

Multi-Wavelength, 1.5 - 10 μm Tunable, Tandem OPO

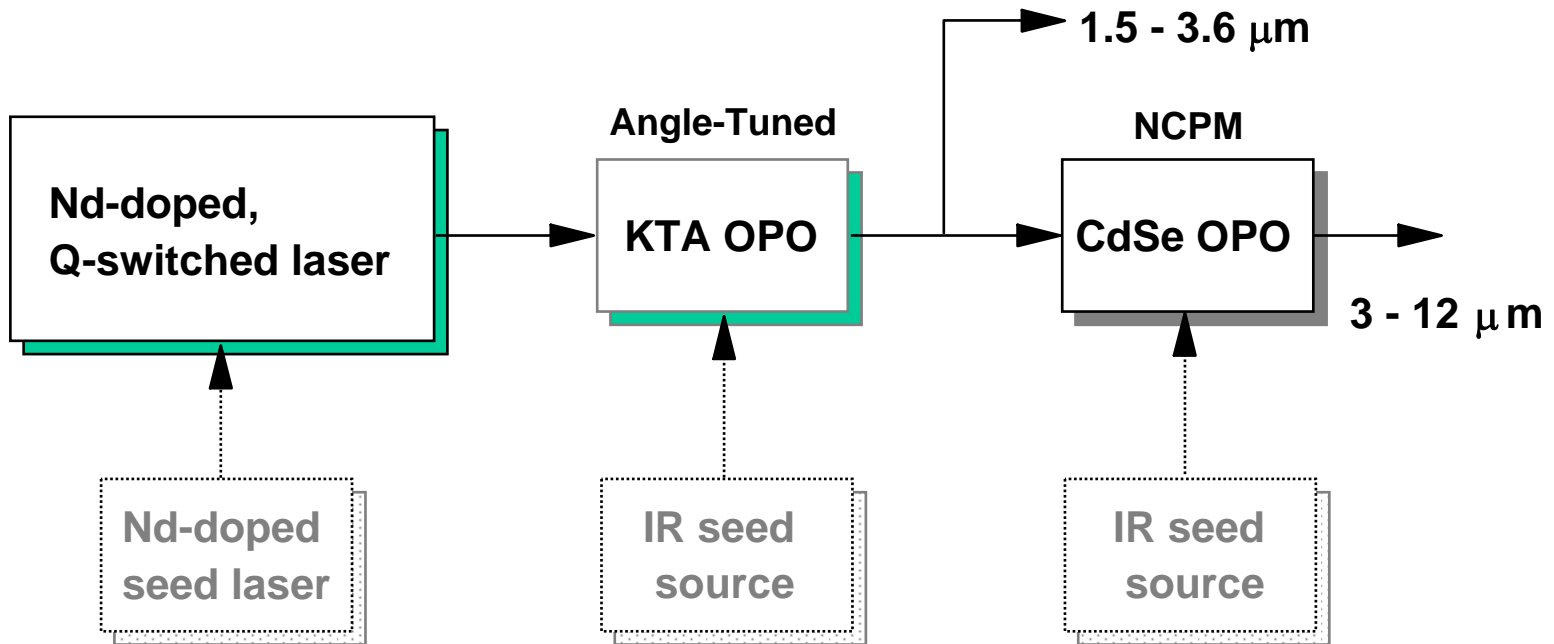
Yelena Isynova, David Welford, Peter Moulton, and Alex Dergachev



