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Algorithms for Pulse Shape Analysis Using Silicon Detectors<sup>1</sup> IAIN DARBY, SEAN LIDDICK, University of Tennessee, ROBERT GRZYWACZ, University of Tennessee; Physics Division Oak Ridge National Laboratory — The development of digital pulse processing, wherein the traditional shaping and timing circuitry are replaced by mathematical routines operating on a digitized preamplifier signal, have enabled the implementation of sophisticated pulse shape analysis (PSA) algorithms. This allows substantially more information to be extracted from an experimental pulse than is possible with a traditional analogue system. By applying PSA to Si detectors it is possible to selectively identify experimental pulses arising from specific physical processes. The application of pulse-shape analysis to Silicon strip detectors will be described for the selective identification of pile-up pulses resulting from the sequential  $\alpha$ -decay of <sup>109</sup>Xe and <sup>105</sup>Te isotopes. A two stage offline PSA algorithm is detailed, which is able to detect pile-up pulses from the sequential alpha decays with time differences between the two individual pulses as low as 100 ns over a wide range of relative amplitudes. The methods to construct idealised pulses and the subsequent extraction of energy and time from experimental measurements will be presented.

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