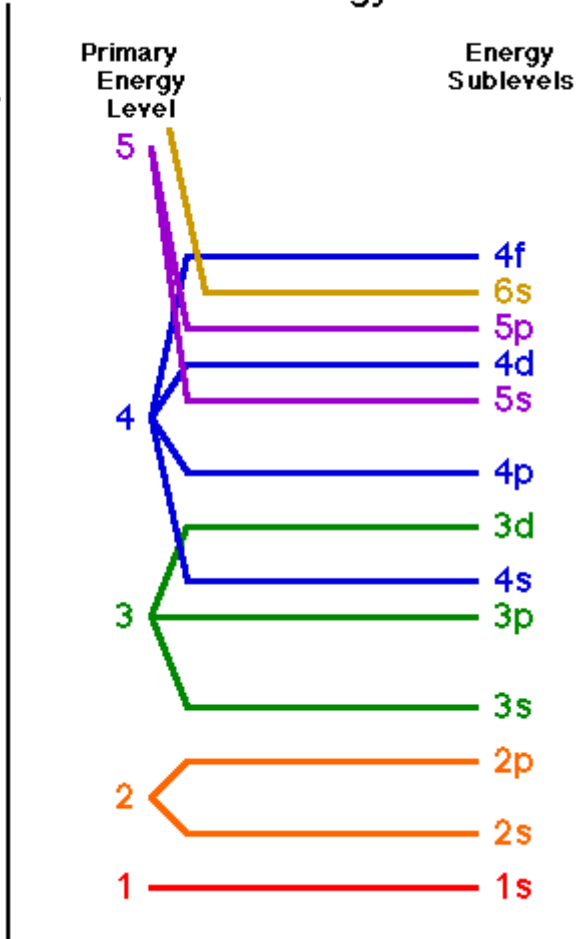
$$1 \text{ eV} = 1.602 \cdot 10^{-19} \text{ J}$$