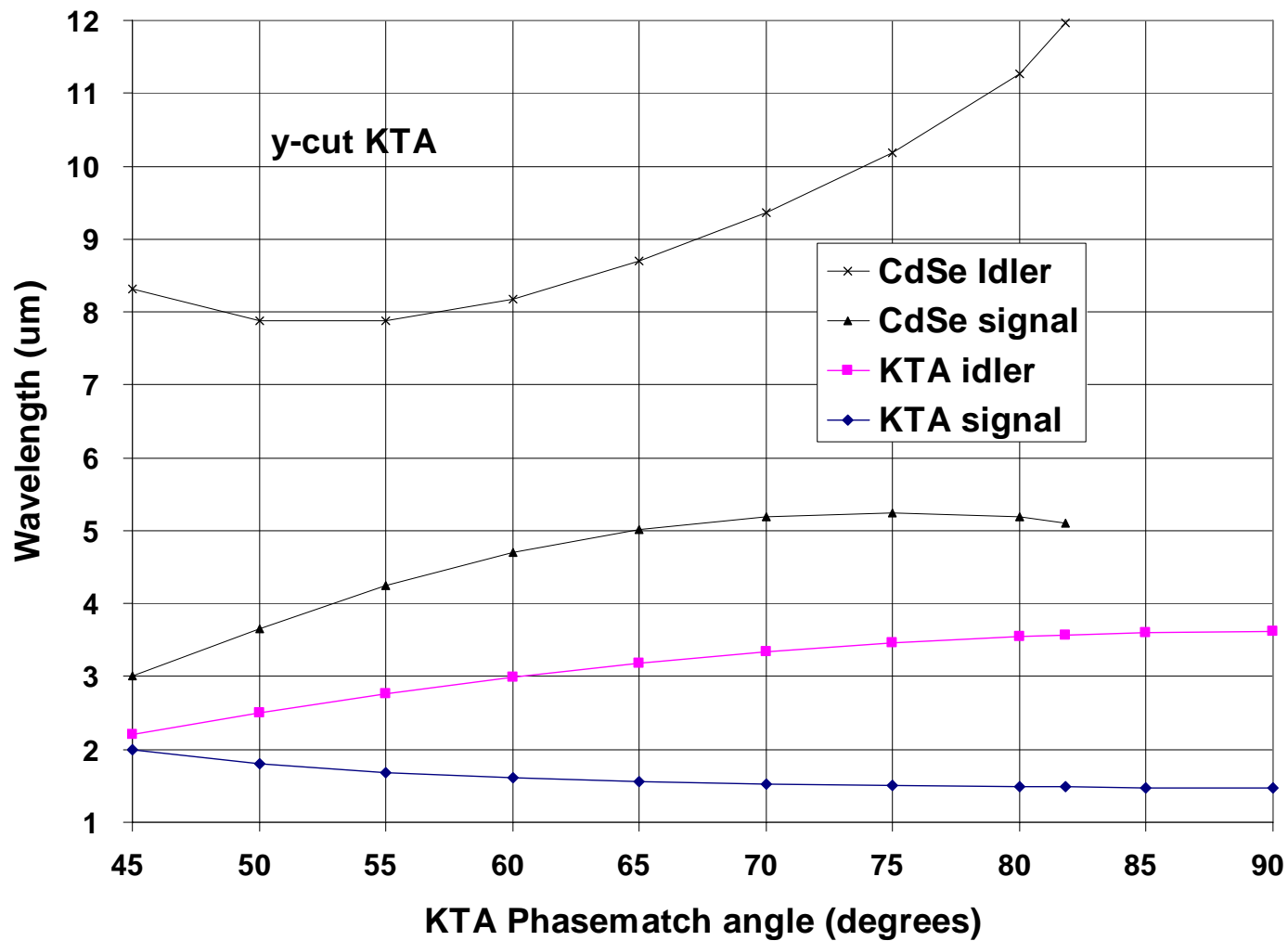
Tandem OPO Program Objectives

- **TASK 1: Develop a Single-Frequency, Injection-Seeded, Flashlamp-Pumped, Q-switched TEM₀₀ Nd:YLF Pump Laser including:**
 - cw, single-frequency diode-pumped Nd:YLF seed laser
 - flashlamp-pumped Q-switched, TEM₀₀ - mode Nd:YLF oscillator
 - lamp-pumped amplifier to generate 200-mJ pulse energies
- **TASK 2: Demonstrate a Narrow-Linewidth, Angle-Tuned KTA OPO**
- **TASK 3: Build a Difference-Frequency Seed Source for the KTA OPO**
- **TASK 4: Demonstrate a KTA-Idler-Pumped Tunable CdSe OPO**
- **TASK 5: Demonstrate Tuning of the Tandem OPO through the absorption lines of Selected Gases**

