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### **What are the differences between FROG Scan and single shot (SS) geometries?**

FROG Scan is a scanning, multi-shot geometry. Rather than use two large beams that are crossed at an angle, FROG Scan uses two beams that are focused at the crystal. Advantages of FROG Scan:

- 1) More freedom in choosing the time window. SS devices have limited time windows that cannot be adjusted.
- 2) Better detector dynamic range. 16-bit vs. 8-bit so you can better handle low-level signals.
- 3) Better spectral resolution. You need good spectral resolution to measure long, transform limited pulses, shaped pulses and high order phase distortions.

Disadvantages:

- 1) You need a series of pulses.

### **Why FROG Scan over other scanning FROG implementations?**

Other scanning implementations of FROG do not offer the range of spectral resolution, temporal resolution, crystal choices, and measurement speed that you need.

- 1) Long scan autocorrelators found in some kits are based have a time resolution of 25 fs. FROG Scan offers a 1 fs scan step size, with a 2 fs resolution—fine enough to measure anything that comes your way.
- 2) Spectral resolution: Measuring long, transform-limited pulses requires good spectral resolution. A transform limited 1 ps pulse has a spectral bandwidth of only  $15 \text{ cm}^{-1}$ . An SHG FROG device requires a resolution 0.34 nm at 400 nm to measure such a pulse accurately. Other systems offer 0.5 nm as their best, which is barely enough to do 470 fs at 800 nm.
- 3) The other scanning implementations can't measure shaped pulses—not enough spectral resolution.
- 4) The other scanning implementations have only 1024 detectors in its spectrometer. We offer twice that, which means better averaging and signal-to-noise ratios.
- 5) Speed. Other scanning implementations are not real-time. Our system has an update rate of 1-2 Hz—20X faster than competing systems.
- 6) Some other scanning FROG implementations are huge—nearly 2 ft x 3 ft. FROG scan is only 6" x 12" on your optical table. Small size means easier alignment and more robust measurement.