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Estimated pulse height spectrum with pulse pile-up correction for Neutron Monitor of Mexico City

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The operating principles of Neutron Monitors are nuclear reactions within the proportional counters. The output signal of these is an electric pulse for every secondary cosmic ray particle that interacts with the detector. Then, the amplitude of the pulse signal reflects the amount of charge generated on each individual interaction. The estimated pulse height distribution provides an energy resolution index and useful parameter to determine the proper operation of the detector. As a result, random nature of cosmic radiation, in addition to the operating characteristics of the detector and the electronic system, lead to a phenomenon called pulse *pile-up*. The effect of the pulse *pile-up* on the recorded pulse height spectra, can be seen on the added wings in the energy peaks of the distribution. This reduces the energy resolution of the instrument.
In the present work, we describe an algorithm that takes advantage of mathematical techniques of digital signal processing with the purpose of calculating the pulse amplitude distribution lessening the distortion caused by pulse *pile-up*. The algorithm was written in *python*, using *numpy* and *scipy* libraries. Finally, we present the results of applying the algorithm to signals from the neutron monitor operating at mexico city.

Collaboration

– not specified –

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