



Teacher's Laboratory

Teacher's Laboratory at CERN



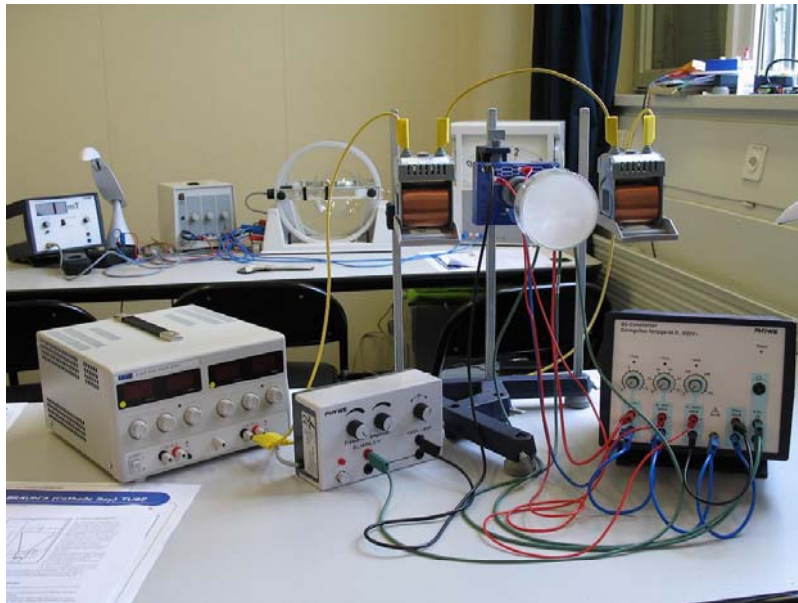
- 5 classroom experiments
 - Cathode ray tube
 - Fine beam tube
 - Electron diffraction tube
 - Photoelectric effect
 - Electron spin resonance
- Video conference equipment
- Green wall



