1. Description of CERN, what it stands for and where is it located?

* CERN stands for the French phrase “Counseil Europeen pour la Recherche Nucleaire” which in English translates to European Council for Nuclear Research
* The main function of this facility was to provide particle accelerators, and other equipment needed to high-energy physics research
* Located around the Franco-Swiss border near Geneva

1. When CERN was founded, why and by whom?

* CERN was founded on the 17th of May in 1954
* French physicist Louis de Broglie put forward the first proposal for the creation of CERN
* It was originally made to study the atomic nuclei after World War II, but was later used to study higher energy physics, focusing on understanding the interactions between subatomic particles

1. What equipment and instrumentation scientists can use at CERN

* At CERN there are multiple accelerators, colliders, and synchrotrons that can be used. The following are a few examples

🡪Linear accelerator 2, 3, 4

🡪The antiproton decelerator

🡪The Large Hadron Collider

🡪 The low Energy Ion Ring

🡪 The Proton Synchrotron

🡪 The Proton Synchrotron Booster

🡪 The Super Proton Synchrotron

1. At least 2 detailed examples of discoveries made about atoms at CERN

* Invention and development of particle detectors, in particular the multiwire proportional chamber
* First to record the interactions from colliding protons by Kjell Johnsen
* Produced the world’s first proton-antiproton collisons on 4th of April 1981, Simon van der Meer and Carlo Rubbia won the Nobel Prize for this
* Discovery of the W and Z bosons in the UA1 and UA2 experiments in 1983
* Used the Large Electron Collider to determ the number of light neutrino families in 1989
* In the PS210 experiment in 1995 the first creation of anti-hydrogen atoms were discovered
* In 2010 they isolated 38 atoms of antihydrogen
* (Each example should have the date, person undergoing experiment, what happened, what they concluded, and what equipment used, and how its helped our understanding today)

1. Explain one detailed example of an experiment currently being conducted about atoms at CERN today

* ALEGIS, ALICE, ALPHA, AMS,ASACUSA, ATLAS, ATRAP, AWAKE, BASE, CAST, CLOUD, CMS, COMPASS, DIRAC, ISOLDE, LHCb, LHCf, MOEDAL, NA61/SHINE, NA62, NA63, nTQF, OSQAR, TOTEM, UA9 are all examples of an experiment that are being conducted,
* For the students examples they must include, what the experiment is about, when did they start the experiment, and what they have found out so far
* For example:

“The ALPHA experiment is being conducted to make, capture, and study atoms of antihydrogen, so they can be compared with hydrogen atoms. It started in late 2005, to follow on from the earlier antimatter experiment ATHENA. This investigation used multiple trapping methods to hold the antihydrogen atoms, so they can take measurements to answer the mysteries about antimatter. In June 2011 they were able to trap these antimatter atoms for more than 15mins.”