

Absorption of alpha

Experiment overview:

- One of the major benefits of the Timepix detector is the way in which it visualises the different types of radiation. In this experiment you will explore what happens to the numbers of particles detected as the distance is varied and a barrier is introduced.

Equipment:

- CERN@school kit
- Alpha source (Americium)
- Ruler
- Paper

Detector settings:

- Exp. count = 1-10
- Exp. time = 0.1-5 seconds
- Bias = no change
- Detector should be open and uncovered.
- “Integral mode” should be un-checked
- The following depends on your software version, either “Finite number of steps” should be checked **OR** “Continuous measurement” should be un-checked

The count and timing settings can be modified to suit. If the radiation strikes begin to fill the screen and the numbers of alpha, beta and gamma detected are not what you would expect, then you can reduce the time of the measurement but increase the number of measurements.

Method:

- Part 1: Alpha range
 - Before putting the source in place, fix the detector in position using a clamp stand and take a background reading.
 - Depending on the format of your source, set up the appropriate equipment to hold the source.
 - Then with the alpha source put in place at 4cm from the detector, take the first measurement with no barrier in place and the detector cover open.
 - Move the source closer to the detector in 0.5cm intervals, stopping at 1cm.
 - After each measurement you should save the files. The filenames used should clearly indicate what the measurement it.
- Part 2: Barriers
 - Set the alpha source at 1.5cm from the detector and arrange the barrier between the source and detector. Begin with paper.
 - Take your measurement.
 - Next, using the barrier cover only half of the detector. Take your next measurement.
 - Compare the uncovered, fully covered and half-covered images. What do you notice about the numbers of alpha, beta and gamma detected?

Analysis:

- Using your measurements from Part 1, what is the range of the alpha source?
- Compare the numbers of alpha, beta and gamma measured for the different settings in part 2. What do you observe?
- The results can be presented in a table or graph.

Suggestions for further investigation

- Repeat this experiment using different sources, for example Cobalt-60 a gamma source.