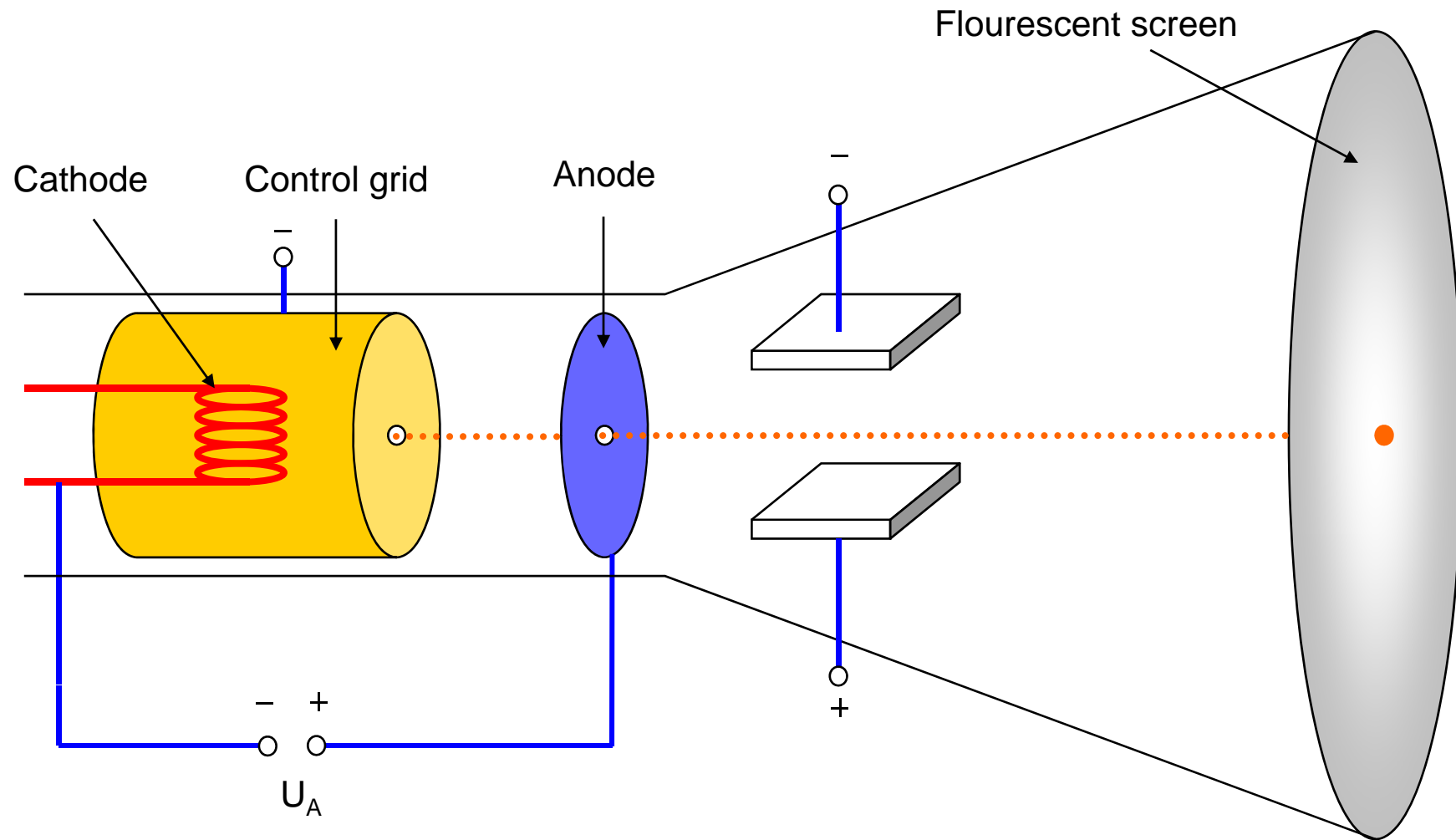
Cathode ray tube



- Study cathode rays
- Deflection by electrical and (or) magnetic field
- Cathode ray tube = electron accelerator
- Example for oscilloscope and (no flat-screen) TV



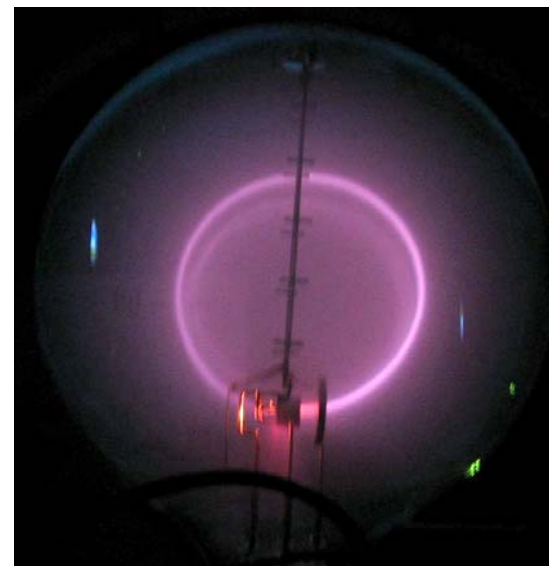
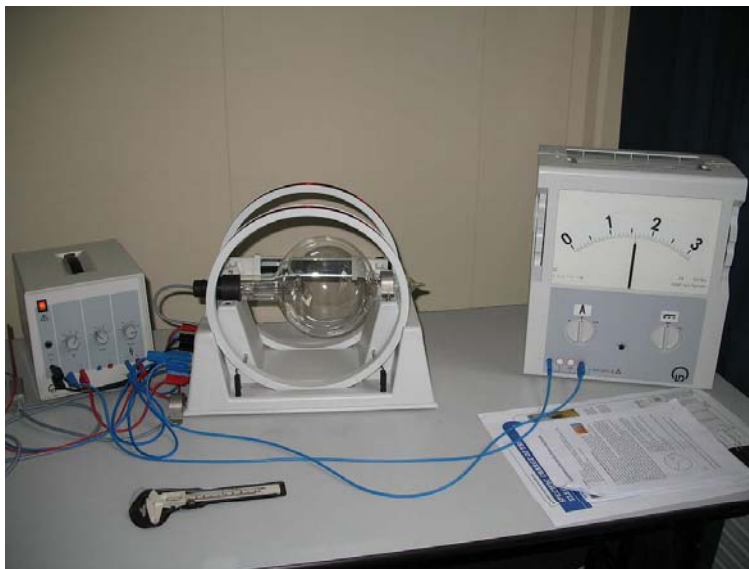
Cathode ray tube