$$E_n = \frac{-13.6 \text{ eV}}{n^2}$$

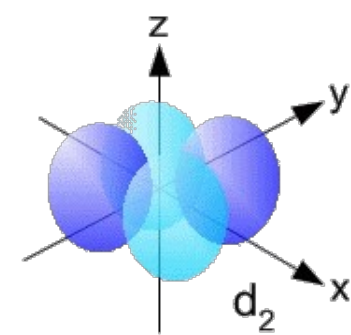
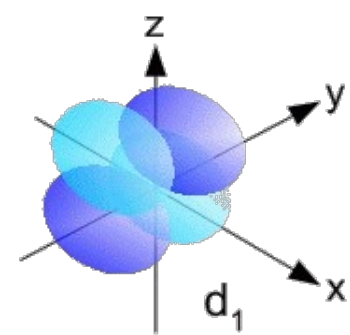
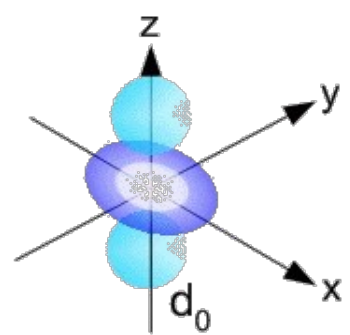
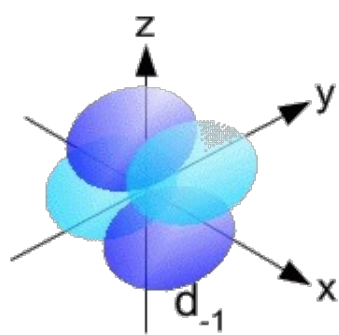
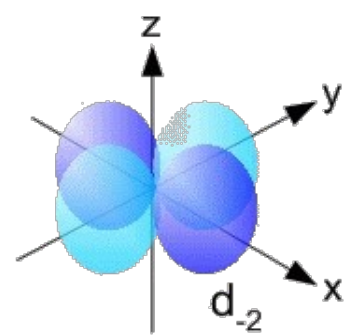
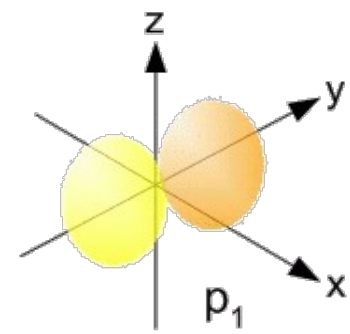
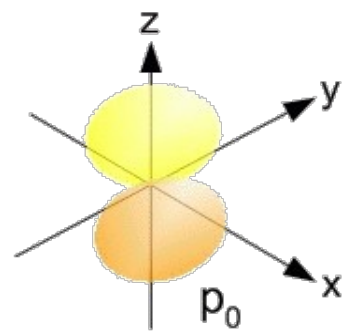
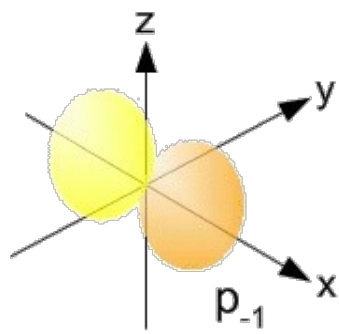
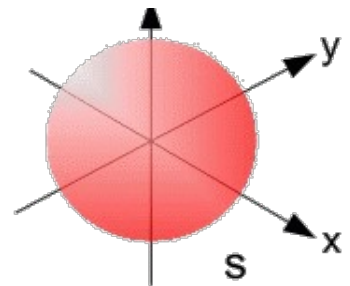
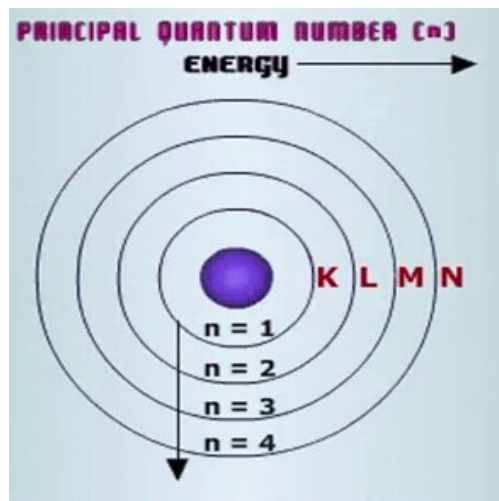
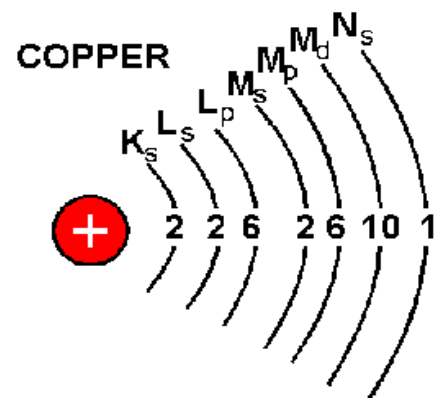
$$\Delta E = -13.6 \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right] \text{ eV}$$

Orbital Energy Levels

Increasing Energy

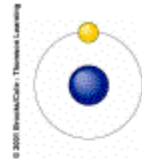


Livelli energetici dell'atomo: orbitali

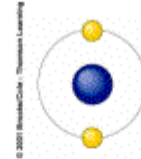


Atomic levels

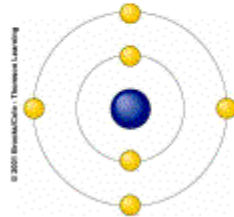
H	+1	↑	1s						
He	+2	↑↓	1s						Filled shell, inert gas
Li	+3	↑↓	1s	↑					Active!
Be	+4	↑↓	1s	↑↓					
B	+5	↑↓	1s	↑↓	↑				
C	+6	↑↓	1s	↑↓	↑	↑			
N	+7	↑↓	1s	↑↓	↑	↑	↑		
O	+8	↑↓	1s	↑↓	↑↓	↑	↑		
F	+9	↑↓	1s	↑↓	↑↓	↑↓	↑		Active!
Ne	+10	↑↓	1s	↑↓	↑↓	↑↓	↑↓		Stable 2s2p octet, inert gas.
Na	+11	↑↓	1s	↑↓	↑↓	↑↓	↑		Active!
Mg	+12	↑↓	1s	↑↓	↑↓	↑↓	↑↓		



