X-Ray Tube

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X-Ray Tube

- Electrical device used for the generation of X-rays.

- This is accomplished by the acceleration of electrons and then suddenly decelerating them.

- The energy of the X-rays is dependent on the kinetic energy of the electrons.

X-Ray tube components

- Glass envelope
- Cathode
- Anode
- Protective housing

Cathode

- Negatively charged electrode

- Two primary parts:

  Filament

  Focusing cup

Filament

Tungsten or tungsten-rhenium alloy is preferred because of its
High melting point
Little tendency to vaporize
High atomic number

The filament is supported by two stout wires, which connects it to the proper electrical source

Modern X-ray machines are provided with two filaments mounted side by side. These filaments differ in size, producing two focal spots of different in the target. Such X-ray tubes are called dual focus tube.

Focusing Cup

Metallic shroud containing the two filaments

Usually made from nickel.

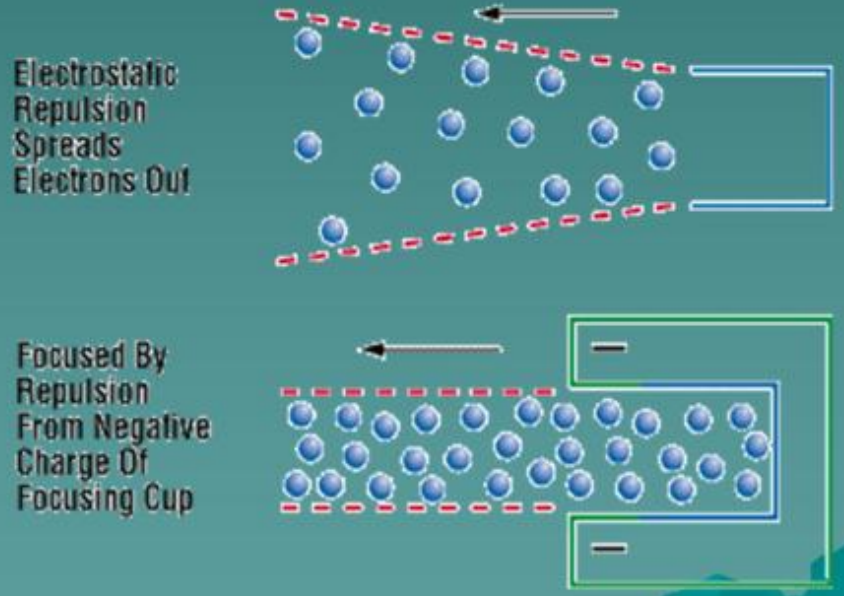
Contains a negative charge

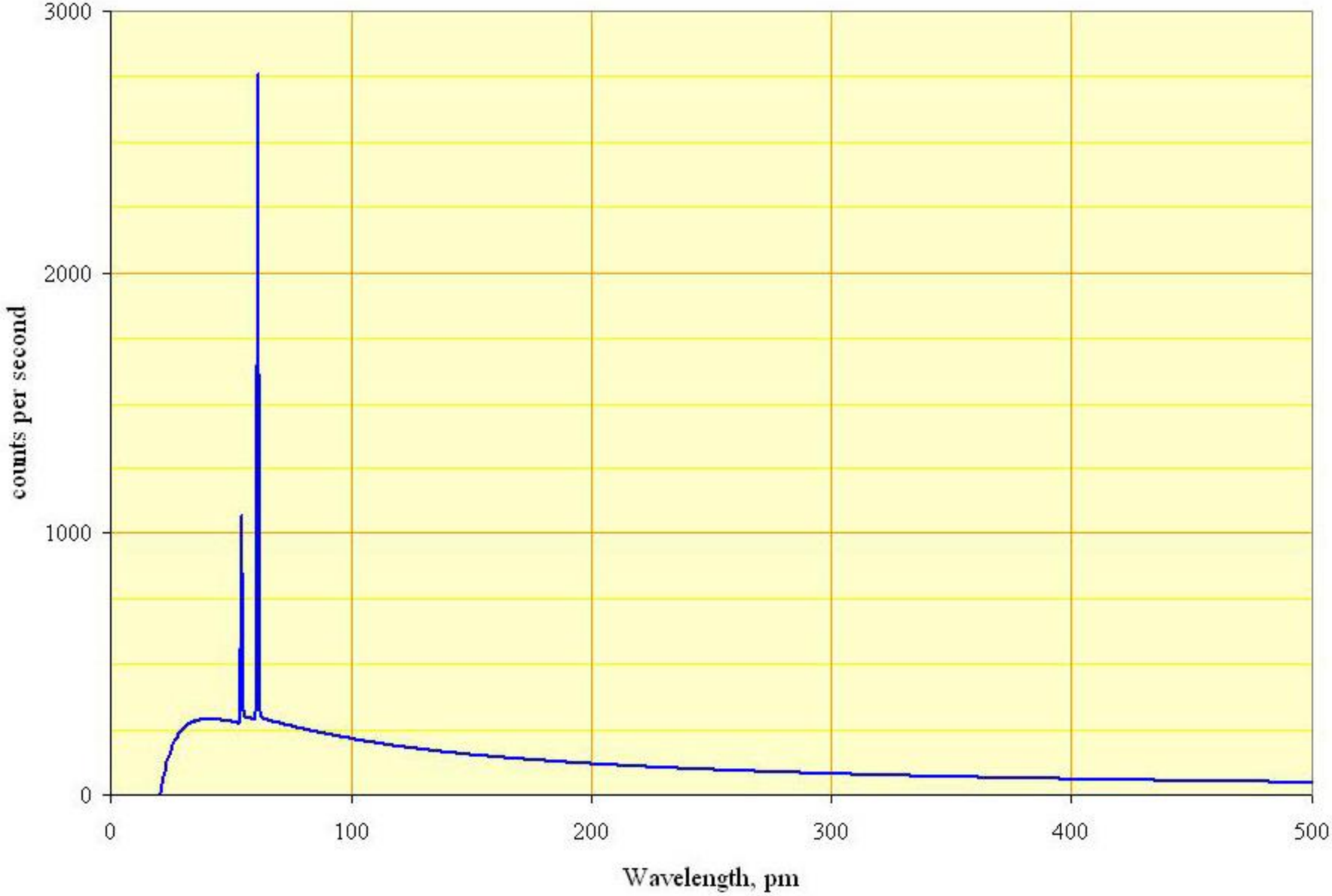
Designed to repel electrons

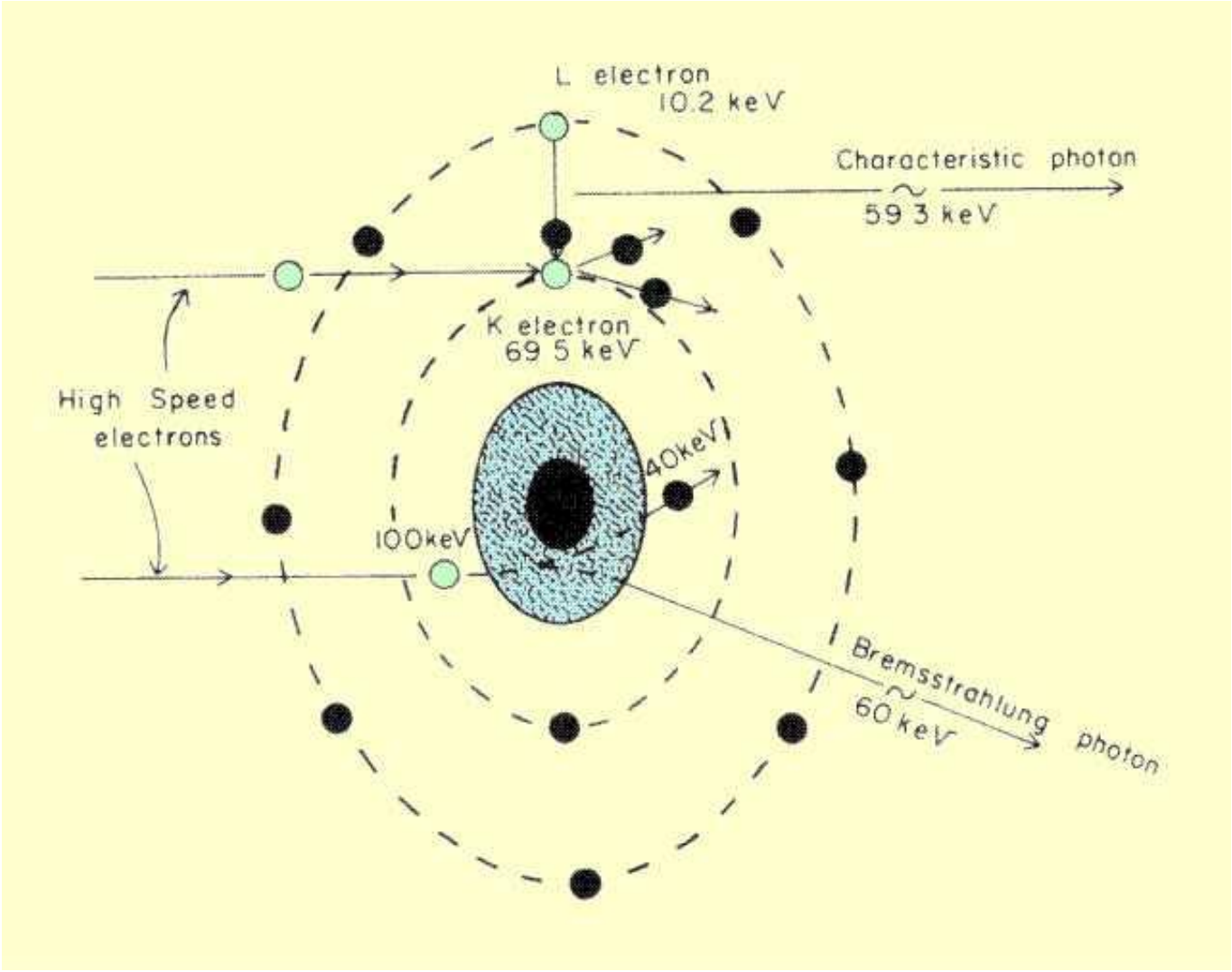
