Physics in Action Conference
November 2021

Normally a staple of the physics calendar, this annual series of immersive and stimulating talks was sadly suspended last year due to COVID-19. Thankfully, this year 42 students across years 12-13 were able to attend in person. Here, some of them give their accounts of the day.

What we don't know about the universe (Chris Lintott, University of Oxford)

The day began with a talk from Chris Lintott, Professor of Astrophysics at the University of Oxford. Professor Lintott is best known for his role of co-presenter in the BBC's long running Sky at Night programme and author of 'The Crowd and the Cosmos'.
Unlike space physicists, astronomers focus on the entire universe, rather than just our little solar system. Bit by bit, they can build a timeline of our cosmos, from the big bang to the thermodynamic death of the universe.
The lecture dealt with hard-hitting, big questions that usually only two types of people ask themselves: physicists, or just curious children. He went on to discuss the possibility of extra- terrestrial life in space, talking about where they may be, what kind of planets could they survive, if they even exist, and if they do, where we would find them.
Currently, astronomers use modern pieces of optical instruments and space probes to search for traces of things that hint towards life beyond earth, such as traces of water. Lintott mentioned how there are projects all over the world, from Switzerland to America, to do with space, or specifically, building our knowledge of space. In a couple of years' time, we may have answers we have been searching centuries for, or not. There will always be the unfortunate chance that we may not find anything at all. However, from that, physicists are able to look back at their method, see what they have done wrong, and apply the corrections to their next project.
Lintott made it clear to mention that as humans, we are unaware of how similar or different these creatures could be. However, there has to be a starting point, and so, if we treat these living beings like ourselves, then perhaps, we may find something that leads us to them. Whilst using these methods, astronomers are able to understand more about our universe. And, with time of course, more and more is unrevealed. For example, at one point,, civilisation was completely unaware that the universe was expanding until Hubble's telescope came into place.
As the first talk of the day, it set the mood just right.
Nasiha, 12KES

Do you have what it takes to be an astronaut? (Suzie Imber, University of Leicester)

A Woman Who Does It All: Dr Suzanne Imber

How likely is it that the average person will be able to go into space for a holiday? Perhaps roast a turkey with your family up there for Christmas or spend your summer holiday watching the stars in a floating metal ship? The answer isn't so simple. Whilst it is entirely possible that you could jump into a rocket and bolt up 300 km into the deep, dark wells of space, the effects of living in microgravity and the feeling of weightlessness can distress an average person's body to the limit. BBC Two's series "Astronauts: Do You Have What It Takes?" is a TV show which assessed the physical and mental ability of 12 average adults to see if they could measure up to be an astronaut. The winner of the show was Dr Suzanne Imber, who A-Level Physics students from Woodford had the opportunity to meet on Tuesday 30th November. In her talk, Dr Imber covered many interesting ideas, from mountain climbing to her experience on television to her current work with Mercury's magnetosphere (a region around a planet dominated by the planet's magnetic field).
Whilst the exact workings of this are still being studied, we know more about the Earth's magnetosphere than other planets. Mercury, for example, Dr Imber said, is much harder to study as it is extremely close to the Sun – it is the closest planet to the Sun in our Solar System. It also is extremely small and has a relatively weak magnetic field – but all of these attributes are also what makes its magnetosphere so unique. And with the help of data from NASA's MESSENGER mission, the first spacecraft to orbit the planet Mercury, Dr Imber is currently attempting to understand the effect of solar wind on the magnetised planets; Earth and Mercury.
Dr Imber's research continues into the effect of solar winds on Mercury and Earth's magnetospheres at the University of Leicester. She delivers regular talks and presentations to school children, and is an inspiration to us all. Listening to her different ambitions and how she has gone to great lengths from her passion alone was inspiring for me, as it was for the hundreds of other A-Level Physicists at the Physics in Action Event.
Srideeksha, 12KPA

Resistance is futile: the science of superconductors (Andrew Steele)

Andrew Steele delivered an engaging presentation about the science behind superconductors. With superconductivity being a topic we study at A-level, being able to see superconductors 'in action' (pun intended) allowed us to further appreciate how remarkable they are.
Before giving a live demonstration, Andrew explained the developments required to find metals that we can make reach their critical temperature and become superconductors. On stage, he then proceeded to make a superconductor, by cooling it down with liquid nitrogen, and then displayed how these can be used to make Maglev trains, where the train levitates and moves around the track with no resistance. This talk allowed us to see how some of the concepts we learn in school have such vast applications in many sectors, and we enjoyed it very much!
Hannah, 13NCR & Shifah, 13KES

Body x movement = thrill (Brendan Walker, Middlesex University)

In this lecture we were introduced to the physics behind generating thrill in amusement rides and VR simulations. As a ride engineer Walker has worked on many rides (most notably thirteen at Alton Tower) using his extensive knowledge and experience. We were able to learn about what makes rollercoasters so impactful. A combination of rapid and large changes in stimuli is what makes a ride thrilling, this can be created by using physics. We learnt that various forces such as G force, friction, centrifugal force, and energy stores must be considered when designing rides in order give a thrilling sensation for riders. In addition, the physics of creating thrill can also be applied to VR simulations. Walker explained that by combining various principles in ride physics, VR simulations are able to create a more realistic and thrilling experience. Overall, this lecture taught us the relationship between ride design and physics, giving us a fitting example of how physics can be implemented in today's world, particularly in places we least expect.

Srivani, 12IBO