Measuring Background Radiation

Experiment overview:
- Background radiation comes to us from multiple sources (see the CERN@school Curriculum guide for details). This experiment gathers data inside a building and outside and encourages you to identify the potential sources of radiation.

Equipment:
- CERN@school kit

Detector settings
- Exp. count = 45
- Exp. time = 40 seconds*
- Bias = 95V
- "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

Method:
- Choose two locations: one outside and one inside.
- At your first location set up the laptop and detector. Open the Pixelman software.
- Input the detector settings.
- Press "Start" and when the run is complete save the measurements in a new folder, with clear filenames indicated what the measurements are of.

Analysis:
- There are two options for beginning analysis:
  - The total count from each measurement (frame) can be entered into a spread sheet. Pixelman displays the results from the measurement in a table listing the different type of particles.
- Or the measurements can be uploaded to the analysis site TAPAS. Once analysed, a CSV file is available to download.
- Once the data is available in a spread sheet you can investigate the following:
  - Compare results between the two locations.
  - Are there differences?
  - Does one location register higher levels of radiation than the other?
  - What are the potential sources that make up the radiation measured in the different locations?

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Suggestions for further investigation

- Does the amount of radiation vary when different indoor locations are tested?
- Equally, how does the amount of radiation measured change if you increase the height of the location.
- The change in height would need to be more than just going onto the roof. What happens if you take the detector up a large hill?

- Once the measurements have been taken, they can be saved into a zipped folder and e-mailed to submissions@researchinschools.org along with the time and date of the measurements, the latitude and longitude and the altitude (these last three can be sourced from Google or by using a smartphone).
- The results will then be uploaded to a map that we can make available for any school to access and analyse. This allows further study into regional variations.

- Carry out the "Measuring Radon" experiment in different locations and compare the results. This can be downloaded from the CERN@school experiments page.

- Carry out the "Capturing Muons" experiment in different locations, particularly different heights.

*Please note that we have discovered that the newer version of Pixelman (2.2.3) has a Exp. time limit 0f 42 seconds for a single frame, beyond which it won't take longer measurements. In order to take longer measurements, please increase the Exp. count field and take more frames.

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