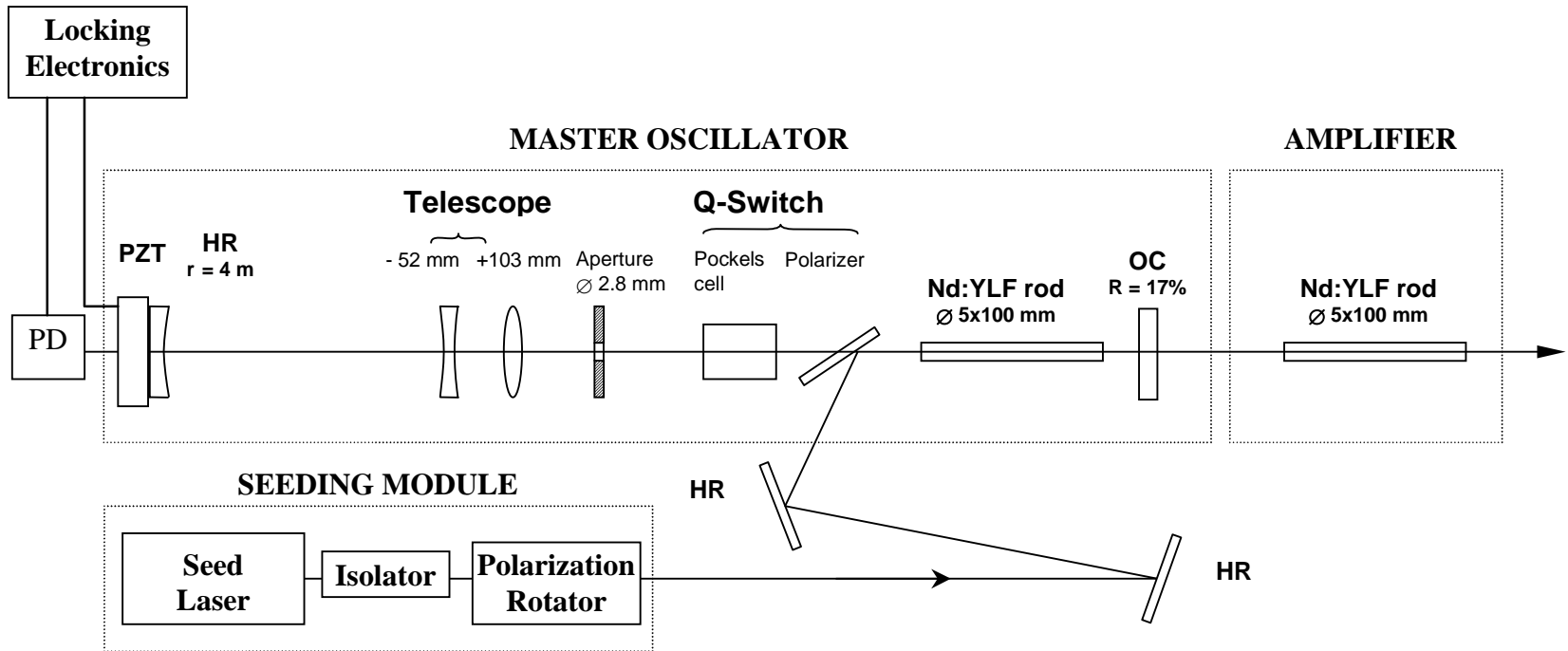
Tandem OPO design



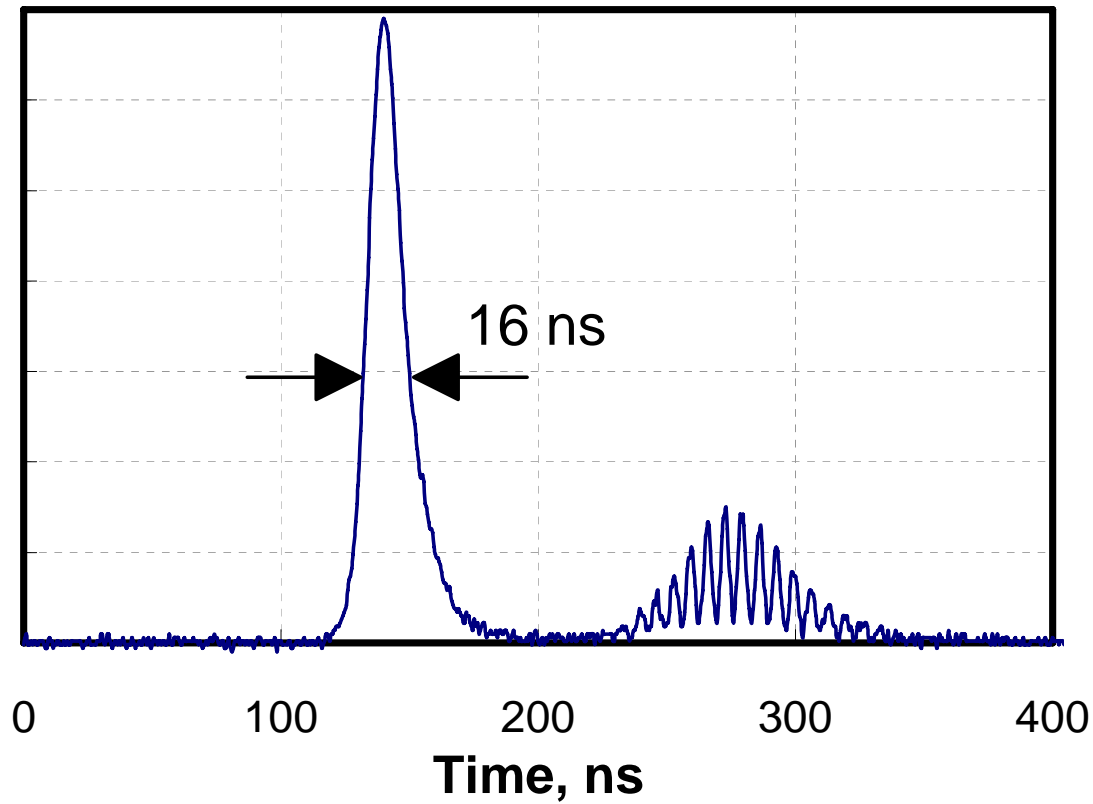
Composite tuning curve for Tandem OPO



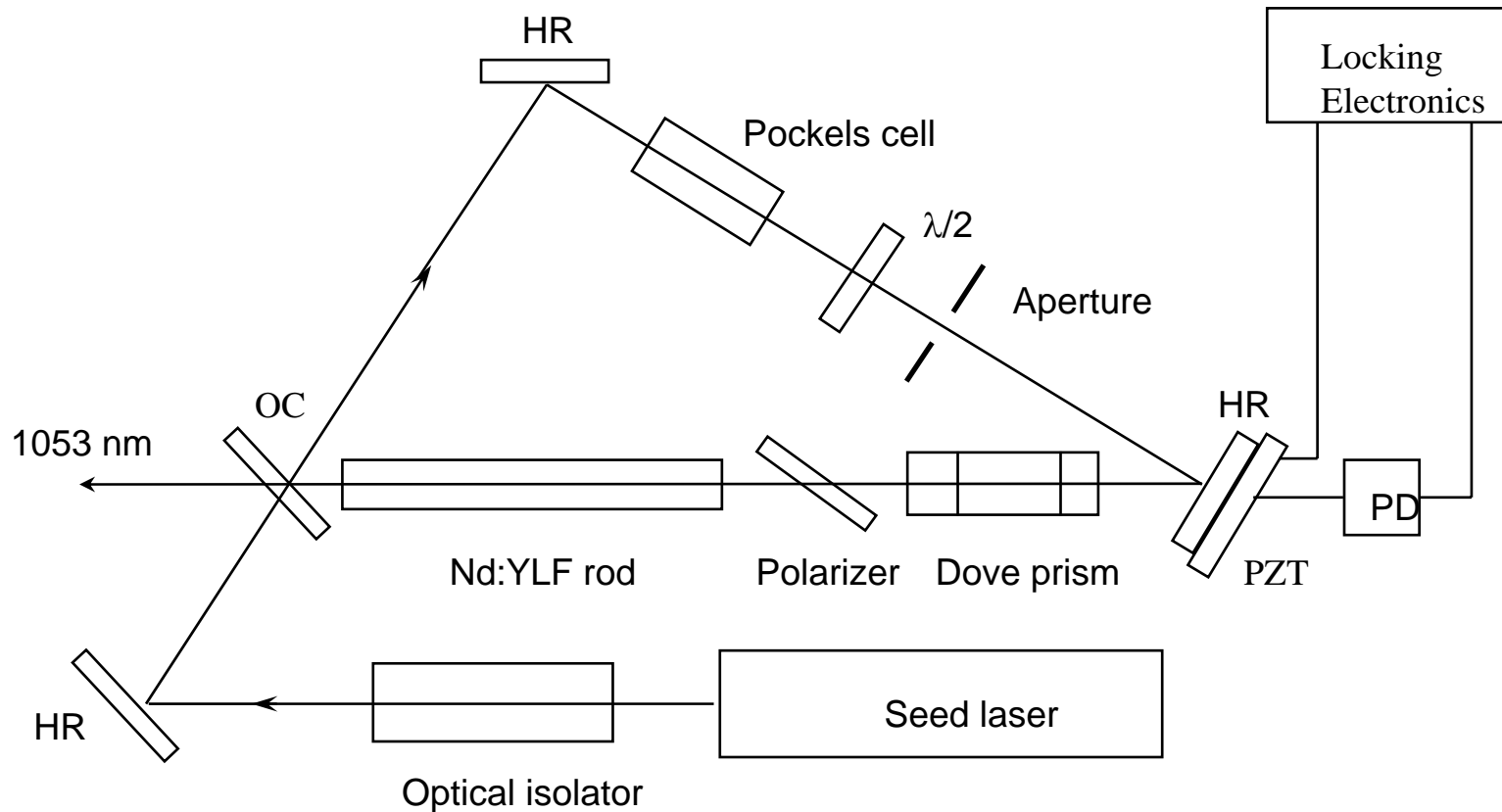
Seeded Nd:YLF standing-wave pump laser



Seeded Operation



Seeded Nd:YLF ring pump laser





Performance of the MOPA system in seeded and unseeded mode.