Designed to condense electron beam to small area on focal track.

The Cathode Structure
How the focusing Cup Works

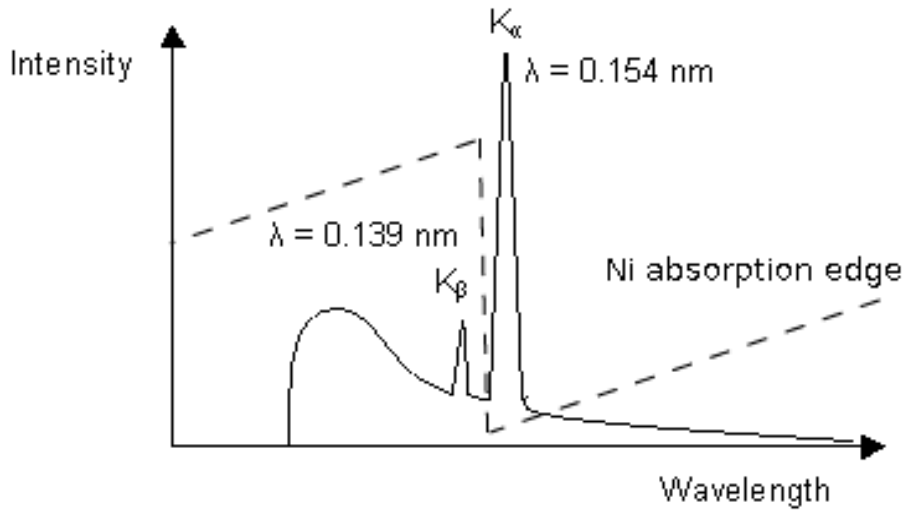
- Shape of Focusing Cup
- Projectile Electron Stream




3000
2000
1000
0
counts per second
0
100
200
300
400
500
Wavelength, pm


L electron
10.2 keV
Characteristic photon
~ 59.3 keV
K electron
69.5 keV
High Speed
electrons
40keV
100keV
Bremsstrahlung photon
~ 60 keV

- Filter → to remove K_β For eg. **Ni filter for Cu K_β**
- Reduction in intensity of K_α
- Choice of proper thickness




Thank
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