

Abstract Submitted  
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**Frequency Domain Multiplexing for Use With NaI[Tl] Detectors<sup>1</sup>**

SAMUEL BELLING, Duke University, COHERENT COLLABORATION — A process used in many forms of signal communication known as multiplexing is adapted for the purpose of combining signals from NaI[Tl] detectors so that fewer digitizer channels can be used to process the signal information from large experiments within the COHERENT collaboration. Each signal is passed through a ringing circuit to modulate it with a characteristic frequency. Information about the signal can be extracted from its amplitude, frequency, and phase. Simulations in LTSpice show that an operational amplifier circuit with a parallel LRC feedback loop can serve as the modulating circuit. Several such circuits can be constructed and housed compactly in a unit, and fed to an inverting, summing amplifier with tunable gain, such that the signals are carried by one cable. The signals are analyzed based on a Fourier transform after being digitized. The results show that the energy, channel, and time of the original interaction can be recovered by this process. In some cases it is possible through filtering and deconvolution to recover the shape of the original signal. The effort is ongoing, but with the design presented it is possible to multiplex 10 detectors into a single digitizer channel.

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