



Safety at CERN

By Charles Demy and Elena Schmit

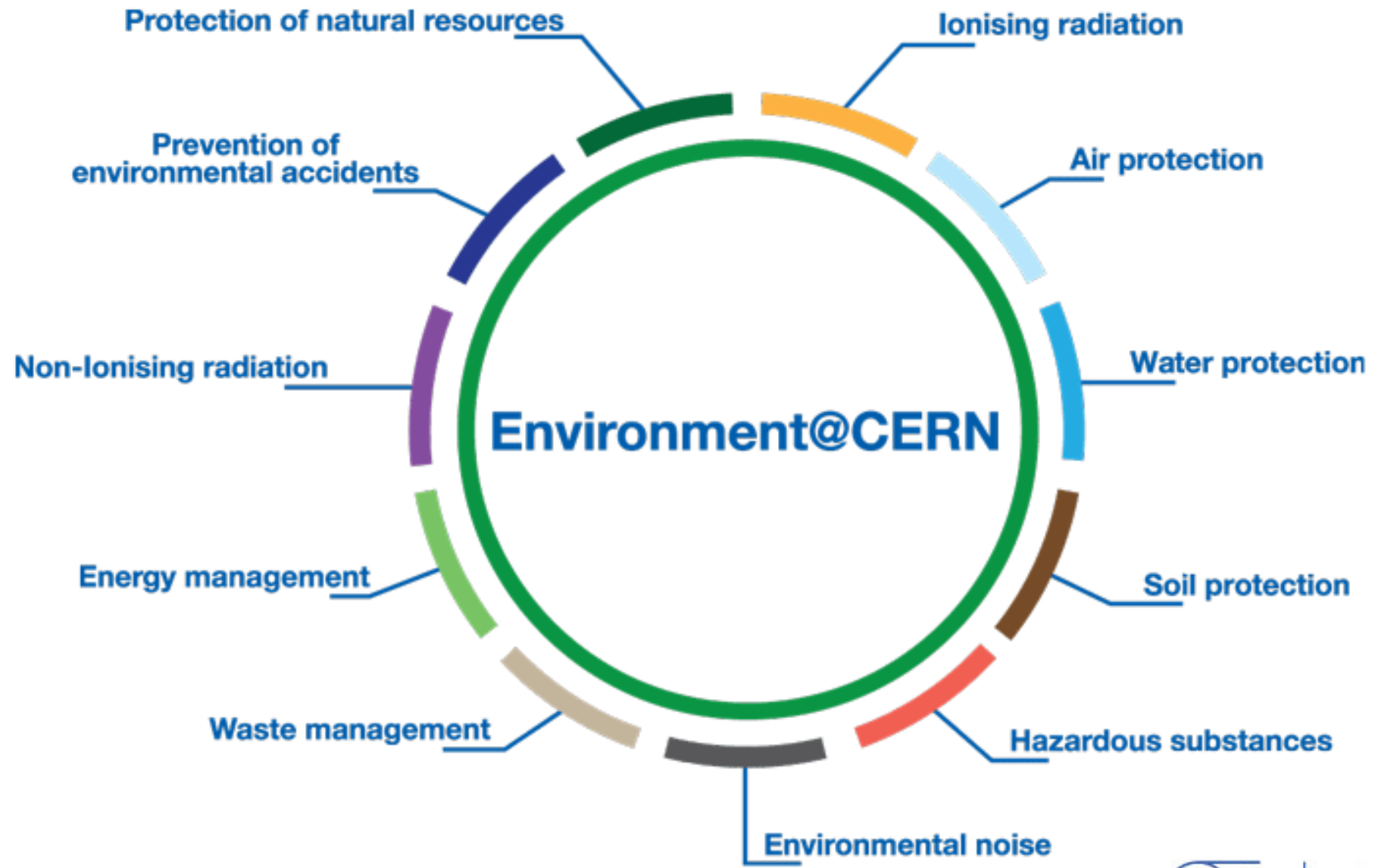
Supervised by Pierre Carbonez and Andre Dziewa



