MATHS IN GENEVA

Year 12 A' Level Maths and Further Maths students went on a 3-day trip to Switzerland to discover more about the applications of maths in the real world.

The focus of the trip was a full day visit to CERN – The European Centre for Nuclear Research – and home of the Large Hadron Collider. CERN began in 1954 as a European collaboration between 11 member countries to promote the advancement of nuclear understanding.

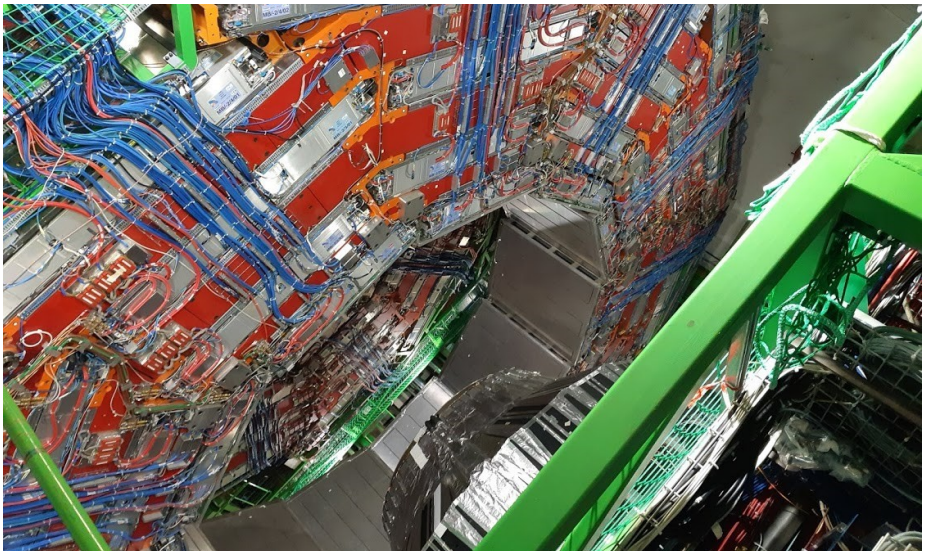
At this time, it was known that the atom was composed of electrons and a nucleus containing neutrons and protons but there were still many unanswered questions about it. CERN was established to help answer these and even bigger questions about the world around us. During our visit, the students discovered how CERN is still helping to answer some of the most fundamental questions: how did the Universe begin? What are the basic building blocks of matter?

The Large Hadron Collider (LHC) is the latest in a number of particle accelerators designed to help us understand more about the world we live in. It is most renowned for the discovery of the Higgs boson particle, which was discovered at CERN in 2012. Two of the scientists who led the project won the Nobel Prize for Physics the following year.

The LHC is the largest particle accelerator in the world and has a circumference of 27 km. It is located up to 170 m below the earth's surface and spans an area around Geneva extending into both the Swiss and French countryside. Its design, development and construction took over 20 years from an initial concept through to operation. Everything about the project

