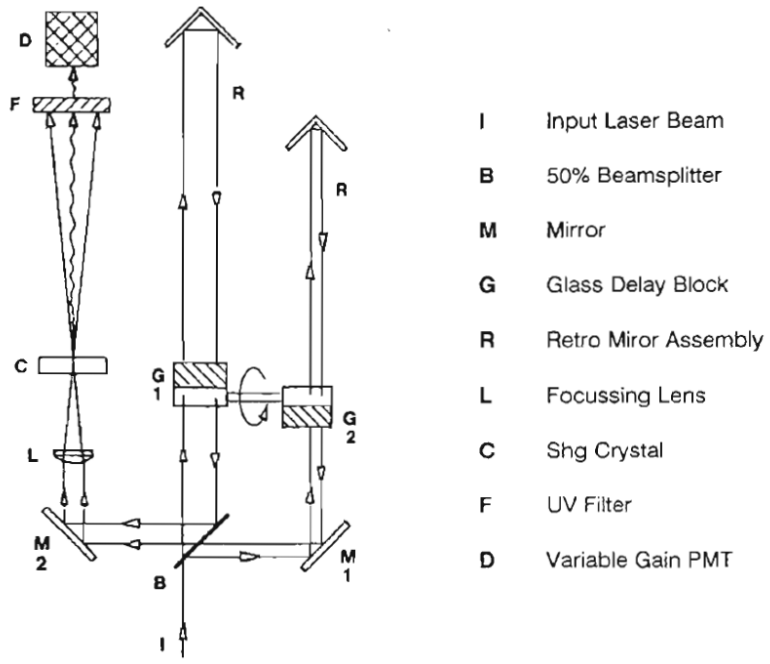
The autocorrelator (AC) is a tool that measures the pulse width of an optical pulse. Our AC (Inrad 5-14B) is able to measure pulse widths down to ~200 fs and up to ~60 ps.

The AC needs pulses with a high input power in order to measure their widths. For the 20 MHz Pritel laser for example, you'll need more than 0 dBm average power – 7dBm average power gave good AC traces. The input polarization should be TM, and you should use a clean flat fiber connector.

Before doing any kind of measurements, make sure that you really are sending in pulses. If you want to measure the pulse width from a MLL, make sure it's mode locked (either with the DCA or with an ESA).

The setup is very simple. You just need a pulsed source, a polarization controller, and the AC. Connect the AC to an oscilloscope. To get an AC trace within minutes, follow these simple steps.



I	Input Laser Beam
B	50% Beamsplitter
M	Mirror
G	Glass Delay Block
R	Retro Miror Assembly
L	Focussing Lens
C	Shg Crystal
F	UV Filter
D	Variable Gain PMT

1. Make sure the light input is TM polarized. With the AC turned off, but the laser turned on, open the cover of the AC. Hold an IR sensitive card in front of R (left) and rotate the glass delay box until you see a beam on the IR card. Place a Polarizing beam splitter between G1 and R (left), and adjust the polarization controller to maximize TM.
2. Place the IR card in front of F. Adjust the knobs at the input (I) and the mirrors (M1, M2) until the IR card shows two dots that are symmetrically spaced around the center of the aperture at F. Close the aperture at F so that the two IR dots do not enter the aperture. The opening should be on the order of 7 mm. Refer to the figure below, which shows how the IR dots can look on the IR card just in front of F.

3. Close the AC and turn it on. Also turn on the oscilloscope. Set the horizontal range to ~10 µs or more.
4. Turn the gain of the AC on until noise appears on the oscilloscope.
5. Change the focus knob until you see a dip in the AC trace. The AC trace should look like an upside down Gaussian.
6. Fine tune the tilt, focus, polarization, and the knobs at I to get the best looking AC trace without saturating the detector. For 1550 nm, the tilt should be ~3.55°. If the detector saturates, the minimum of you AC trace will no longer look like an upside down Gaussian, instead it will be a flat line. You'll get the best looking AC traces with the lowest gain settings, so make sure you optimize all variables.
7. Measure the FWHM of your AC trace. 1 ms on the oscilloscope trace translates to 9.9 ps in the optical domain. This value must be multiplied by 0.707 (1, 0.5) assuming that the pulse is a Gaussian (Square, Lorenzian).