# Laser System for Charged Particle Optical Detection (CPOD)

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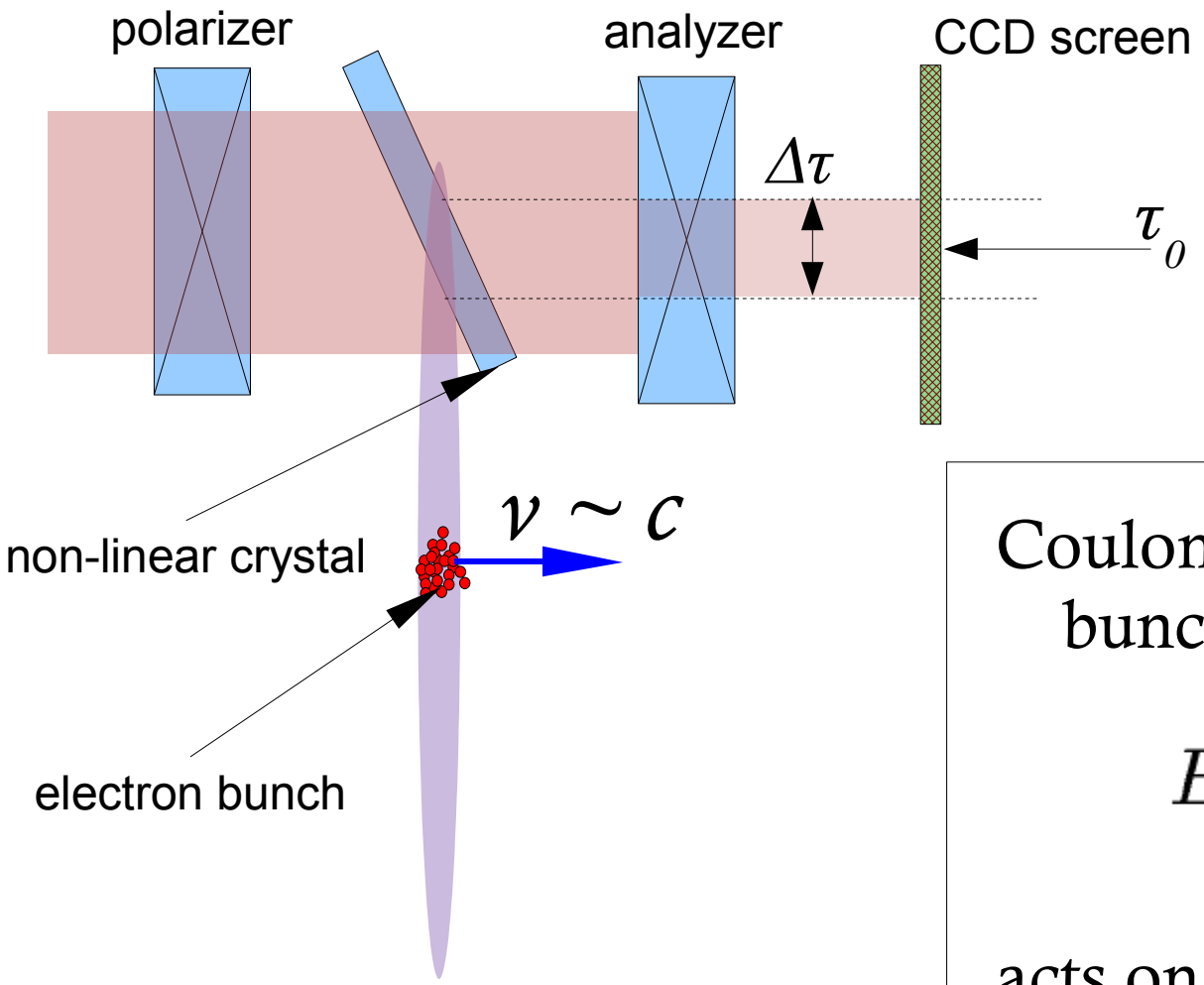
# CPOD Technique