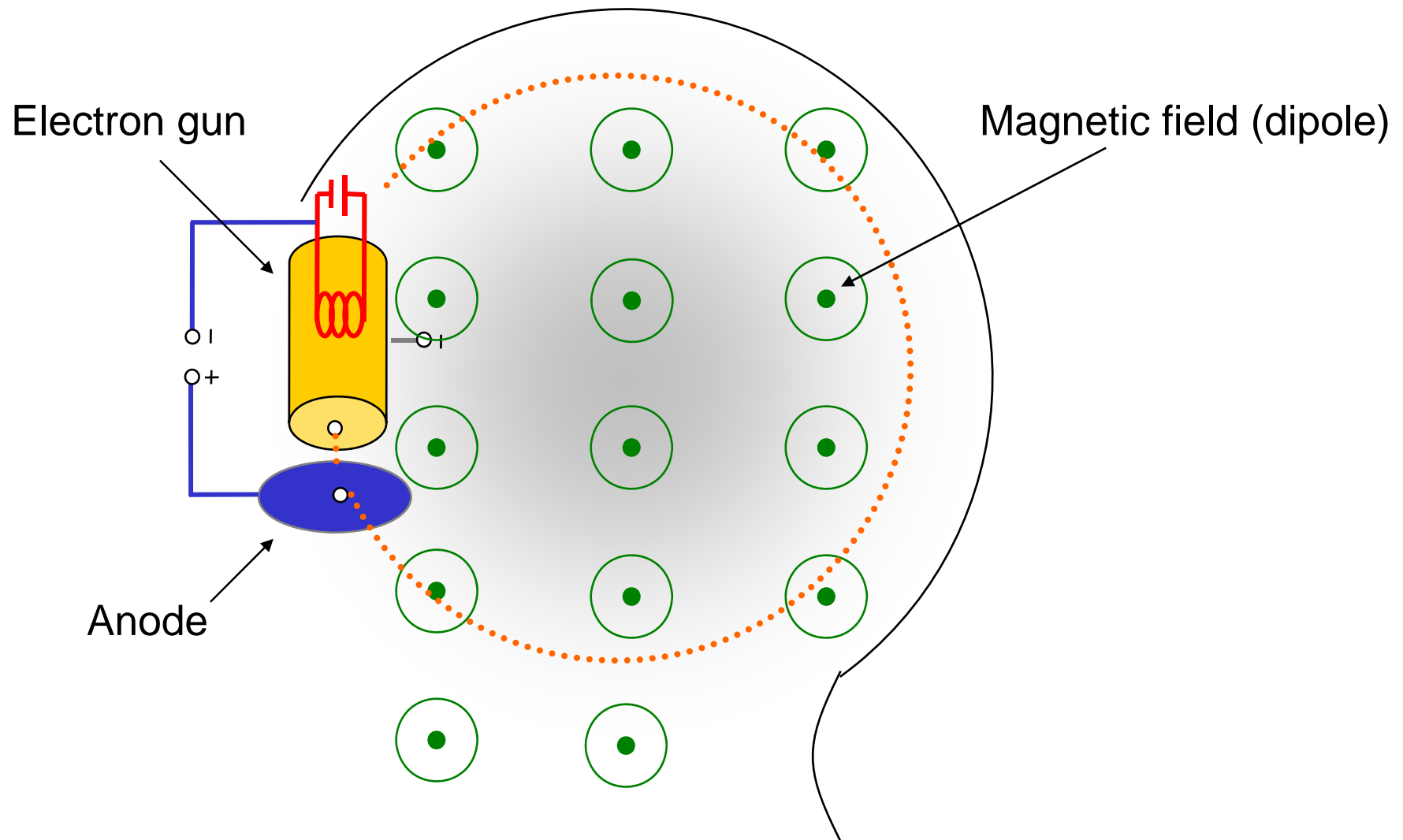
Fine beam tube / Thomson-experiment



- Study Cathode rays.
- Study Lorentz force.
- Study of the deflection of electrons in a magnetic field into a circular orbit.
- Determination of the specific charge of the electron.



