

2018 Physics Teachers' Conference
Discussion Group Activity
Teaching strategies and exam techniques for poorly done exam questions
Photoelectric Effect: Group responses

What is the order in which you structure the content to explain the photoelectric effect?

- i) Wave model – problems with this? , ii) Mechanics of PE effect experiment. Demonstration/ or Phet Colorado simulation , iii) Discovering for themselves what happens , iv) Compare what they see with wave model
- Understand E-Fields. Distinct energy levels of the electron "shells" – vary for each substance. Later: Wave model – what would that predict? . Particle model. Progression of science.
- Through understanding of waves – demonstrate wave model inadequate – Planck's impact of photons- binding energy
- Clear diagram has to be presented to students. Better to go through all components and explain the physics behind it.
- Prac work, graphing, calculations
- Bohr Model – Experiment . Wave theory done with young experiment

What are the most common misconceptions your students have in relation to the photoelectric effect?

- Photon vs photo electron . Ability to graph seems to be getting worse (relation CAS calc) . Quotes values rather than calculating
- Can't read units of graph : i) Stopping voltage \neq threshold frequency, ii) Can determine Planck's constant from gradient of line.
- Light behaving as wave or particle rather than being able to exhibit both behaviours.
- The relationship between number of incoming photons and electrons ejected.
- Intensity – energy confusion. Understanding, Explanation of intensity not great.
- Combining all the wave and particles model when ask about which models is applicable.

What equipment have you used to conduct the photoelectric effect?

- Electroscope – for a lead discussion.
- White light lamp – red, yellow, green, blue filters.
- Use Phet not equipment . Equipment takes too long to prepare.
- Colorado Phet simulation. . Ready made and available ones.
- Premade Tube, for PE supplement with Videos.
- Australian Synchrotron education program lab.

What apps/simulations have you used to enhance student understanding of the photoelectric effect?

- Phet Colorado Photoelectric simulation (6 groups)
- Concept understanding: Prac and/or simulations. i) Focus of Φ as energy required first then, ii) once concept is understood, look as V_0 (as KE_{MAX}) as separate
- Prac and/or simulation – to get concepts straight, lots of practice questions. Make clear stopping voltage is a way of measuring the maximum Kinetic Energy of electrons

Other Comments

- 4 Proper interpretation of the graph is essential in concept understanding. Students have difficulty translating math/graphs to English
- 5 Many students lack skills on reading graphs. If students understood the graph they could then explain (translate) values more easily