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Development of a Pulse-Train Recorder for Safeguards

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A list-mode pulse-train recorder, PTR-32HV has been developed by the Hungarian Centre for Energy Research. The hardware has been authorized by the IAEA for safeguards applications. The finished unit provides 32 input channels, high voltage output, low-voltage output and is controlled over a USB port. Each input channel can be used independent or in sum for neutron multiplicity analysis. Independently used channels can replace several parallel working conventional shift registers. The hardware can be controlled by the INCC software package used by the IAEA or by software provided by the vender.

The vender software provides four distribution views including follow-up time, multiplicity, Rossi-alpha and impulse rate. There are several channel related and other utility functions like merging, unfolding, deleting and chopping. We have recently expanded the data analysis software to include conventional signal-triggered shift-register multiplicity analysis and Feynman variance-of-the-mean analysis in addition to incorporating fast-accidentals sampling (FAS). We have also expanded the available error analysis to include the calculated standard deviation, Dytlewski-Ensslin theoretical error calculation and a new variance analysis technique applicable to FAS and Feynman analysis.

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