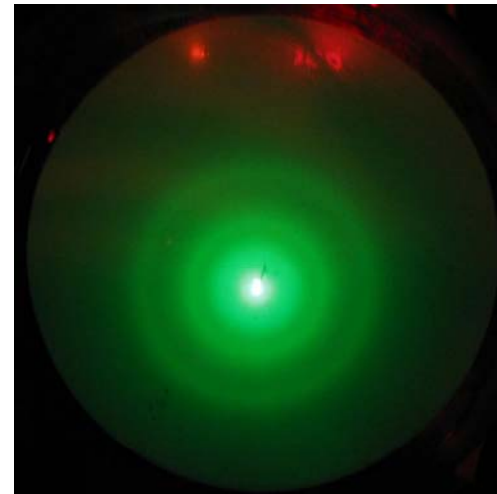
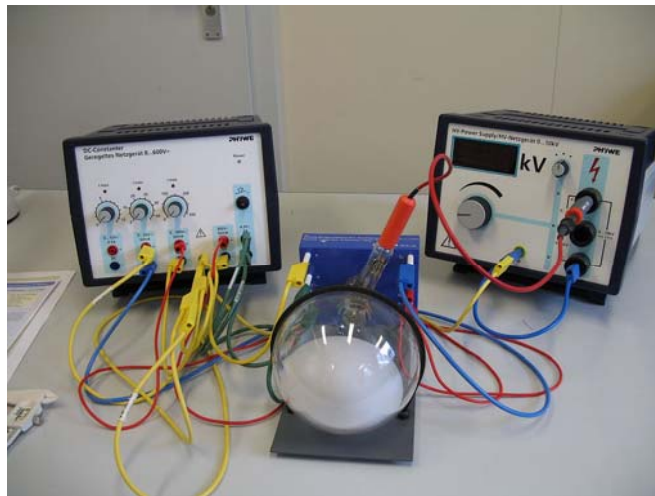
Fine beam tube / Thomson-experiment