HSE

- Occupational Health & Safety and Environmental Protection Unit
- Radiation protection group, environmental protection group, CERN fire brigade, occupational and safety group and transversal services group





Water protection



- Cooling down instruments
- Heat exchanger between distilled water and water
- Cooling towers
- Chemicals => chlorine



Different measures in water

Ph = acidity

Redox = oxydation

Temperature

Free chlorine = disinfectant chlorine

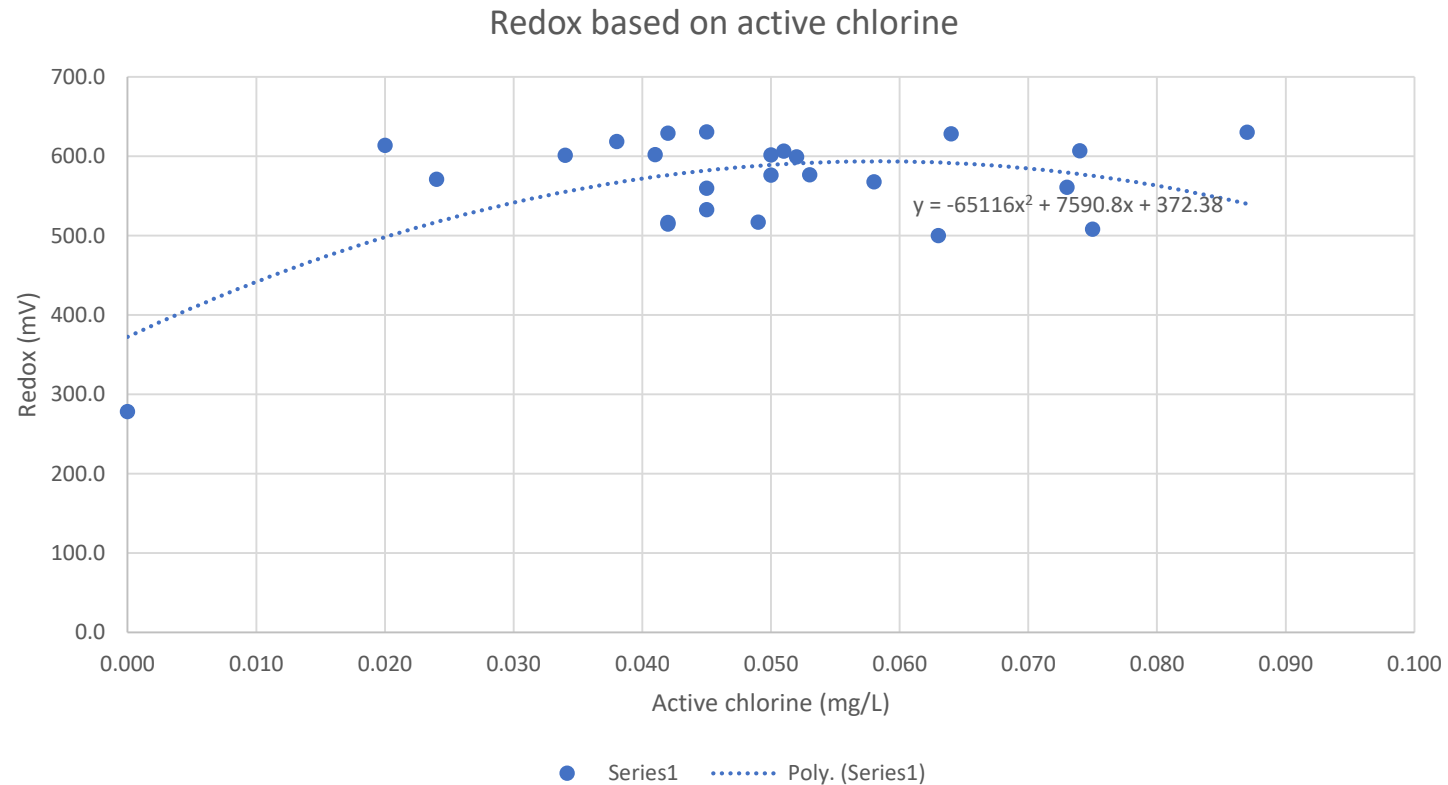
Active chlorine = active form effective against bacteria, viruses





What was the project?

