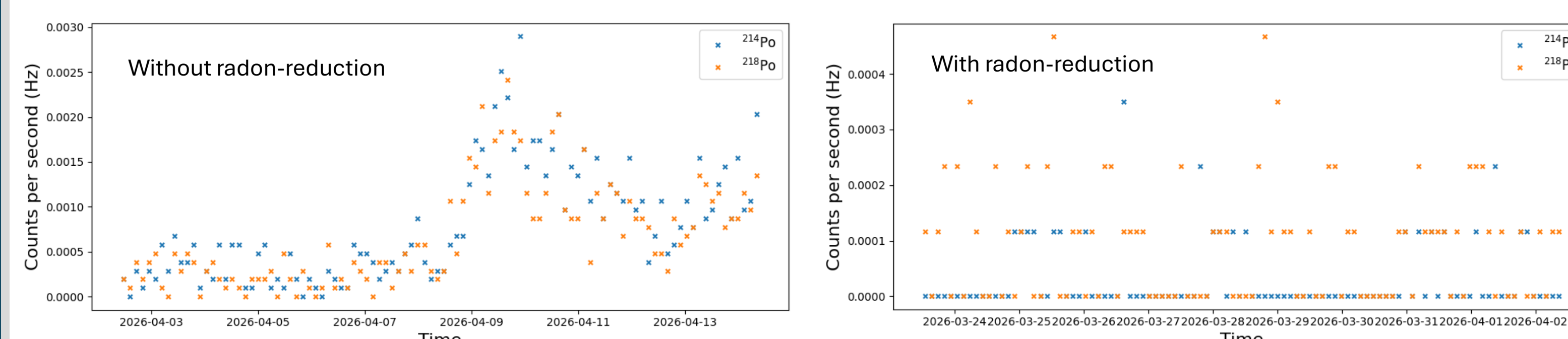


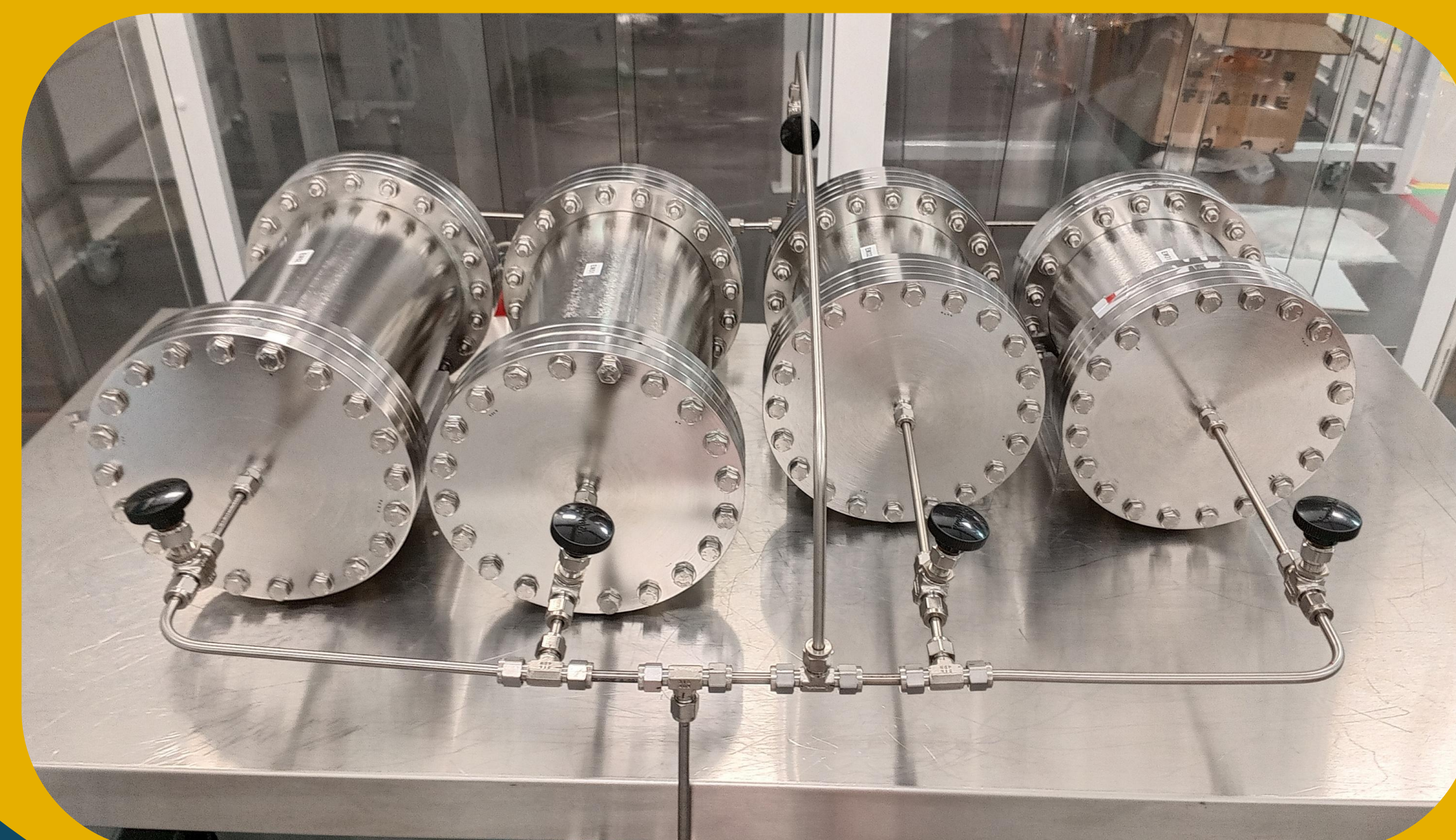
Radon Emanation at Boulby Underground Laboratory