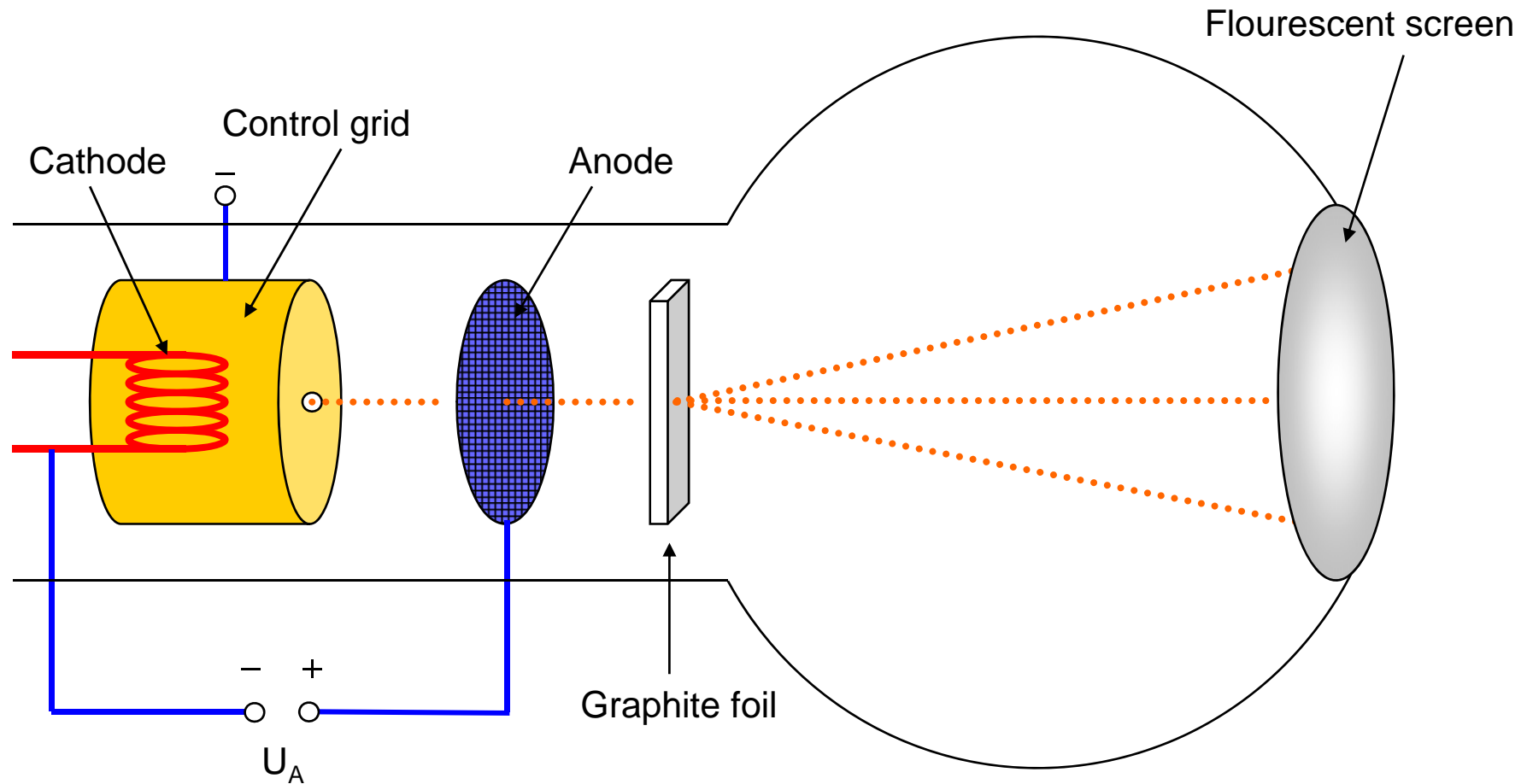
Electron diffraction tube



- Determine the interplanar spacing of graphite using de Broglie relation and Bragg's reflection
- Related topics and concepts:
 - Wave-particle duality (X-ray vs. electron)
 - Bragg's reflection
 - Study small structure (inaccessible to optical)