Research results



Correlation coefficient: $-0,06953146$ (neglectable)



Conclusion 1

To succeed a research, you need:

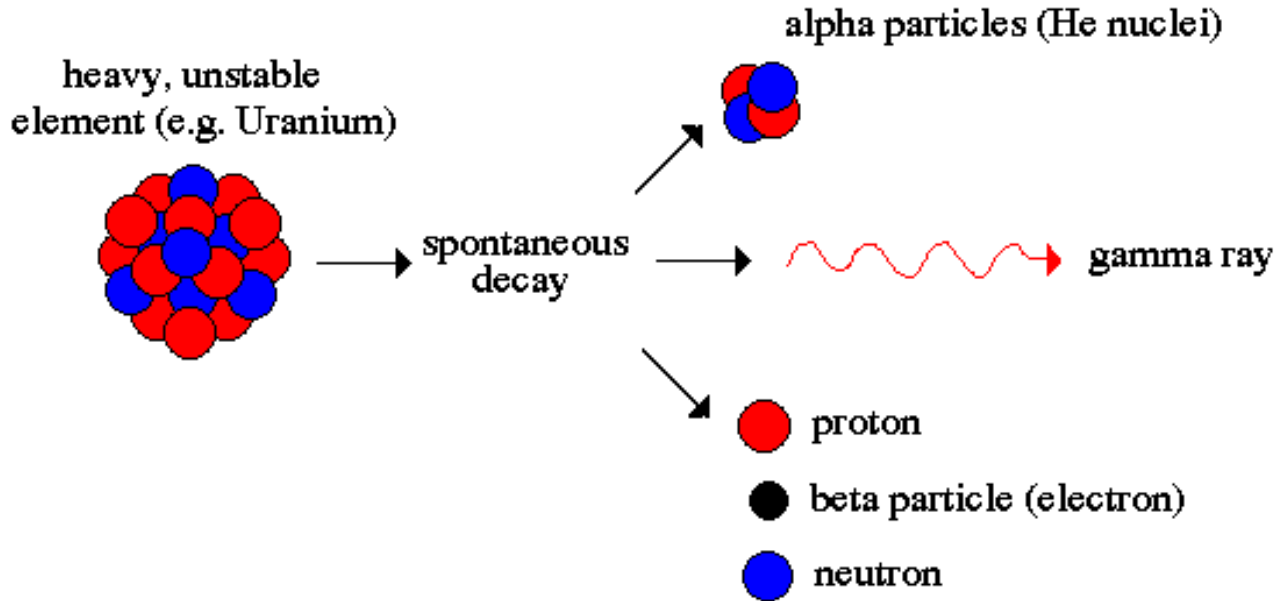
- a lot of data
- a lot of patience
- a lot of motivation
- a lot of knowledge
- ...
- and a bit of luck





Radioprotection group

Radiations at CERN



- in the accelerators, some protons escape the track of the magnetic field
- atoms all around are hit and gain an excessive amount of energy
- radiations are emitted to get rid of this energy

Radioprotection and dosimetry



1.4 mSv
(annual)



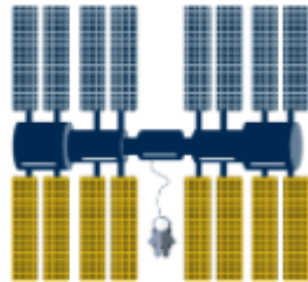
3 mSv
(annual)



~ 4 mSv
(annual)



20 mSv
(annual)



146 mSv
(annual)



10 Sv
(accidental exposure)

Dose for an average CERN employee :

0,1 - 0,2 mSv/year

Doses

Average dose through medical exposure (Switzerland)