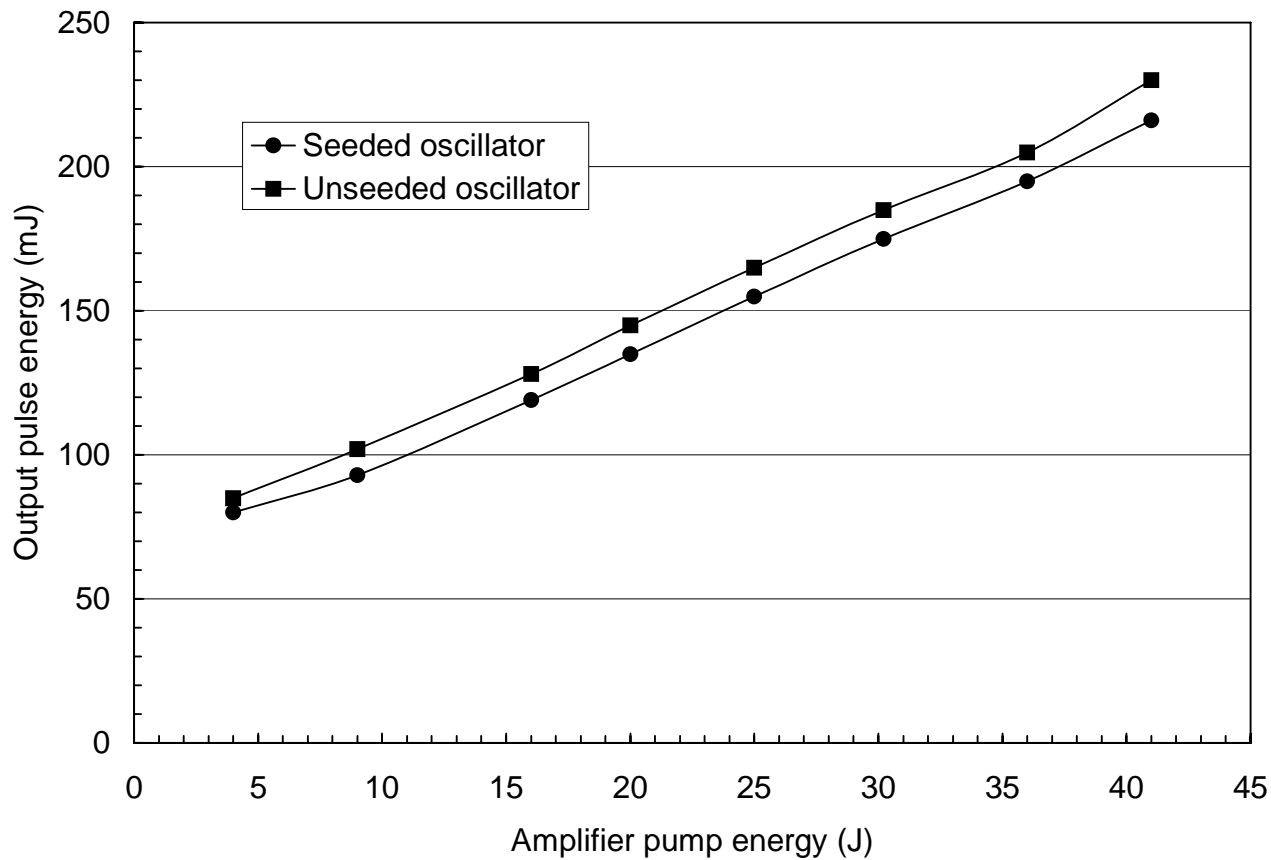
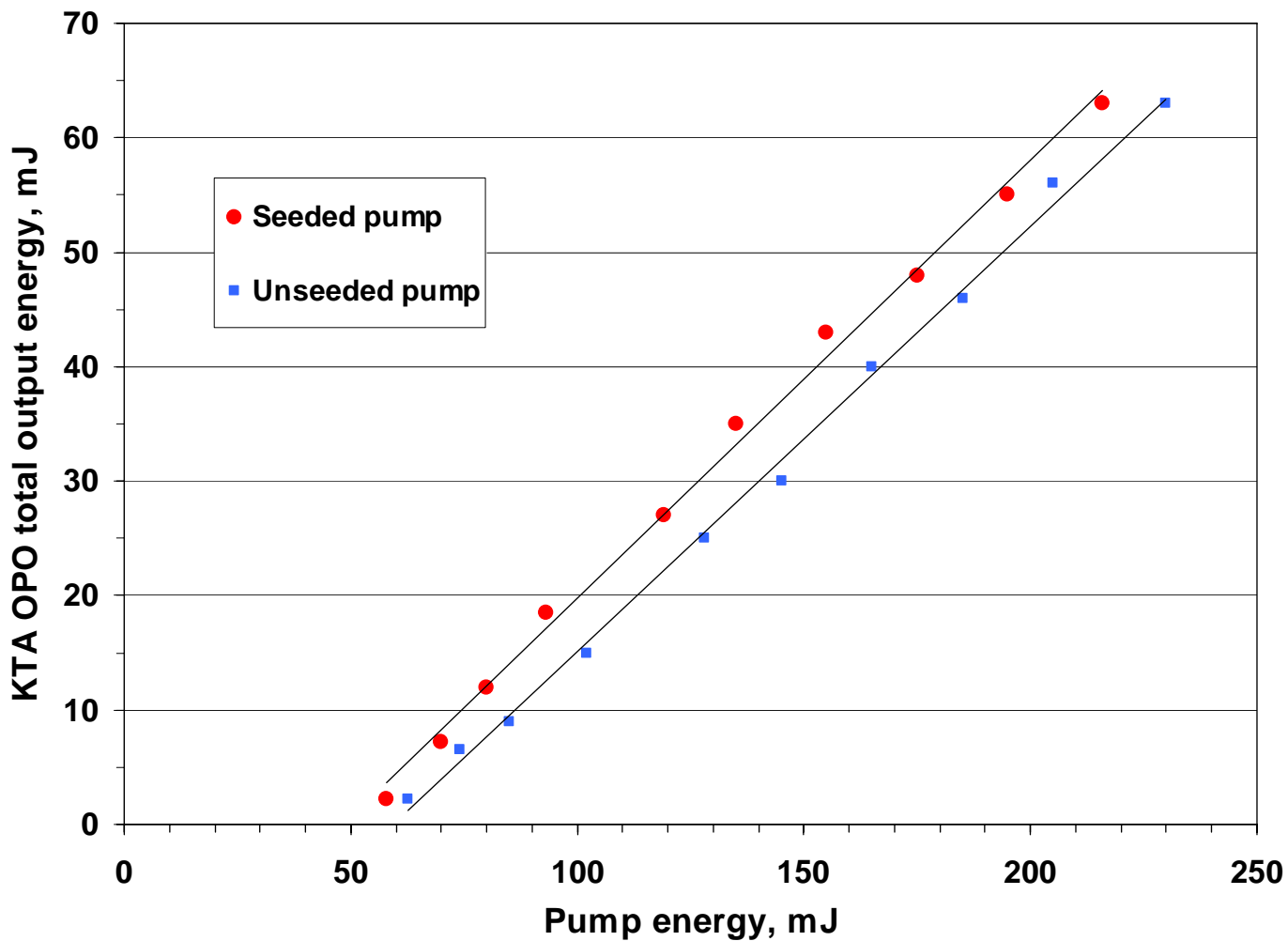