Electron diffraction tube



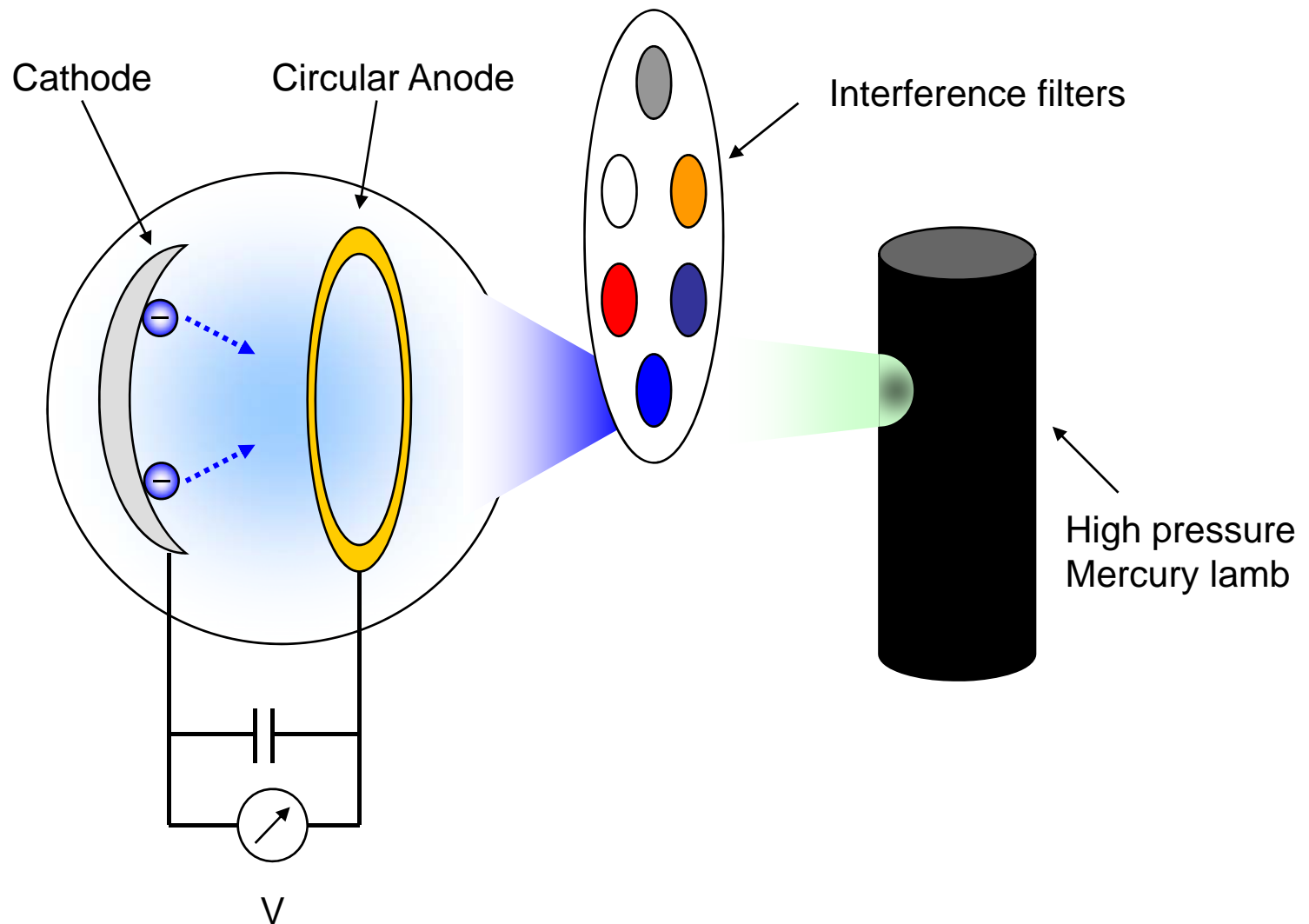
Photoelectric effect



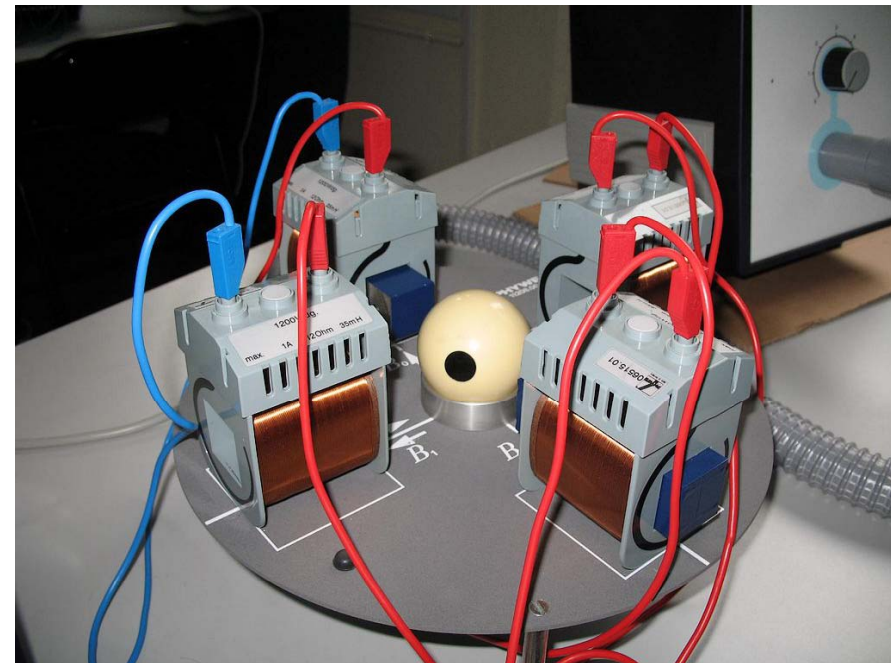
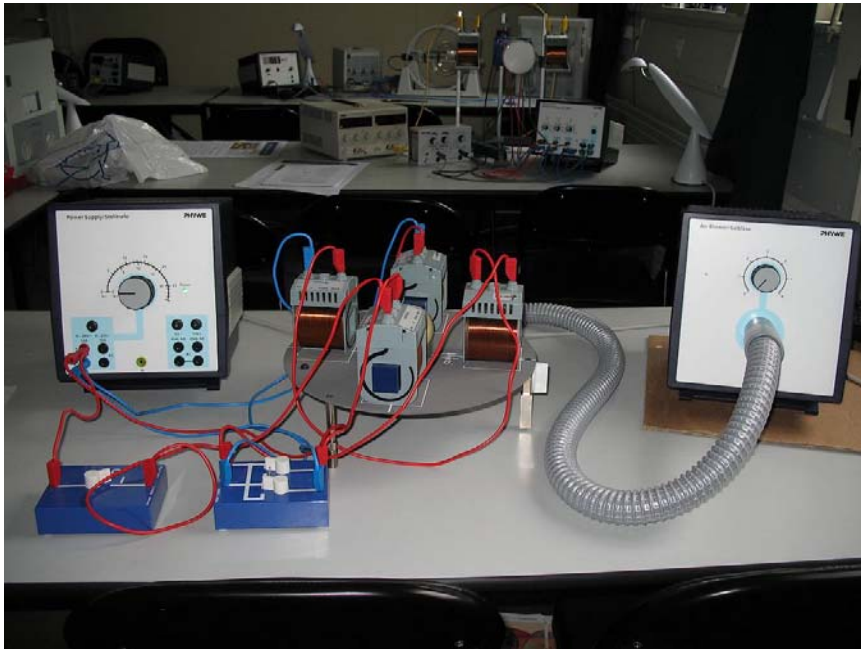
- Verify the photoelectric effect.
- Calculate Planck's constant h
- Show that the kinetic energy of the electrons is independent of the intensity of the light.



Photoelectric effect



Electron spin resonance



Electron spin resonance



- Model of electron spin resonance demonstrating the interaction between the magnetic moment of the electron spin with a superimposed direct or alternating magnetic field
- Related topics and concepts:
 - Larmor precession
 - Resonance, gyroscope (not main focus)
- Caveat
 - No classical equivalent to spin concept!
 - This is just to help student form some mental model