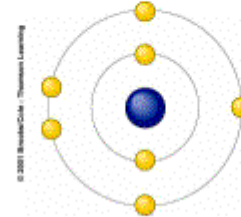
HYDROGEN
1p⁺ , 1e⁻



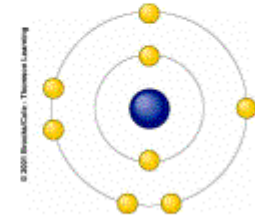
HELIUM
2p⁺ , 2e⁻



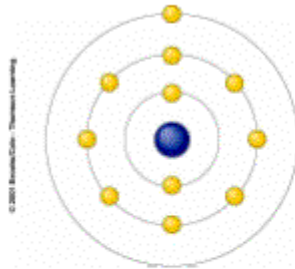
CARBON
6p⁺ , 6e⁻



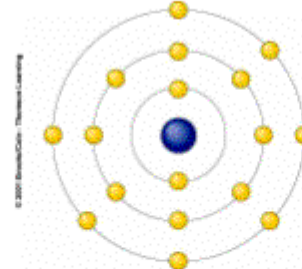
NITROGEN
7p⁺ , 7e⁻



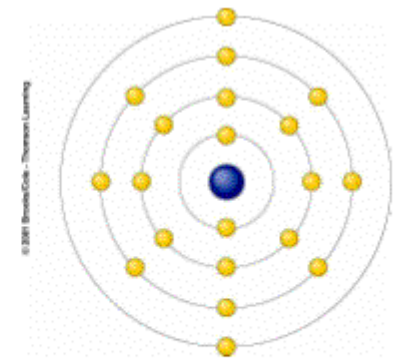
OXYGEN
8p⁺ , 8e⁻



SODIUM
11p⁺ , 11e⁻

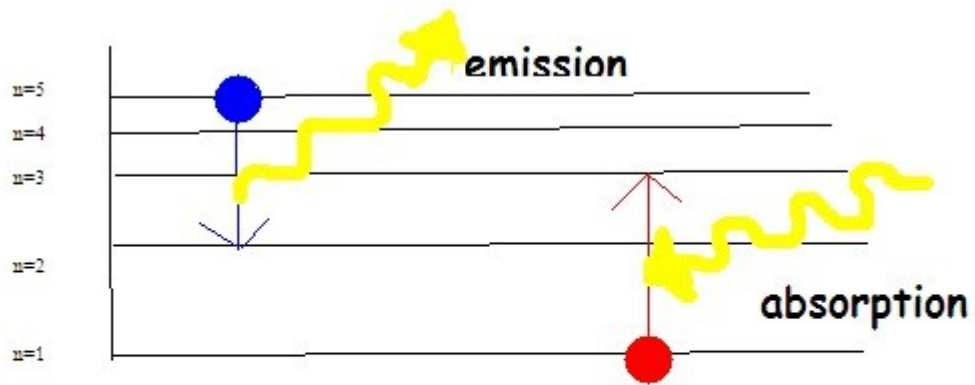