Table 1. KTA crystal parameters.

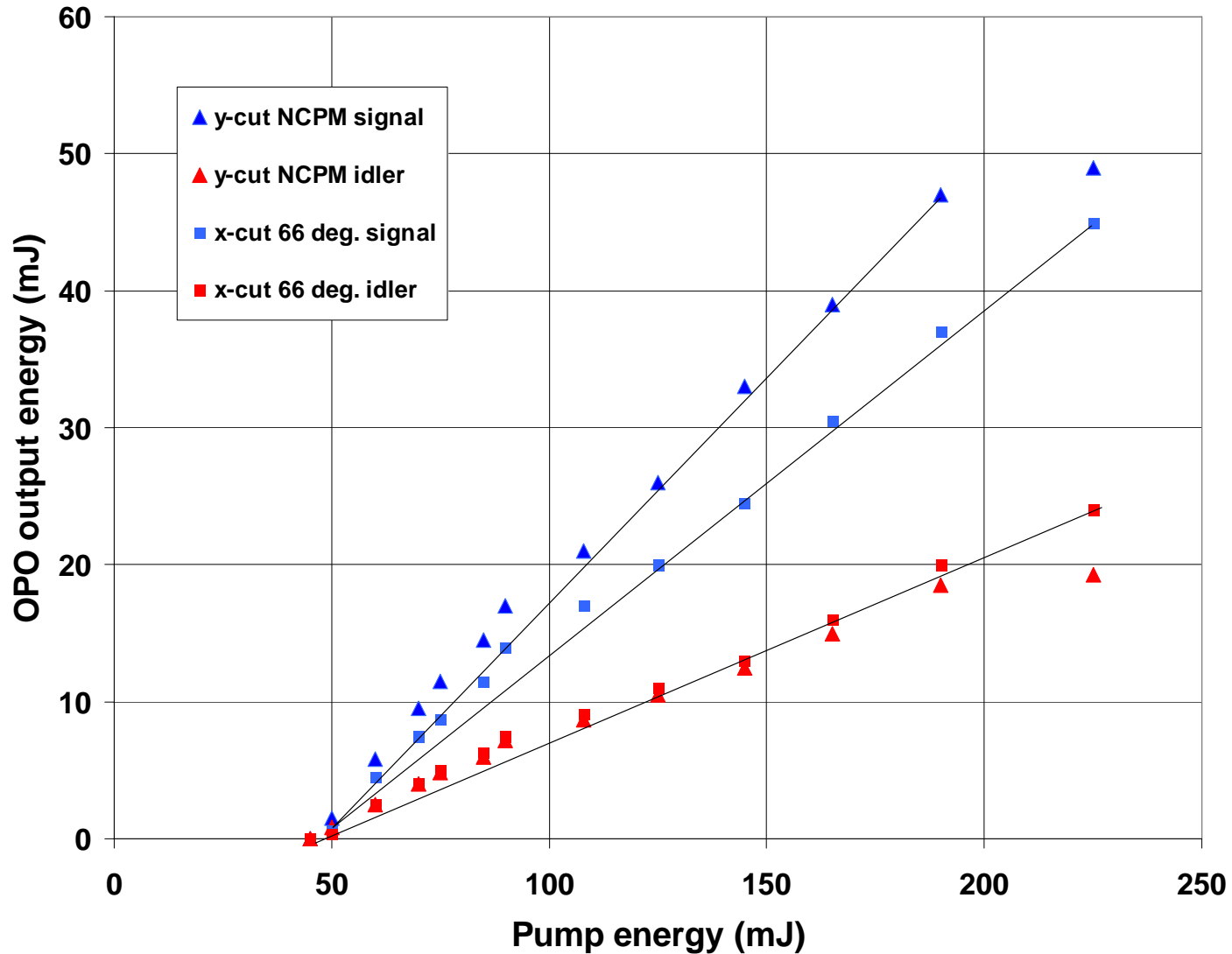
KTA crystal —#—	Dimensions (w x h x l, mm)	Cut	Angle to z axis (degrees)
1	5 x 5 x 15	x	90
2	10 x 8(y) x 20	x	60
3	8(x) x 10 x 15	y	70
4	8(x) x 10 x 25	y	90



