

DSP Based Radiation Spectrometer

Organization:

International Space & Response (ISR) Division of Los Alamos National Laboratory

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Project Description:

We would like to have a team design and build a simple radiation detector/spectrometer that employs digital signal processing methods to characterize an output of a Helium-3 filled neutron detector tube. A suitable tube will be provided to the team that is sensitive to the natural background radiation so that a radioactive source will not be needed for testing. The goal is to demonstrate a “direct to digital design” by implementing the necessary functionality with as simple of an analog signal chain as possible between the detector and ADC. The detector requires roughly a 1000VDC bias voltage (<1uA) and the system should be self contained. Ideally the data would be displayed on a built in touch screen interface, but is not required.

Relevance:

This is meant to be a proof of concept for doing what has been traditionally done using a fully analog signal chain that is tuned and optimized for a particular measurement with a much smaller and simpler piece of hardware that can be eventually flown in space. This is the radiation measurement equivalent to what software defined radios did to wireless communications in recent years. The underlying technology that makes this theoretically possible is coming on the market with the necessary radiation hardness to make spaced based applications viable.