CHLORINE
17p⁺ , 17e⁻

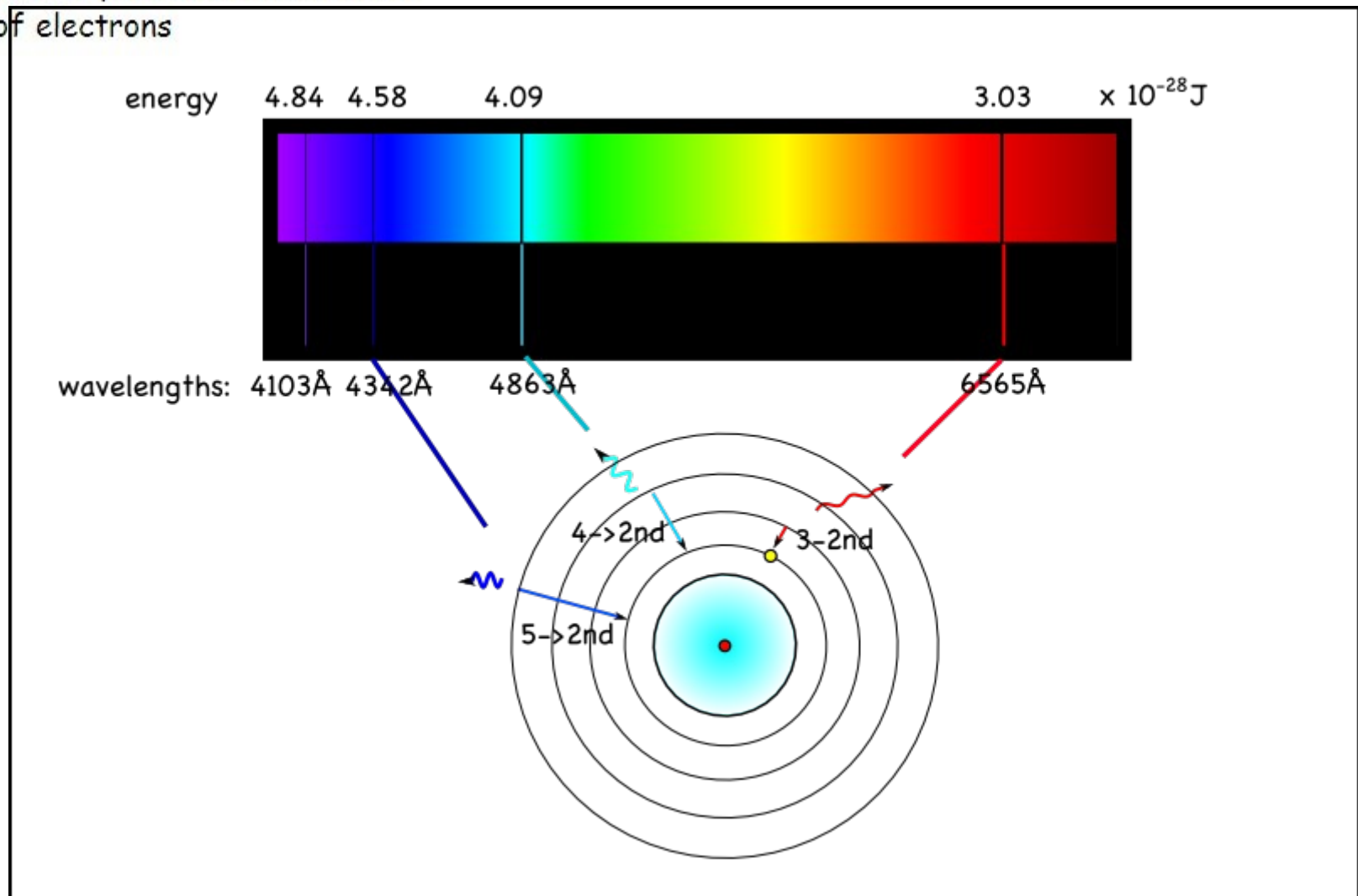


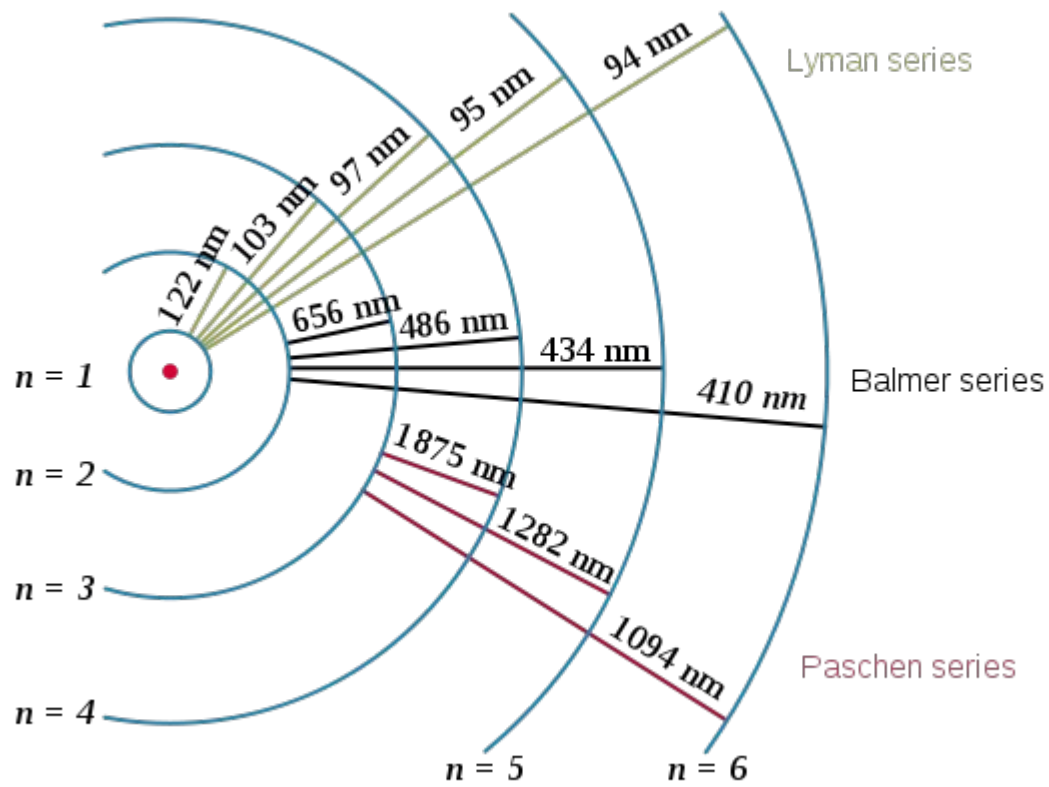
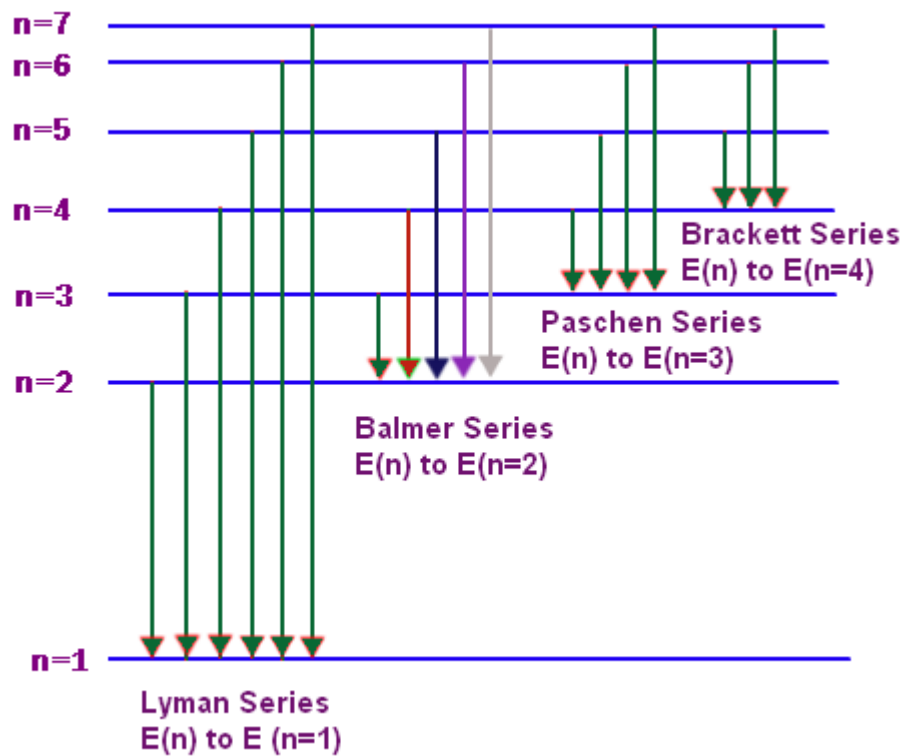
CALCIUM
20p⁺ , 20e⁻