Average dose for aeroplane pilots

Natural background Radiation in Switzerland

Maximum dose for a radiation worker

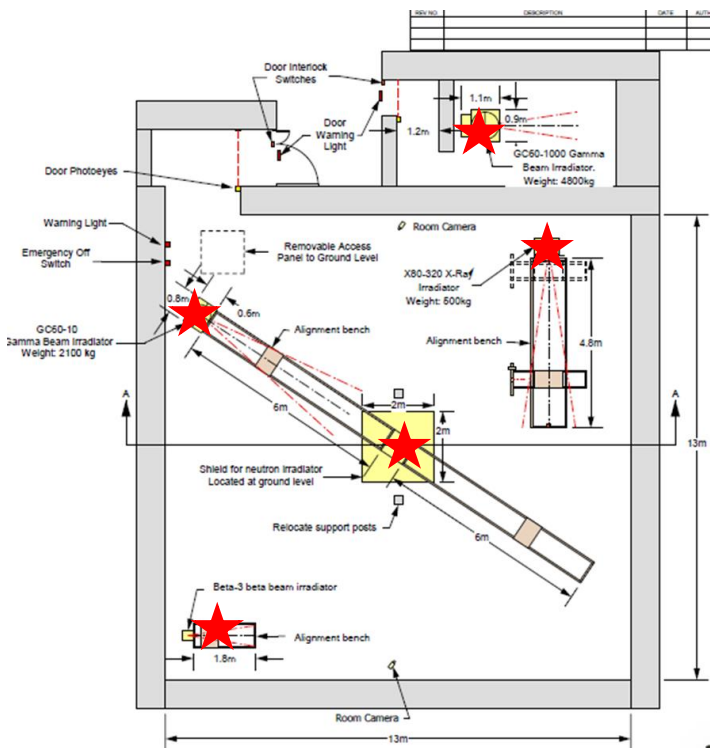
Dose for crew members of the International Space Station

Lethal dose



HSE
Occupational Health & Safety
and Environmental Protection Unit

Our laboratory :



X-rays



Gamma

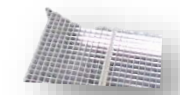
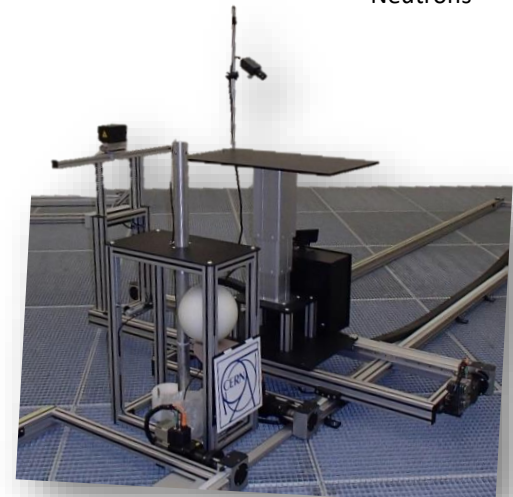


