

## **Low Cost front-end readout electronic for instrumentation used in Neutron experiments.**

### **ABSTRACT**

In the field of material characterization, the neutron scattering technique is found to be useful in so many applications. This technique requires a position sensitive neutron detector (PSND) and their front-end readouts (FER) electronic to detect the position of neutron interactions. Normally, the PSND is designed for specific applications and has unique technical specifications. Therefore, it requires a customised electronic FER to match its specifications. Furthermore, a large active area requires a large number of FER electronic and, therefore, there is, also, an increased development cost. This paper presents a simple and low-cost design for FER electronic which consists of an eight channels preamplifier-shaper suitable for instrumentation used in neutron experiments. This FER was built entirely with low-noise FET-input operational amplifier (Op-amp) and passive components. The development cost is around U.S. \$50/channel. Results have shown that it is capable of accepting a wide dynamic range input charge (20 to 600 fC) with an excellent output linearity (nonlinearity < 1%). It has a good equivalent noise charge (ENC) with a performance average of 2113 e<sup>-</sup> and is less sensitive to input capacitance variation (24 e<sup>-</sup>/pF).

**Keyword:** Low-cost; Front-end readout; Preamplifier; Shaper; Neutron experiments