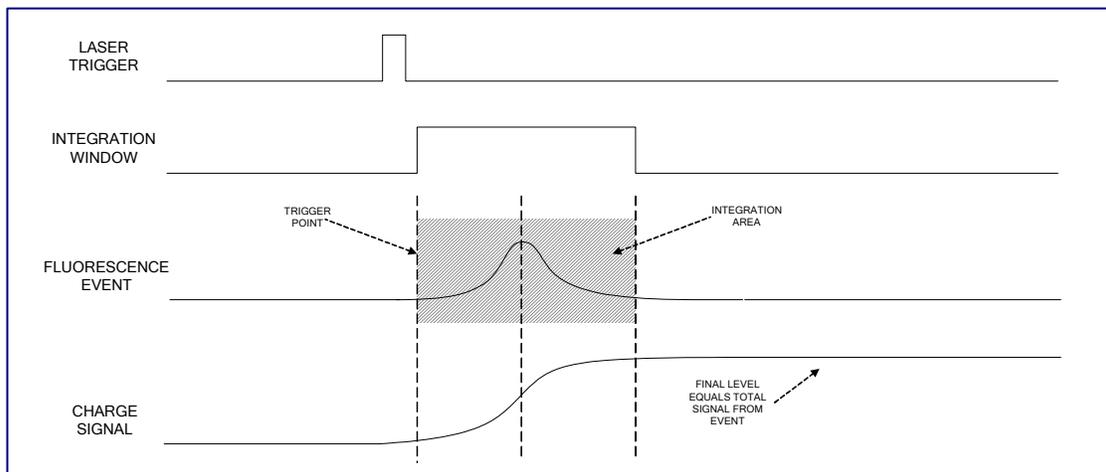DNA sequencing applications require the use of four or more photomultiplier tubes to detect the fluorescence from DNA fragments labeled with fluorescent dyes — each dye indicating the presence of a DNA fragment with one of the four DNA bases (T, A, G, C). A typical setup using a PhotoniQ, four photomultiplier tubes, optics, a laser, and a microcapillary electrophoresis array containing the DNA fragments is shown below. The PMTs are positioned with the optics to detect the fluorescence from the DNA fragments labeled with the individual dye markers. Each PMT connects to a charge sensitive preamp input on a PhotoniQ IQSP418 or IQSP518 multichannel PMT data acquisition system. The data acquisition system is triggered to coincide with the firing of the excitation laser such that each event consisting of the integrated outputs from the four PMTs, is digitized and recorded by the unit. The resulting data from the PhotoniQ is sent to a PC over a USB 2.0 connection for display, logging, or real time processing. Bias to the PMT detectors is controlled by connecting the front panel DAC output from the PhotoniQ to the detector bias adjust input on the PMTs. Since many PMTs have a low voltage control input to set the high voltage to the cathode, this provides a convenient means for the user to set the PMT gain through the PhotoniQ GUI or user's custom software application.
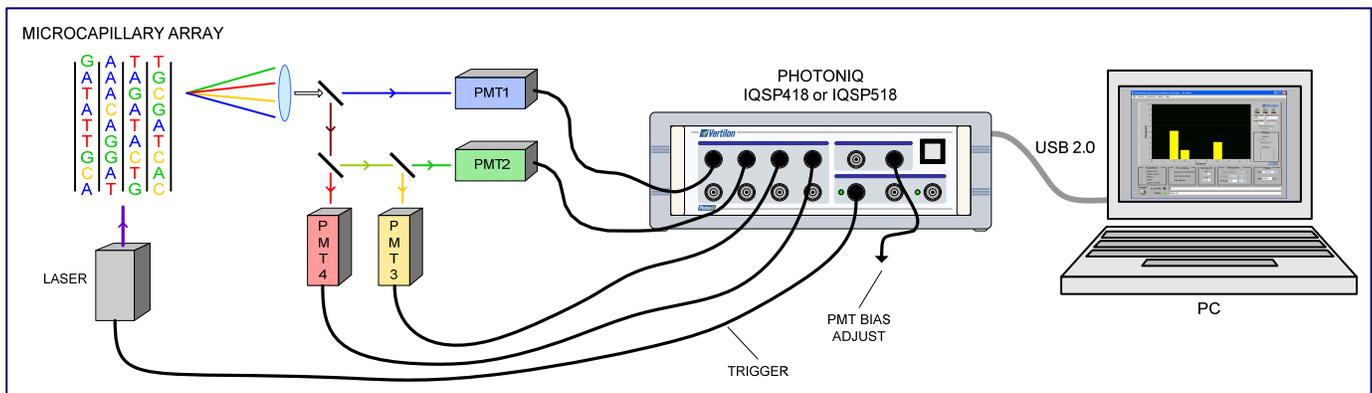
In DNA sequencing the PhotoniQ is configured in edge trigger mode so that the unit captures the fluorescence signals detected by the PMTs for a pre-defined period of time immediately following the firing of the excitation laser. This period is called the *integration time* and corresponds to the interval over which the PhotoniQ integrates the resulting fluorescence signal. Timing for this mode is shown below.

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Vertilon Corporation, 66 Tadmuck Road, Westford, MA 01886   /   Tel: (978) 692-7070   /   Fax: (978) 692-7010   /   www.vertilon.com