

# A'Level Physicists

The personal perspective of a  
Physics teacher.

# Why I'm Here

- I'm biased, but they are usually the nicest students in the school!
- I'm concerned that we don't do enough for them. Delivering the curriculum is certainly not enough.
- I'd like to see greater ties with the Higher Education community to assist with supporting these students.

# Talk Format

- To look at some of the comments A'Level Physics students invariably and spontaneously come up with.
- To investigate the motivation behind these comments.

# We've done this before, it's boring!!!!

This can be associated with the spiral curriculum: take electricity as an example: covered in yrs 2,4,6,7-9 then for GCSE, as can be seen examples of the questions asked at the end of KS3 (puzzle box, series/parallel distinguishing, trouble shooting), compare to GCSE, now with calculations, more context,  $V=IR$ ,  $P=IV$ ....what happens at A'Level? Series and parallel, Kirchoff's laws, resistivity, emf and internal resistance, AC only as it applies to seeing on a CRO and the transformer.

No: calculations involving simultaneous equations, no Wheatstone bridge, resistance cube, no AC theory, capacitors with DC only.....

What has this to do with you, as university courses aren't full of series circuits?

It is what they have already received as part of the spiral curriculum: possible BIG losers are earth science and particle physics. A challenge to present them as something new.

# I wasn't prepared for the jump between GCSE and A'level

Lets have a look at some very recent GCSE examination questions and see that perhaps there may be an issue....

## GCSE

The reading on the voltmeter is 5V, the reading on the ammeter is 2A. Calculate the resistance of the lamp, Use the equation on p2 to help you. [2]

The pd(voltage) across the bulb is 12V when the current is 2A. Calculate the resistance of the bulb.  
Ans .....ohms [3]

A doctor uses a radioactive material with a half-life of 10 hours. The count rate at the start is 960 counts per minute. What is the count rate after 30 hours?

[1]

Ellie opens her parachute and slows down. Explain why she slows down. Use ideas about forces in your answer.

[1]

Apparently few marks for these more "difficult" bits, might they get ignored?

How do you answer these?

Describe how light produces electricity in a photocell. In your answer write about atoms and electrons. **[2]**

Radio communications use digital signals. Write down **one** advantage of using digital signals in radio communications **[1]**

# This is stupid!!!!

One of the current issues is the "need" to teach quantum theory and particle physics at school before a solid foundation has been built in matter and classical waves.

# I thought I'd hate this, but it is really good!

- The sun and the earth's magnetic field (GCSE)
- Telescope resolution, Rayleigh criterion. (A'Level option)
- PV diagrams, Otto cycle, heat pumps, Stirling engine (A'level option)

# Why can't we learn about...

- ♂ entanglement, quantum teleportation, relativity
- ♀ Useful stuff

You've made Maths make  
sense....

And/or shown a reason for studying "abstract" maths.

# Is there a course on this at University?

Pupils showing lots of interest around the topic.

Amazed at the real interest in Philosophy of science - measurement, nature of knowing, nature of perception, Heisenberg vs Schrodinger (upper sixth quantum only), What is this thing called science?, Sociological perspectives (data collection, the science that is considered worthy of study)?, how much of science is actually "belief", how much do we really KNOW?

# Where do we go from here?

- Can't change syllabus content/rigour. Schools must not let the syllabus dictate the "learning experience". Universities could perhaps tap into what is good in the sixth form curriculum.
- Must remember that there is still enthusiasm out there, and it may not necessarily be for "obvious" topics.