Beta

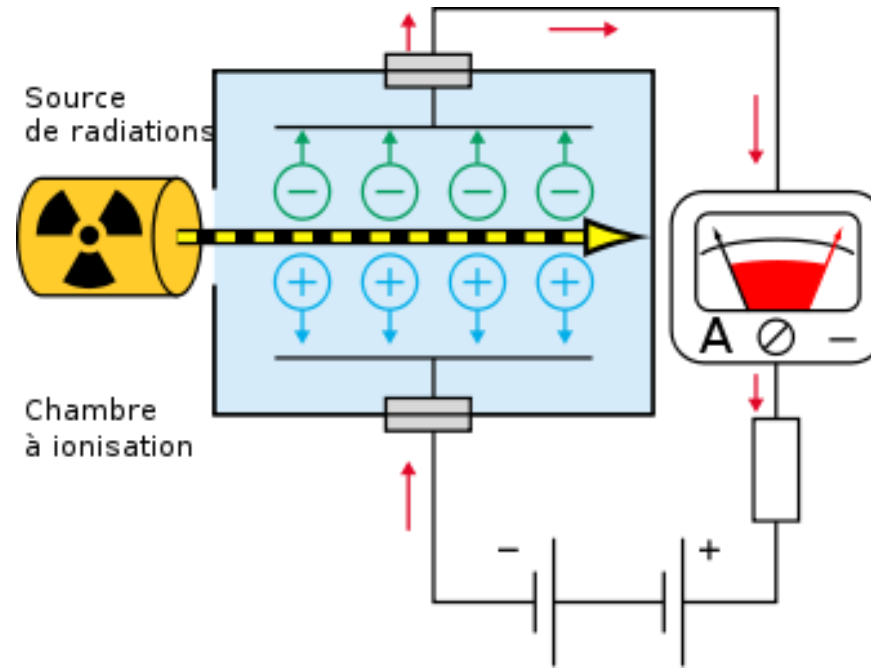
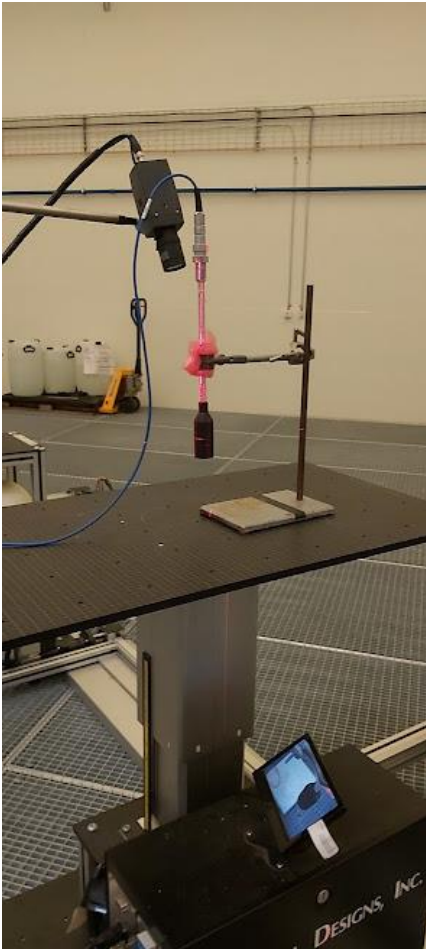



