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P2.65: Charge reset shaping multiplexing for SiPMs using deep learning architecture

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This study proposes a new signal multiplexing method for molecular imaging systems used in nuclear medicine, which can reduce the number of readout channels by utilizing charge reset amplifiers and a deep learning model. The results show that the proposed method can reduce 16 readout channels to one without distorting the original signal, using charge reset preamplifier and deep learning architecture. The proposed method is tested using a 4x4 Ce:GAGG scintillator array and a 4x4 SiPM array with a 137Cs radiation source. The average energy resolution was 11.87%, and the crystal positioning map also indicates that distinct SiPM array pixel identification is possible without the need for a charge division method. The proposed method could help reduce the cost and complexity of NM systems while maintaining or improving their performance. Future work will focus on expanding the technique to accurately identify a greater number of crystals while also increasing the ratio of crystals to SiPMs.

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