

Autocorrelation and cross-correlation
measurements of green picosecond pulses
based on the two-photon-induced photocurrent
in a photodiode.

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Why measuring short laser pulses is not a trivial problem?

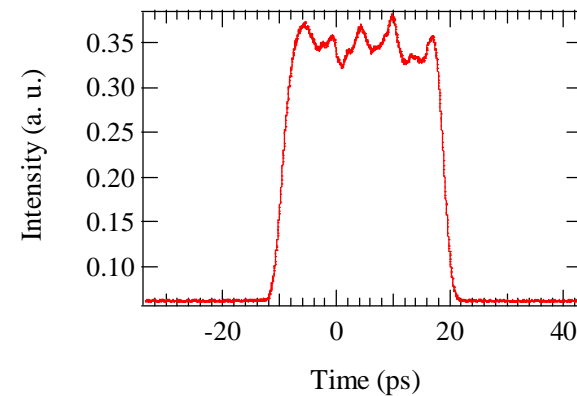
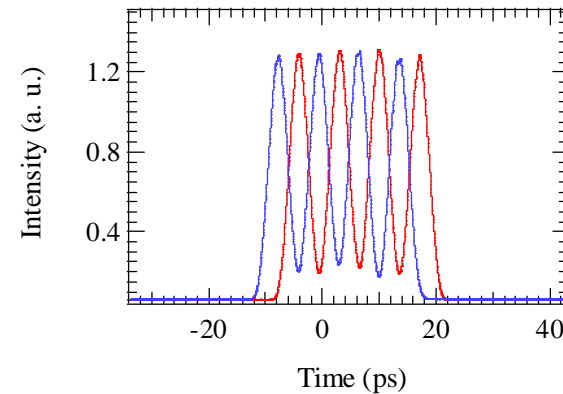
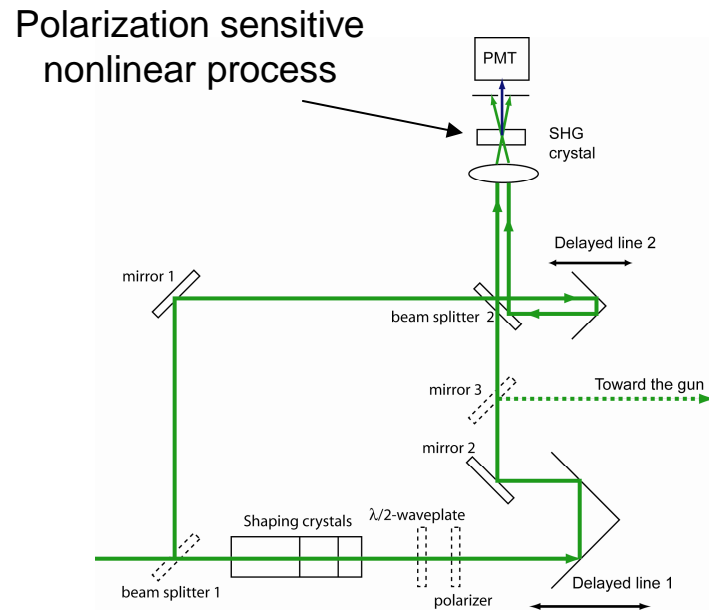
Electronics devices (diodes, oscilloscopes, etc) are not fast enough to allow direct measurement of picosecond and femtosecond pulses.

Several techniques have been developed that allow short pulse duration measurement:

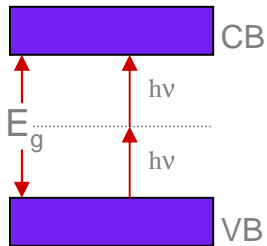
- cross correlation
- auto-correlation
- spectral phase interferometry for direct electric field reconstruction (SPIDER)
- frequency resolved optical gating (FROG)

ERL laser system pulse measurements

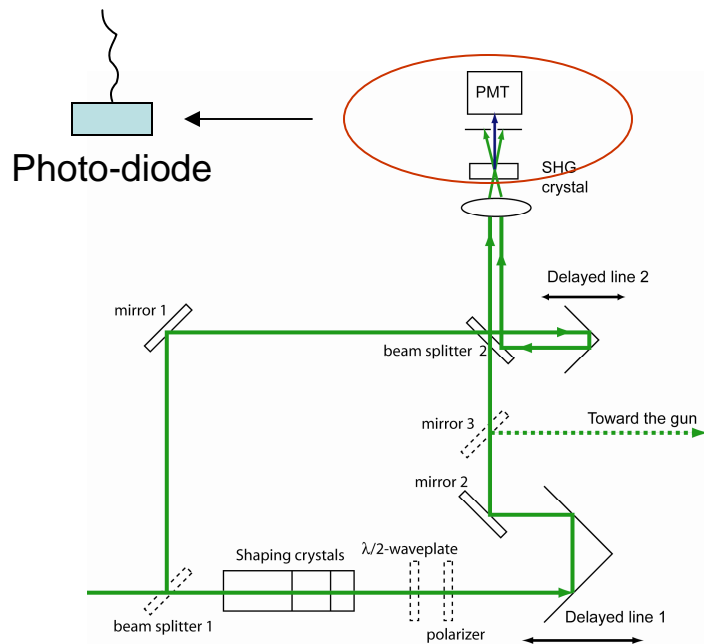
- 2-ps original pulse
- pulse shaping by stacking in birefringent media
- sequence of pulses with alternating polarization



Two-photon-induced photocurrent in a photodiode



- $h\nu < E_g < 2h\nu$
- two-photon induced photocurrent $\sim I^2$



Project goals:

1. To identify commercially available diodes with proper characteristics.
2. To characterize the two-photon response of these diodes using the ERL laser system.
3. To build auto/cross-correlator based on a selected diode.
4. To identify and quantify errors in autocorrelation measurement.