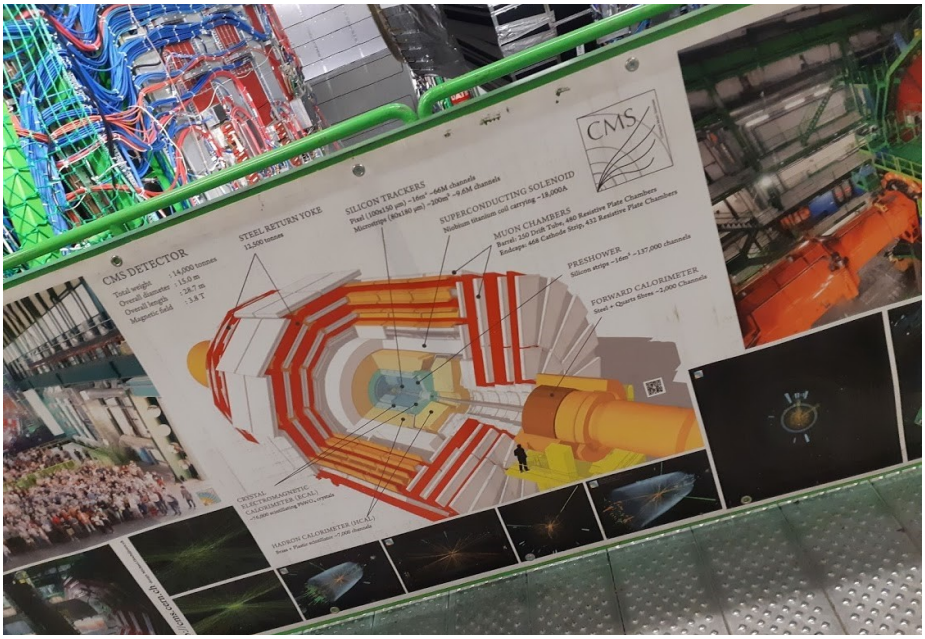
was ground breaking. It would require the largest electromagnets ever designed and would need a huge capacity for generating electricity in order to achieve the high energy levels required to produce the much needed proton collisions. This in turn would lead to extreme temperature differences in a very small volume and another challenge for the design engineers to overcome. During the visit the students gained an appreciation of the technical and engineering challenges that were faced and overcome during the design and construction phases.

The LHC itself is only part of the operation at CERN. At various points around the circumference, detectors are placed each with their own distinct experimental purpose. We visited one of these detectors – CMS (Compact Muon Solenoid). It was actually at CMS that the Higgs boson particle was first detected. After learning about the design of the detector and how it functioned, we had the incredible experience of traveling over 100 m below the surface and seeing the detector first hand. This is only possible every 6 years when the Collider is not operational. We were expertly guided by Physicists



and Engineers whose day-to-day job is working on maintaining the detector or monitoring and interpreting the huge scale of the output data. We witnessed the complexity of the engineering and the scale of the high-tech equipment needed to observe some of the smallest particles in existence.

The scale of the science and technology at CERN is awe-inspiring and the resourcefulness and problem-solving skills of those involved in the projects really challenges your thinking. Our visit left us feeling inspired and marvelling at the amazing things we don't still fully understand about the world. CERN was the undisputed highlight of our trip to Geneva. One of the students commented on our return: "CERN really opened my eyes to what engineering allows us to achieve and to see it on that scale in real life was amazing." It truly was an amazing place to visit.



During our trip to Geneva, we also visited the Red Cross Museum and discovered the fundamental role of technology to help them deliver their key mission as "an impartial, neutral, and independent organization whose independently humanitarian mission is to protect the lives and dignity of victims of war and internal violence and to provide them with assistance". The museum hosts a number of permanent and temporary exhibitions that highlight the plight of individuals and communities throughout the world and over the 150-year history of the International Red Cross (IRC) and illustrate the role of the IRC as an information giver. One of the exhibitions was a collection of prisoner of war records from World War II that could be accessed and reviewed. Much to our surprise one of the young men highlighted was originally from Lymm, which brought home the importance of the Red Cross role. The visit was both fascinating and humbling and reminded each of us that human rights should not be taken for granted.

No trip to Switzerland would be complete without some chocolate tasting and we indulged with a trip to the Stettler Chocolate factory. We discovered the history of chocolate making and its association with Switzerland and how advances in technology allowed chocolate to develop into the sweet treat that we love today.

We also took time to enjoy the beauty of Geneva. We viewed many sites of the city – The Palais de Nations, The broken Chair, The Jet d'Eau and Geneva Old town. We took in the panoramic view of the lake and the City surrounded by the snow-capped peaks of the Alps.

Science and Maths aside, Geneva had a lot to offer and we had a very memorable trip. Mrs Ramsbottom, Mr Fitzgibbon and Mrs Dowdall feel incredibly lucky to have spent an educational and enjoyable 3 days with a great group of Sixth formers!

Geneva 2021 *– Despite the current uncertainty with COVID-19, we are intending to run the trip again next year. If your child has signed up to study Maths or Physics at A' Level and you were unable to return the register of interest form, please email Mrs Dowdall (bdowdall@lymmhigh.org.uk) so that your child's name can be added to the list.*