KTA OPO pumped by seeded and unseeded Nd:YLF Laser

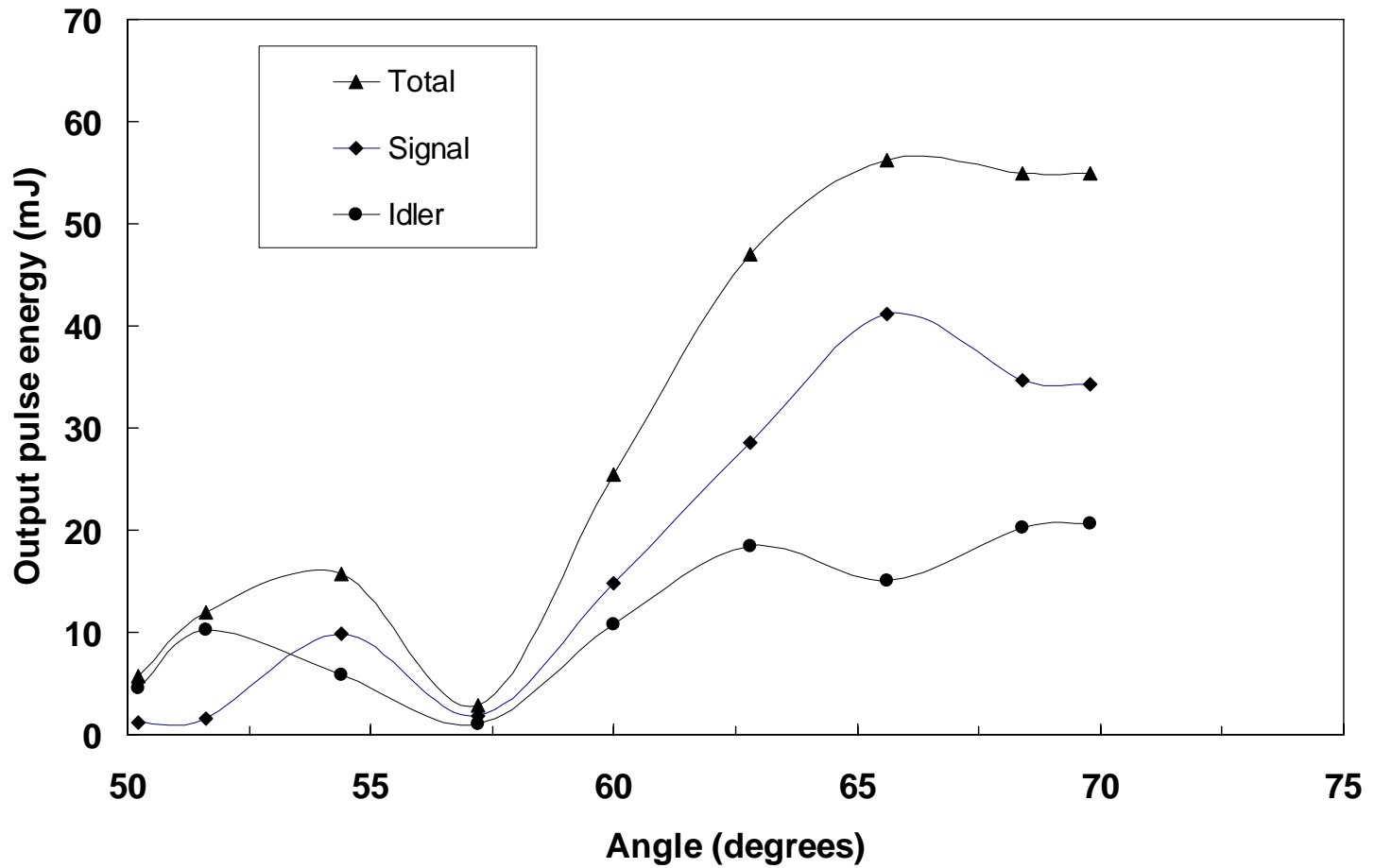


I/O data for x- and y-cut KTA

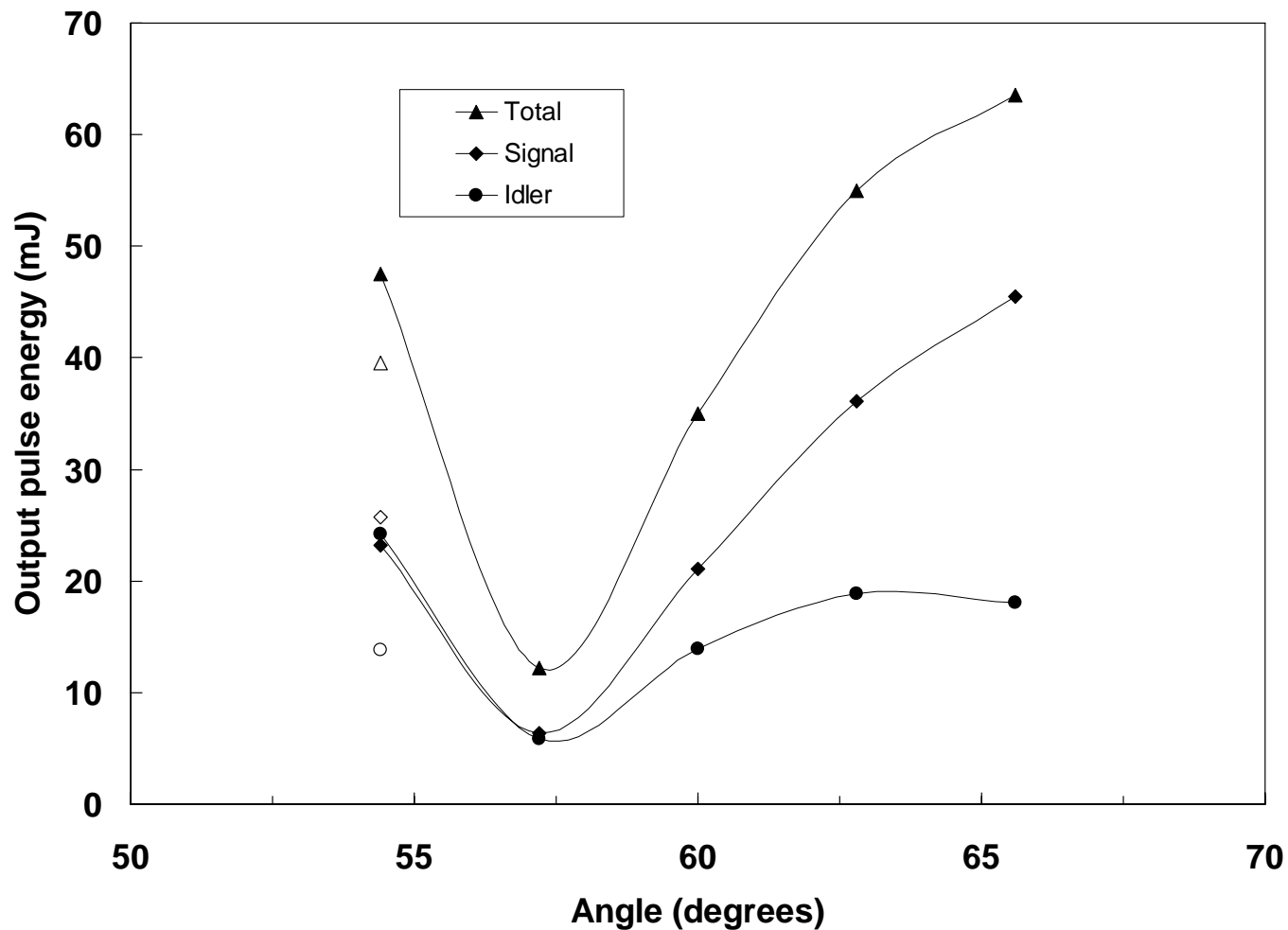




KTA OPO OUTPUT PULSE ENERGIES at 200-mJ PUMP