Beta

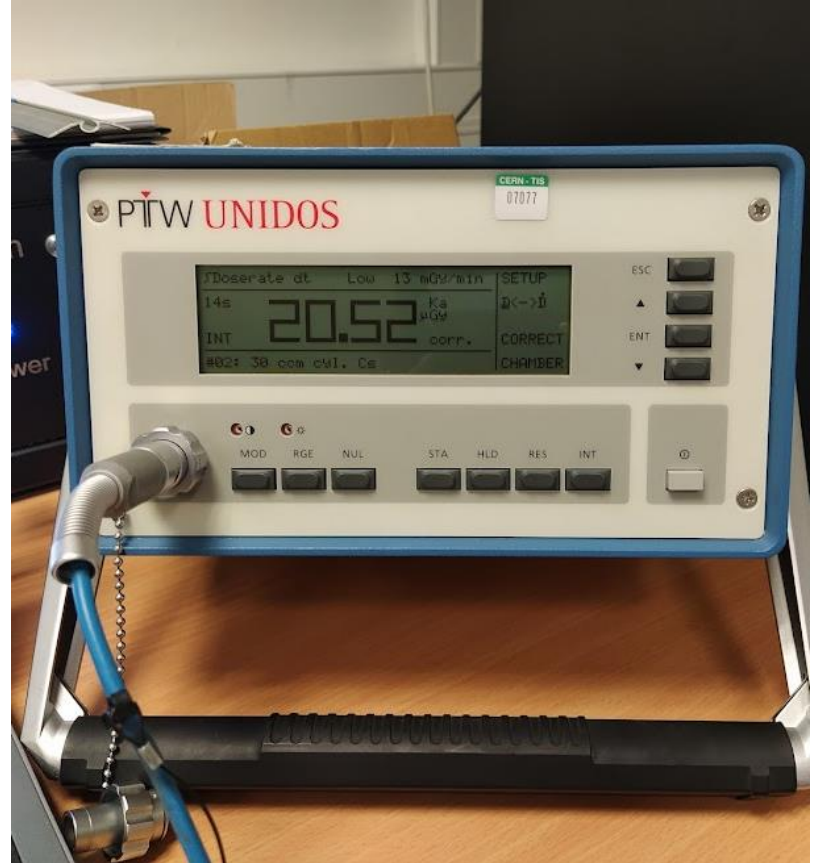
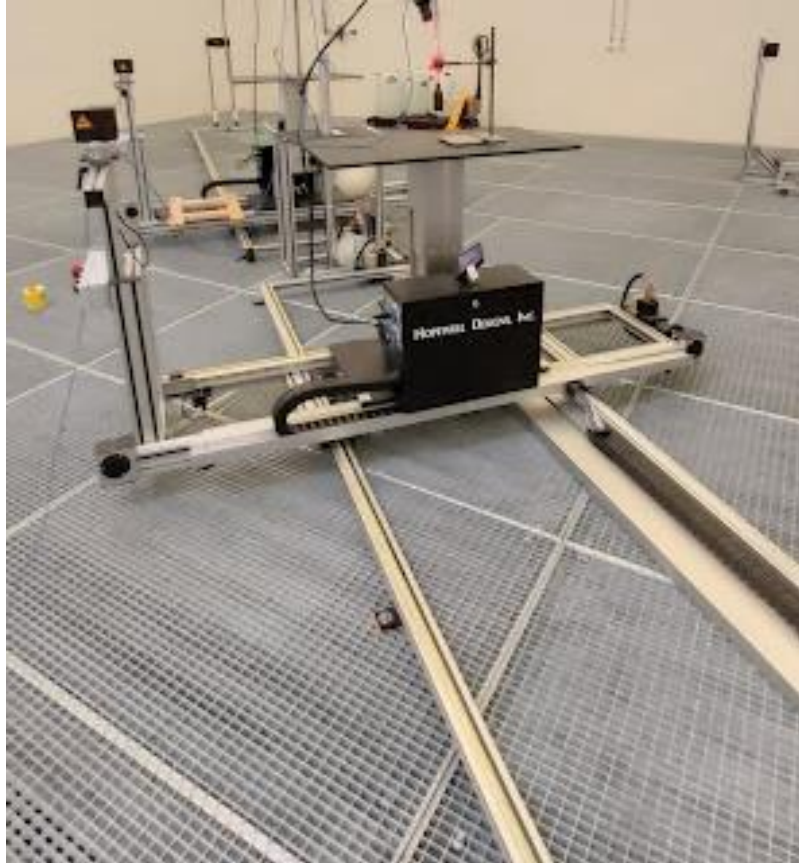
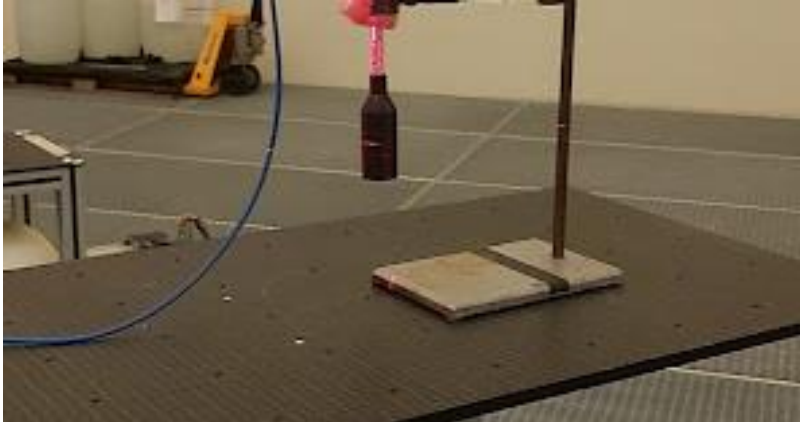
Neutrons



How does it work ?

