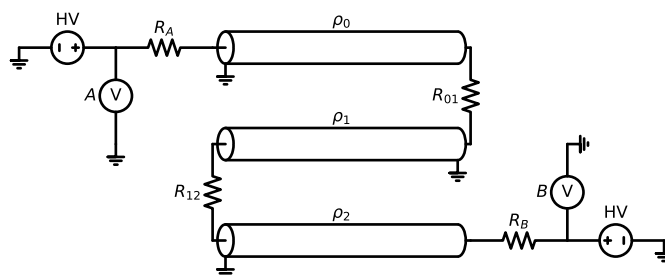
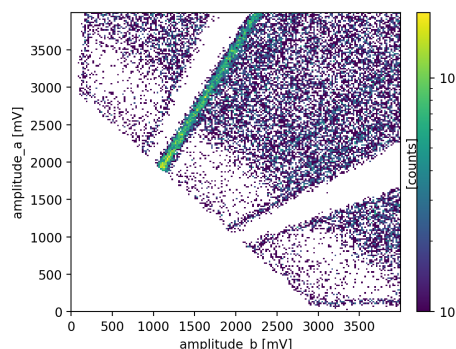


Implement an image-recognition based data quality monitor



Supervisor	?	Code difficulty	★★★★☆
Co supervisor	Gregory Tucker	Physics difficulty	★☆☆☆☆

DESCRIPTION

Data collected by neutron detectors is typically comprised of two or more coincident analogue signals. These signals are digitized and used to identify, e.g., when and where a neutron was detected. Position sensitive ^3He detectors (PSDs) produce two analogue signals from either end of a resistive wire, A and B, the ratio of which can be used to identify the neutron absorption position along the wire. Collecting the number of events as a function of A and B can be used to identify faults in a PSD; e.g., sparks at the end of a tube, or a ^3He leak produce different features in such a histogram. The signals can be stored and subsequently analysed at a later date to identify detector problems – but this has large data storage costs and will only identify problems if they are first suspected.

A new monitoring system will solve both the data storage problem and resolve the causality dilemma. This project will pull together existing technologies to identify detector problems in near real time, providing a clear indication to users and facility staff that data quality may be reduced or that detector system maintenance may be required.

- ESS has produced software to make histograms from streamed data. This project will determine how best to utilise these to produce input for the fault-identifier.
- Artificial intelligence techniques have become a standard way to identify features in 2D images. A limited set of test data to train an AI model, but the project may include collecting real- or producing simulated-data if more is required.
- Fault information will be communicated, via the ESS streaming infrastructure. How the information is presented to end users will be determined as part of the project.

REQUIREMENTS

Experience with Python. Additionally UI/UX or AI experience would be of benefit.

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