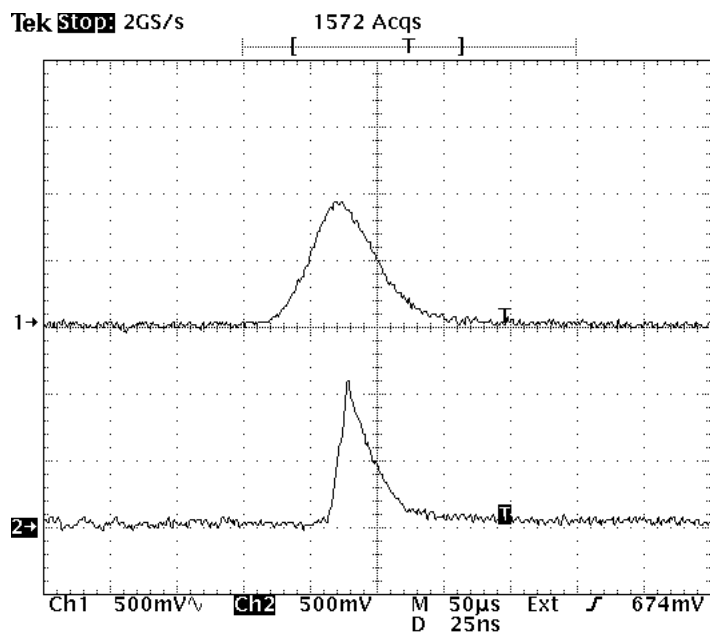


KTA OPO WITH WALKOFF COMPENSATION at 200-mJ PUMP



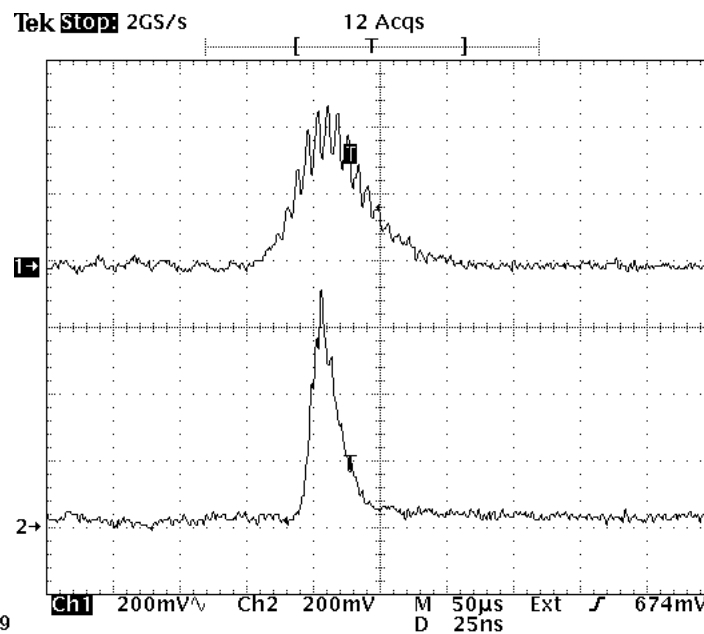
Markers w/t background: two-crystal KTA OPO w/no WO compensation