The Boulby UnderGround Screening (BUGS) facility offers a variety of different radioassay techniques including radon emanation. Radon is a critical background in rare event searches so understanding the emanation rates of different materials and components is essential.

Boulby has very low ambient radon levels. The radon reduction system uses charcoal traps to lower the levels in the nitrogen gas even further.



Boulby currently has four emanation chambers: two 3L and two 5L.



Samples are placed in a stainless-steel chamber and flushed with radon reduced nitrogen gas before being closed and left to emanate for at least 30 days.

Gas from the chamber is spiked onto the detector using N₂ gas.

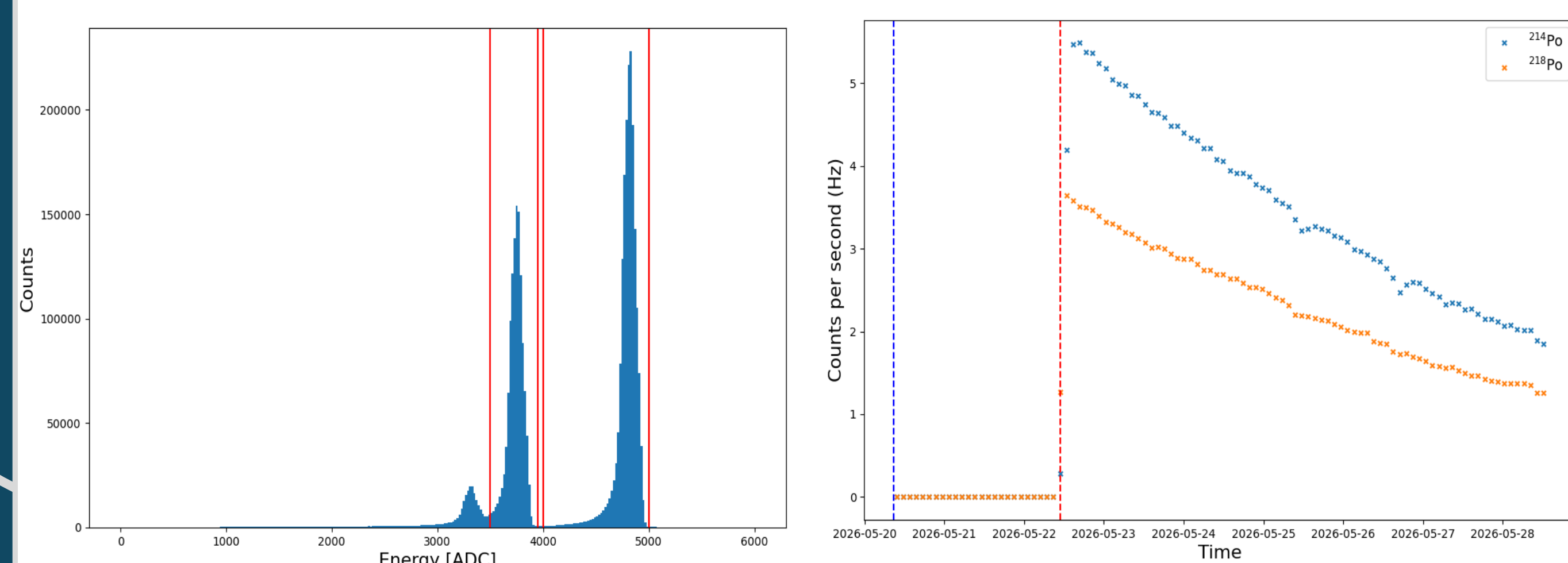
The sample gas is left on the detector for at least 7 days. During this time, radon in the gas decays and produces positively charged daughters which are drifted by an electric field towards the PIN diode at the top of the detector.

Alpha particles from Po decays produce signals in the detector.

Data is recorded using a CAEN DT5724 digitizer and CoMPASS software.

We have two radon detectors with backgrounds of $140 \pm 30 \mu\text{Bq}$ and $120 \pm 40 \mu\text{Bq}$.

The future...
Our setup includes concentration line capabilities which we hope to get up and running soon. We would also like to get more emanation chambers to increase throughput.



Data is saved to a ROOT file and analysed using a python script which calculates the radon activity.