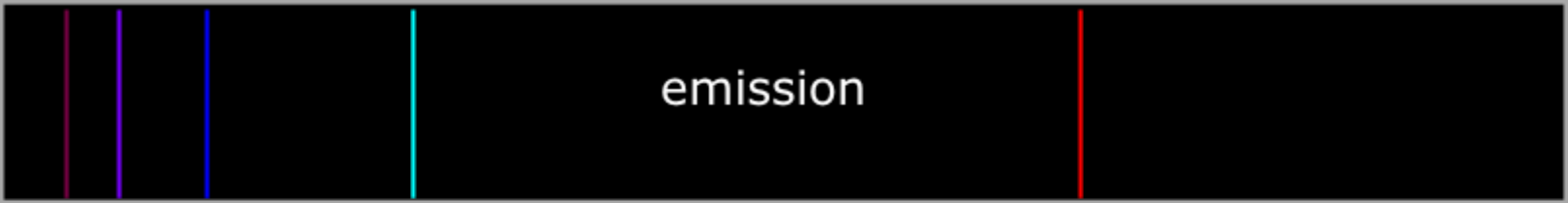
1	H	(1s)	13.6
2	He	(1s) ²	24.6
3	Li	He (2s)	5.4
4	Be	He (2s) ²	9.3
5	B	He (2s) ² (2p)	8.3
6	C	He (2s) ² (2p) ²	11.3
7	N	He (2s) ² (2p) ³	14.5
8	O	He (2s) ² (2p) ⁴	13.6
9	F	He (2s) ² (2p) ⁵	17.4
10	Ne	He (2s) ² (2p) ⁶	21.6
11	Na	Ne (3s)	5.1
12	Mg	Ne (3s) ²	7.6
14	Si	Ne (3s) ² (3p) ²	8.1
16	S	Ne (3s) ² (3p) ⁴	10.4
18	Ar	Ne (3s) ² (3p) ⁶	15.8
19	K	Ar (4s)	4.3



Absorption and emission of photons as a result of energy level change of electrons



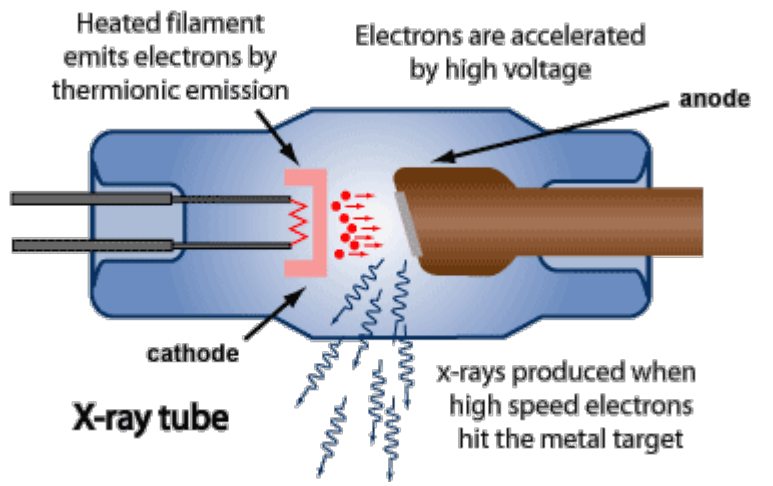
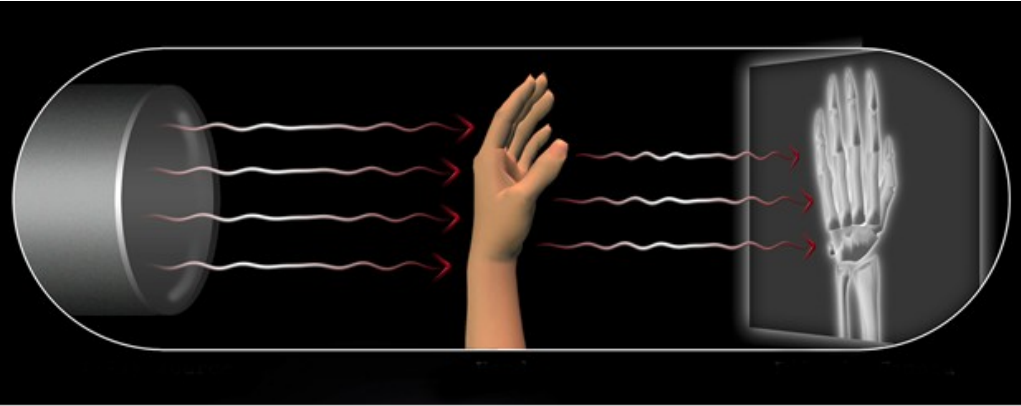