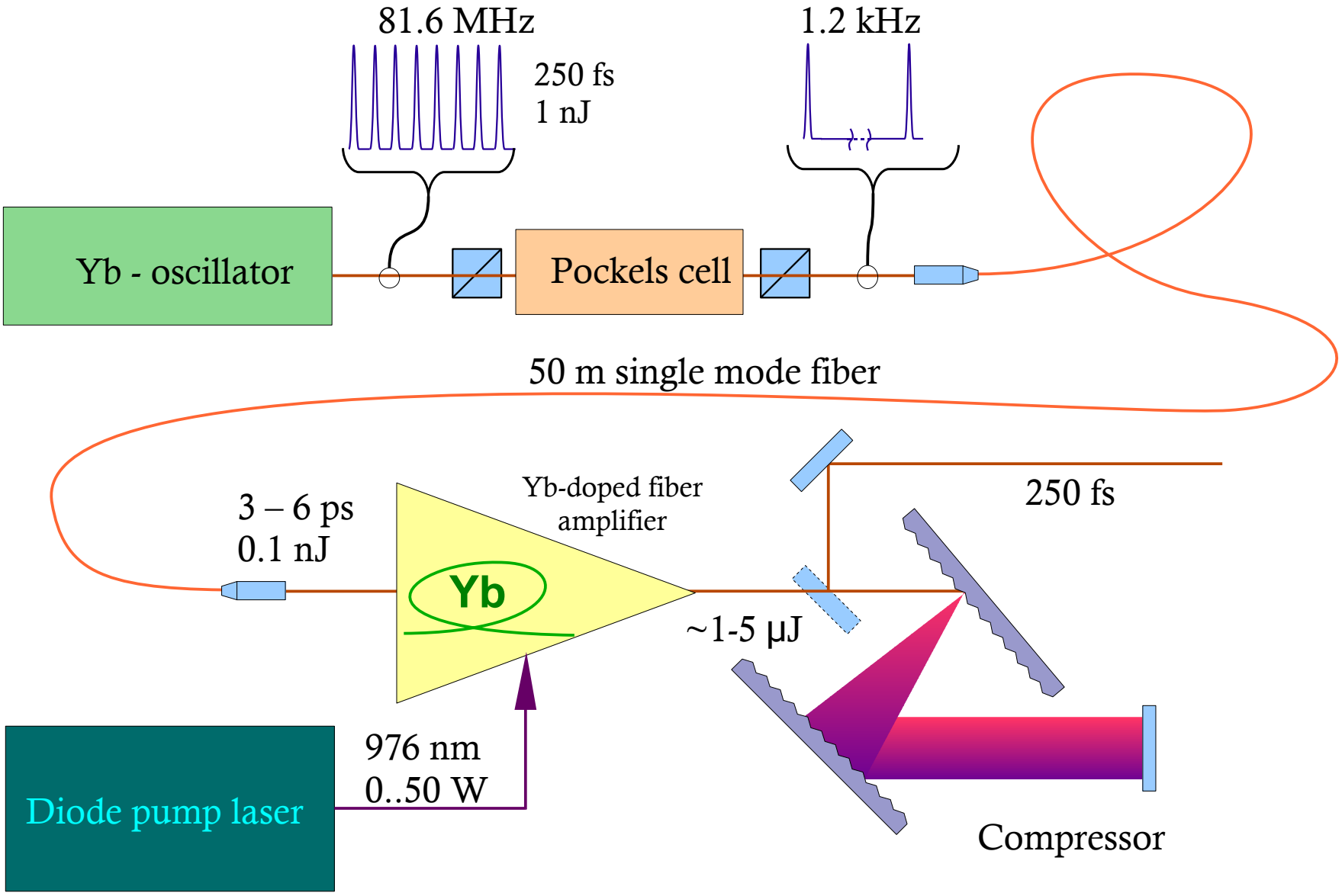



Coulomb field of the electron bunch:

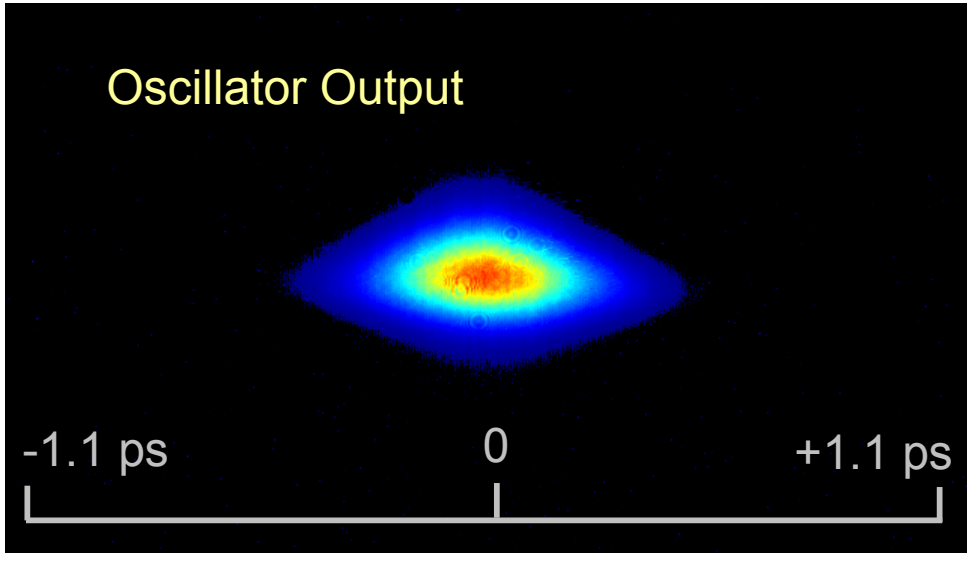
$$E = \gamma N_e \frac{q}{4\pi\epsilon_0 r^2}$$