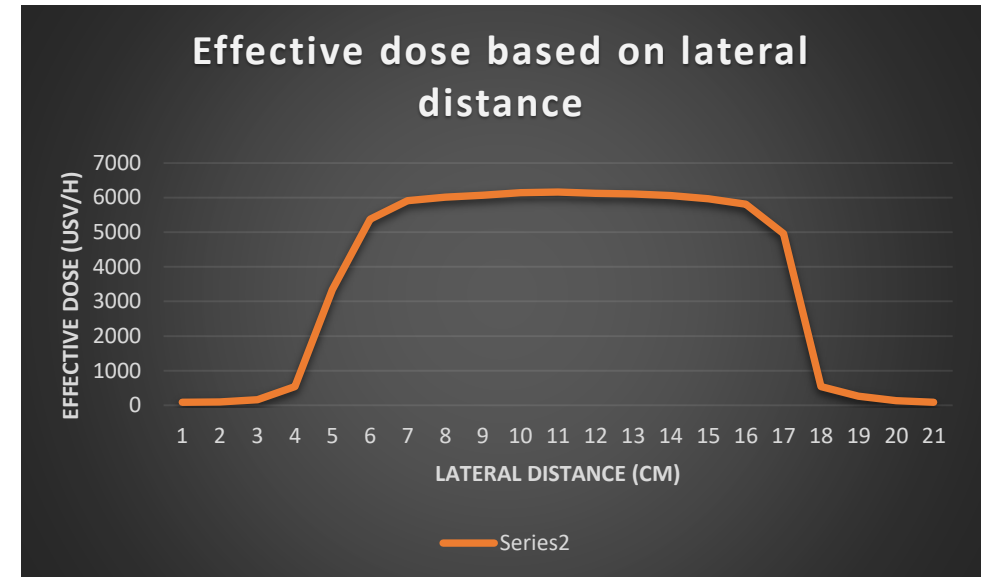
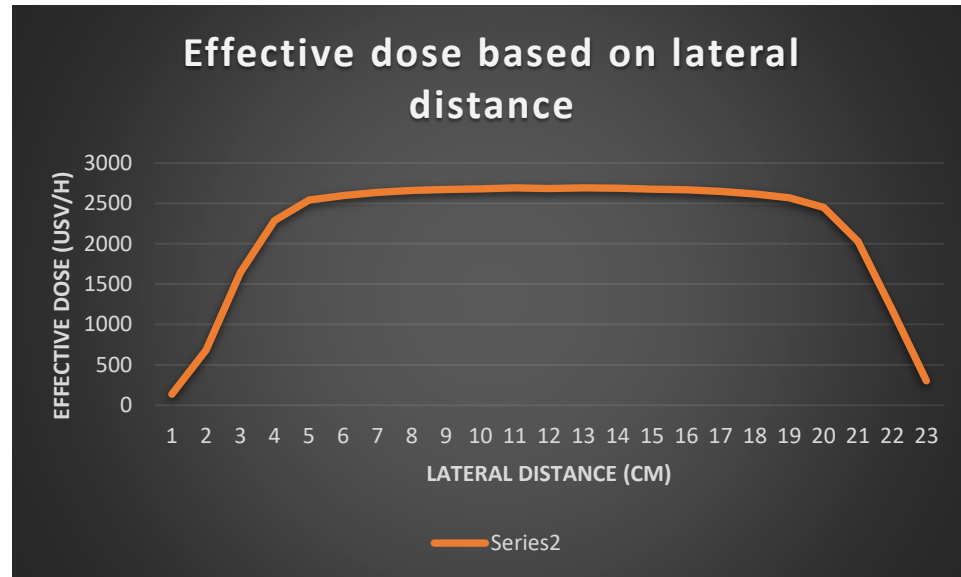


- Ionisation of the gaz by the radiations
- Attraction of the charged ions by a cathode and a anode
- An electric courant is produced  we can therefore measure radioactivity



Our project

Results



Conclusion 2

- Everyday we are exposed to natural radioactivity
- The protons of the LHC or other accelerators produce some non-natural rays
- However the radioprotection is there to make sure that nobody on the CERN site or around it gets exposed to a dangerous amount of radioactivity



Thank you for listening and many thanks to our supervisors Pierre and André for their disponibility and their kindness !