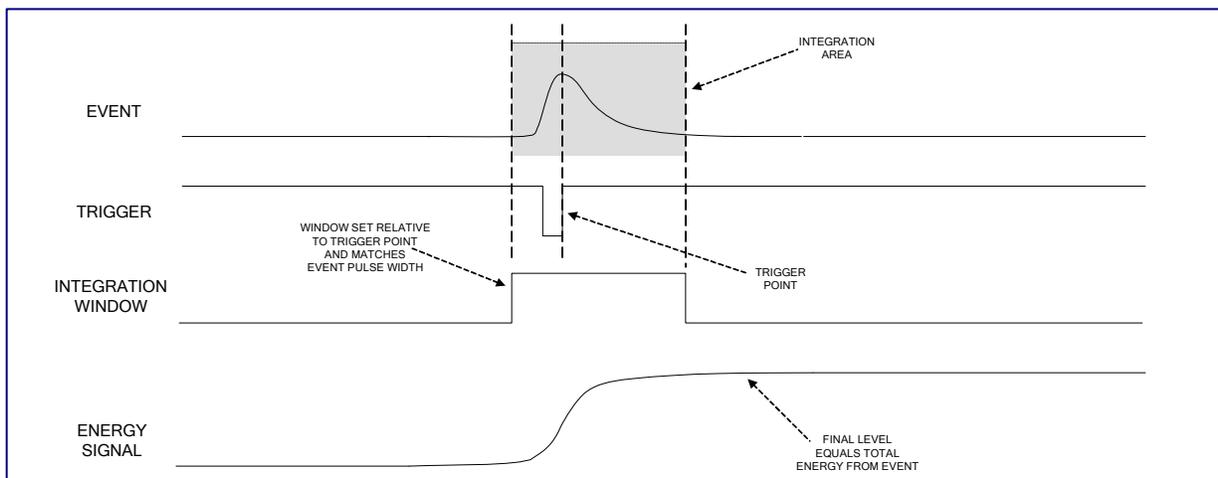A typical setup for a PET scanner application using a PhotoniQ, a SIB2316 and two silicon photomultiplier arrays (SPMArray) is shown below. The SPMArrays are positioned to detect incoming light from a scintillator crystal or optical assembly and connected to the SIB2316 by two FPC cables. The sensor interface board cable (SIB cable) connects the 32 detector outputs from the SIB2316 to a PhotoniQ IQSP480 or IQSP580 32 channel data acquisition system. Bias to the detectors is provided from bias supplies on the SIB2316 and controlled through the PhotoniQ graphical user interface. The two independent bias supplies on the SIB2316 allow each SPMArray to be individually trimmed to optimize gain matching of the silicon photomultiplier devices. The trigger output from the SIB2316 supplies the trigger to the PhotoniQ when coincident pulses exceeding a user-programmed energy threshold are detected on the two SPMArrays. Alternatively, the coincidence function can be bypassed altogether and the PhotoniQ triggered when a single pulse from either SPMArray exceeds the energy threshold. The energy threshold is also controlled through the PhotoniQ GUI. Each time the PhotoniQ is triggered, the total energy from each channel from each SPMArray (32 channels total) is digitized in parallel and sent to a PC over a USB 2.0 connection for display, logging, or real time processing.
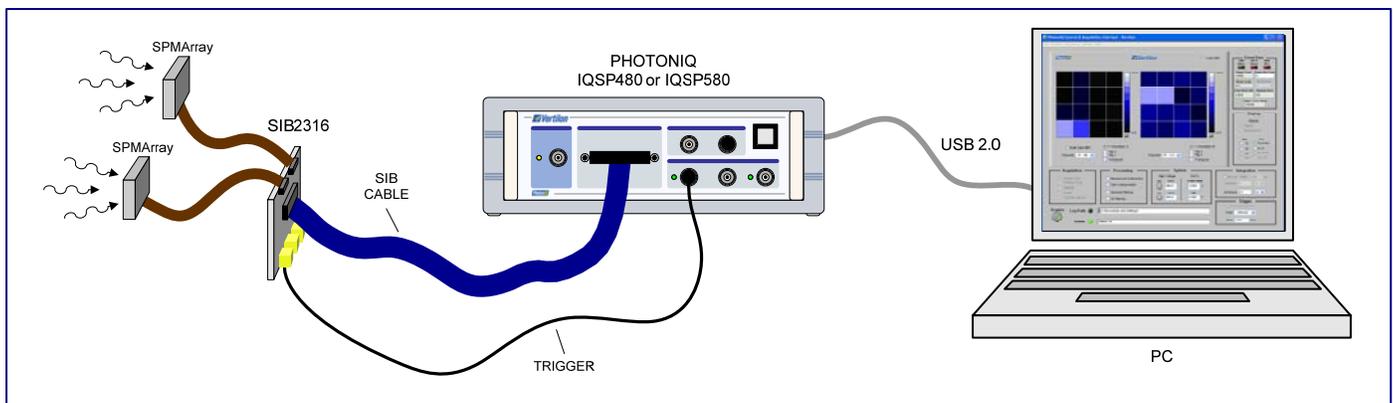
In a PET application, the PhotoniQ is configured in pre-trigger mode so that the unit can capture the energy information from the detectors that occurred just prior to the trigger signal. This powerful triggering mode allows the data acquisition unit to be timed to the pulse peaks yet still collect the entire signal from the particle event — including the portion of the signal that preceded the peak of the event. Timing for this mode is shown below.

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