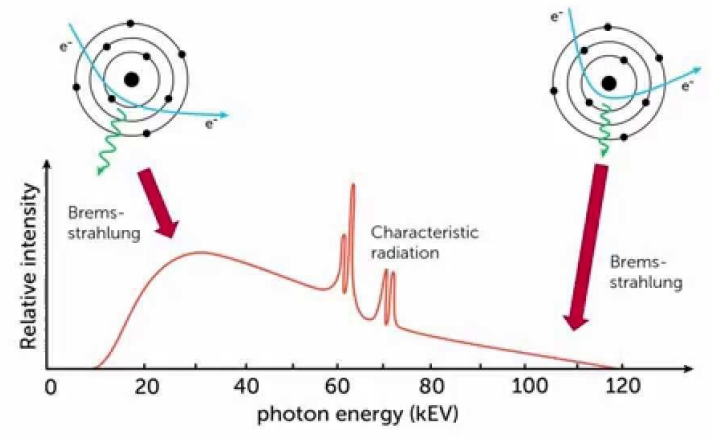
Hydrogen line spectrum: Balmer series



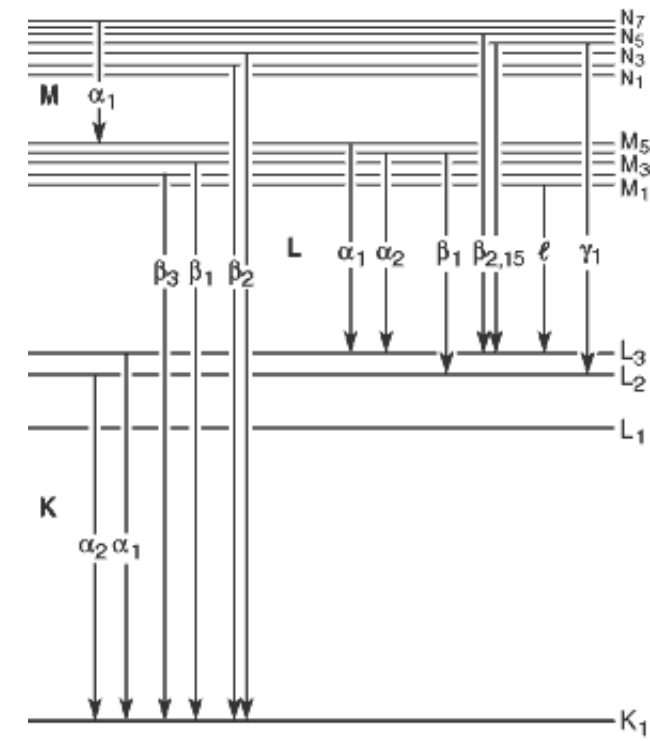
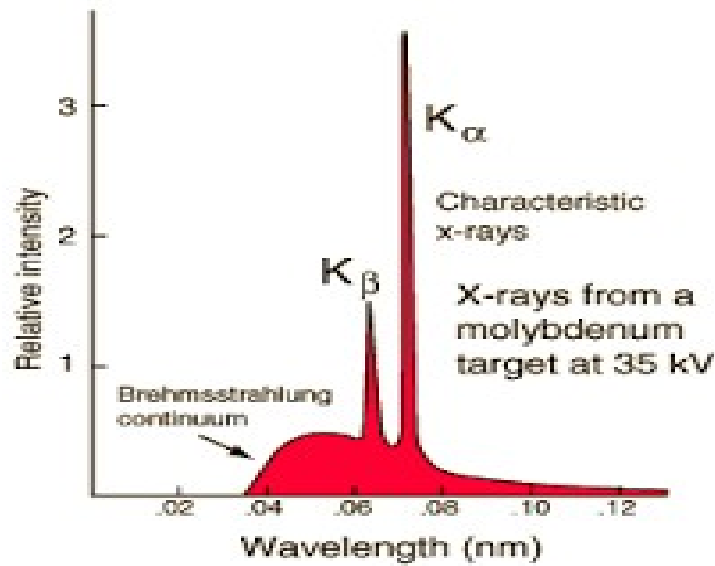
400nm 500nm 600nm 700nm



X-ray generation - spectrum



RAGGI X



1) Righe: Un fascio di elettroni viene sparato contro target. Un elettrone viene rimosso e un elettrone esterno 'salta' ad un livello piu' basso (target con atomi massivi come tungsteno, molideno, renio)

2) Continuo: Bremsstrahlung: l'elettrone viene deflesso e frenato, perde energia emessa come raggio X. Spettro continuo.

