

QUANTUM OPTICS WITH DR LACHLAN ROGERS

TALKING POINTS

KNOWLEDGE:

1. How are diamonds formed naturally?
2. Can you list some interesting facts about diamonds that are alluded to in the article?

COMPREHENSION:

3. Why is it better for Lachlan to use diamonds grown in a lab than those that are naturally formed?
4. What makes colour centres of interest to Lachlan?

APPLICATION:

5. What can the property of 'spin' help quantum scientists do?
6. Can you think of some of the technological applications that could result from Lachlan's investigations? In what ways might these change the world?

ANALYSIS:

7. Lachlan worked in Dr Thomas Volz's lab before co-founding a company with him. What is your understanding of the career potential for those studying quantum optics? Has it changed your viewpoint in any way?

SYNTHESIS:

8. What would happen if there was no such thing as classical physics and the laws of the universe were purely governed by quantum physics? Do some research to understand the crucial differences, then use your imagination to see what might happen!

EVALUATION:

9. Quantum optics is clearly an exciting field. What do you think of the idea of working on something that could constantly surprise and/or baffle you? Can you think of the pros and cons of an environment such as this?

ACTIVITIES YOU CAN DO AT HOME OR IN THE CLASSROOM

- Create a crossword based on Lachlan's research. First, write out a grid with all the words interlinking in some way, then think of some clues for each word. Try it out on your parents and classmates!
- Imagine the year is 2121 and the fields of quantum optics, computing and physics are now part of our everyday lives. What could be possible then that isn't now? What is better about this world of the future? What, if anything, is worse? Explain your thinking behind the points you make.

MORE RESOURCES

GLOWING DIAMONDS

Lachlan has put together a video abstract that provides an overview of glowing diamonds, which should help you understand a little about the work he is involved with.

<https://bit.ly/2O7NuSo>

IOP SCIENCE ARTICLES

There are a series of different open access research papers that Lachlan has worked on available on the IOP Physics website. Together, they illustrate his research area of quantum emitters in diamond.

- Exciting results from a relatively new colour centre in tiny diamonds: <https://bit.ly/2PM5Etg>
- Looking at glowing colour centres one at a time to identify changes in properties as the silicon isotope varies: <https://bit.ly/2OFJqBW>
- A powerful new mathematical technique for analysing blinking quantum emitters: <https://bit.ly/2PMZPf7>

SPACE OPTICS

NASA has produced this wonderful guide to light and colour:

https://www.nasa.gov/pdf/58258main_Optics.Guide.pdf

Though linked to space optics, this guide introduces the concepts of light and colour, and explains how to make a kaleidoscope, periscope, telescope AND microscope!