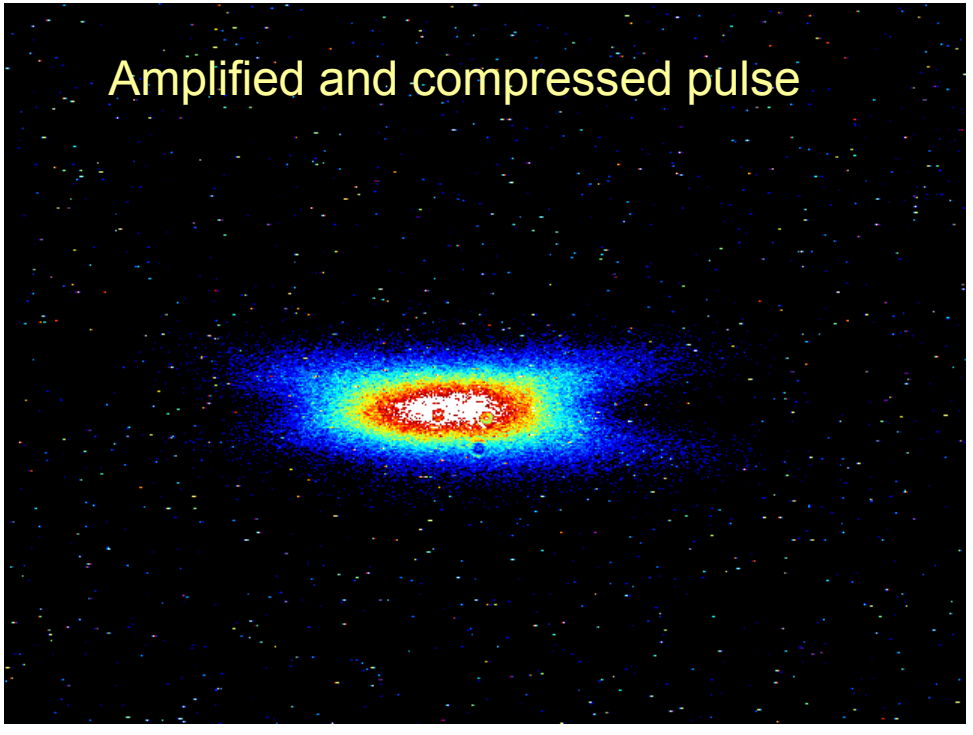
acts on the nonlinear crystal inducing birefringence that can be detected with the help of a short laser pulse

# Laser setup for CPOD



# Temporal shape of laser pulse FROG measurements

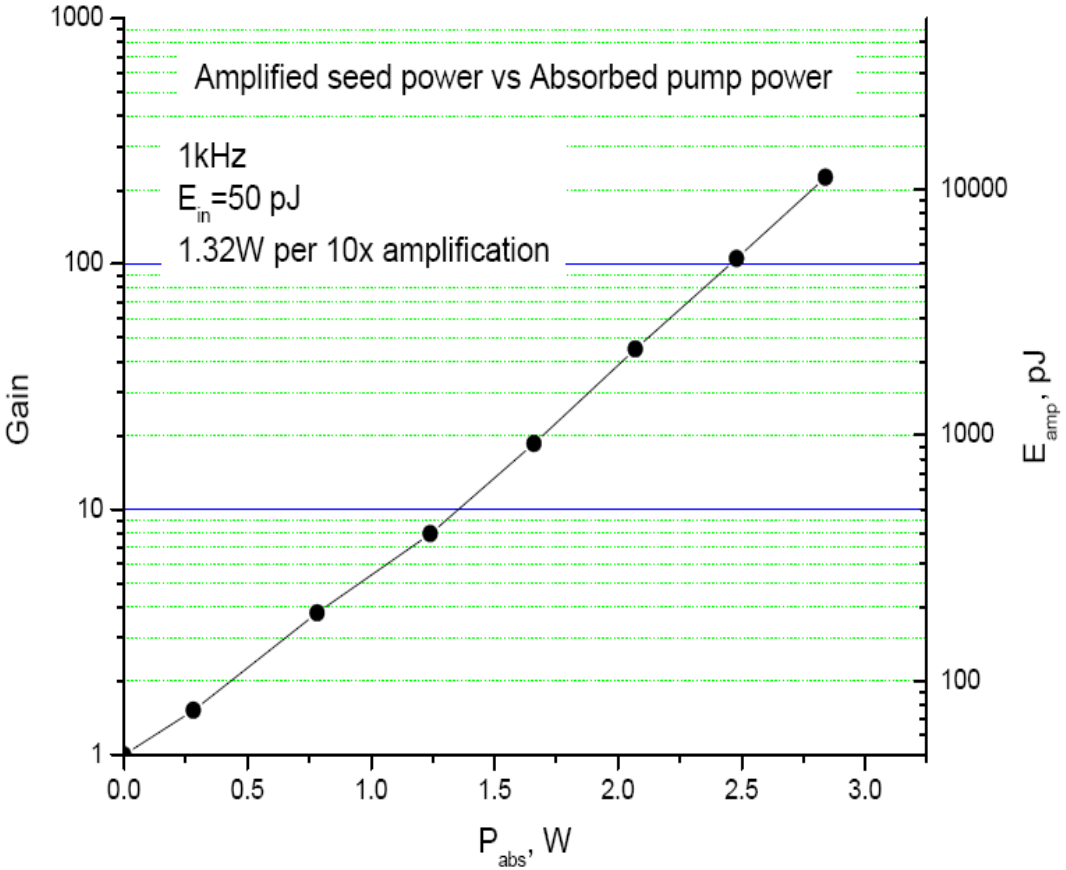


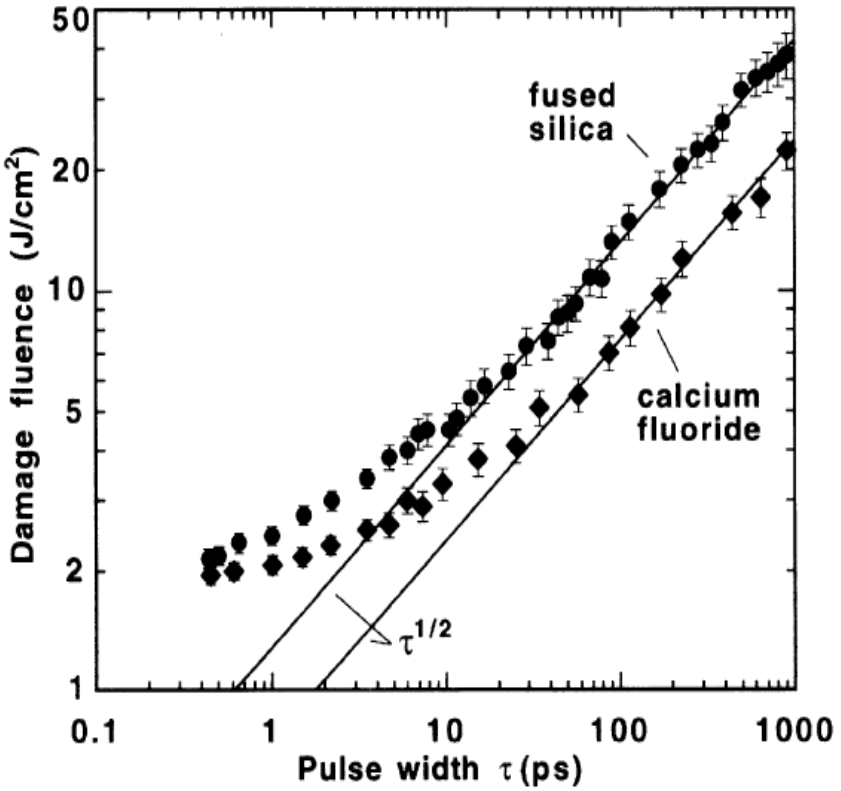




- Duration of the oscillator pulse is about **250 fs**
- GVD in the fiber causes pulse broadening.
- The original pulse duration can be restored with help of the grating compressor

# Laser pulse energy

- S/N ratio scales linearly with laser pulse energy
- The optical damage threshold is around 10 μJ (3ps) for 20 μm–core fiber
- This pulse energy is expected at pump power of 5.5 W




Stuart et. al PRL 74 (1995), p 2248

# Summary

- We designed and build a laser system for Charge Particle Optical Detection Experiment
- The laser system is capable to produce 250fs pulse
- The maximum output energy is limited by 1-5 μJ