KTA OPO pump and signal pulse profiles



29 Jan 1999
14:26:01

Seeded pump

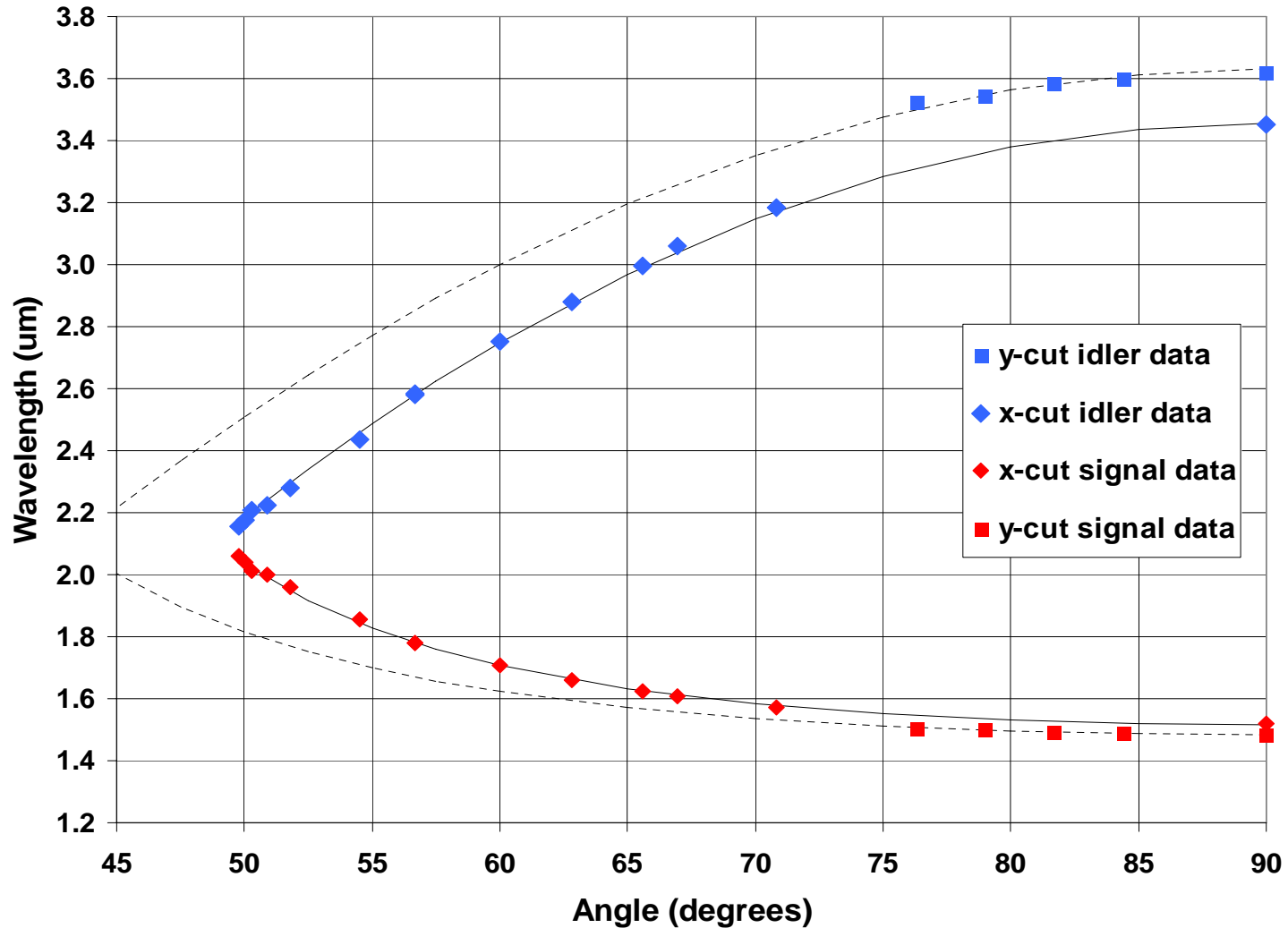


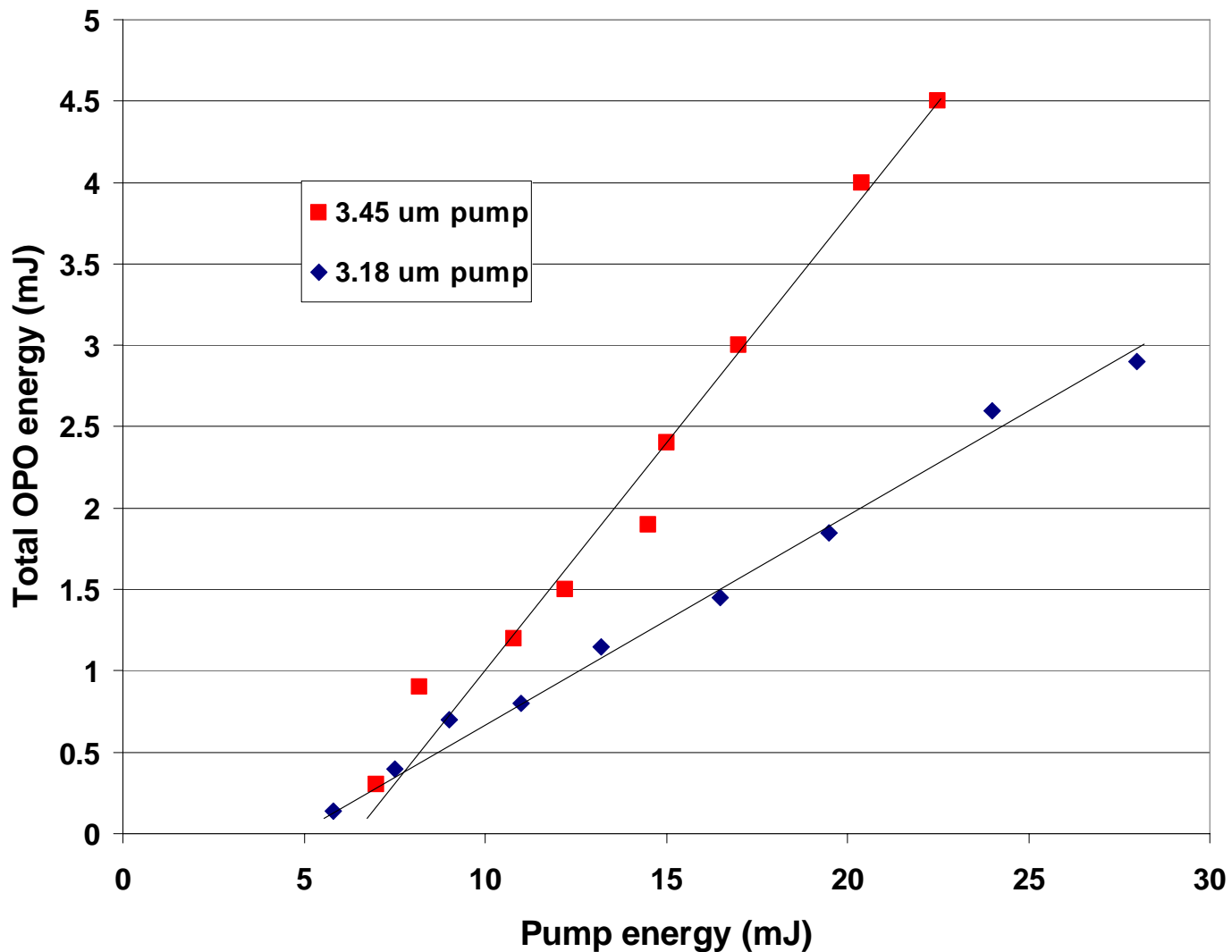
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Unseeded pump

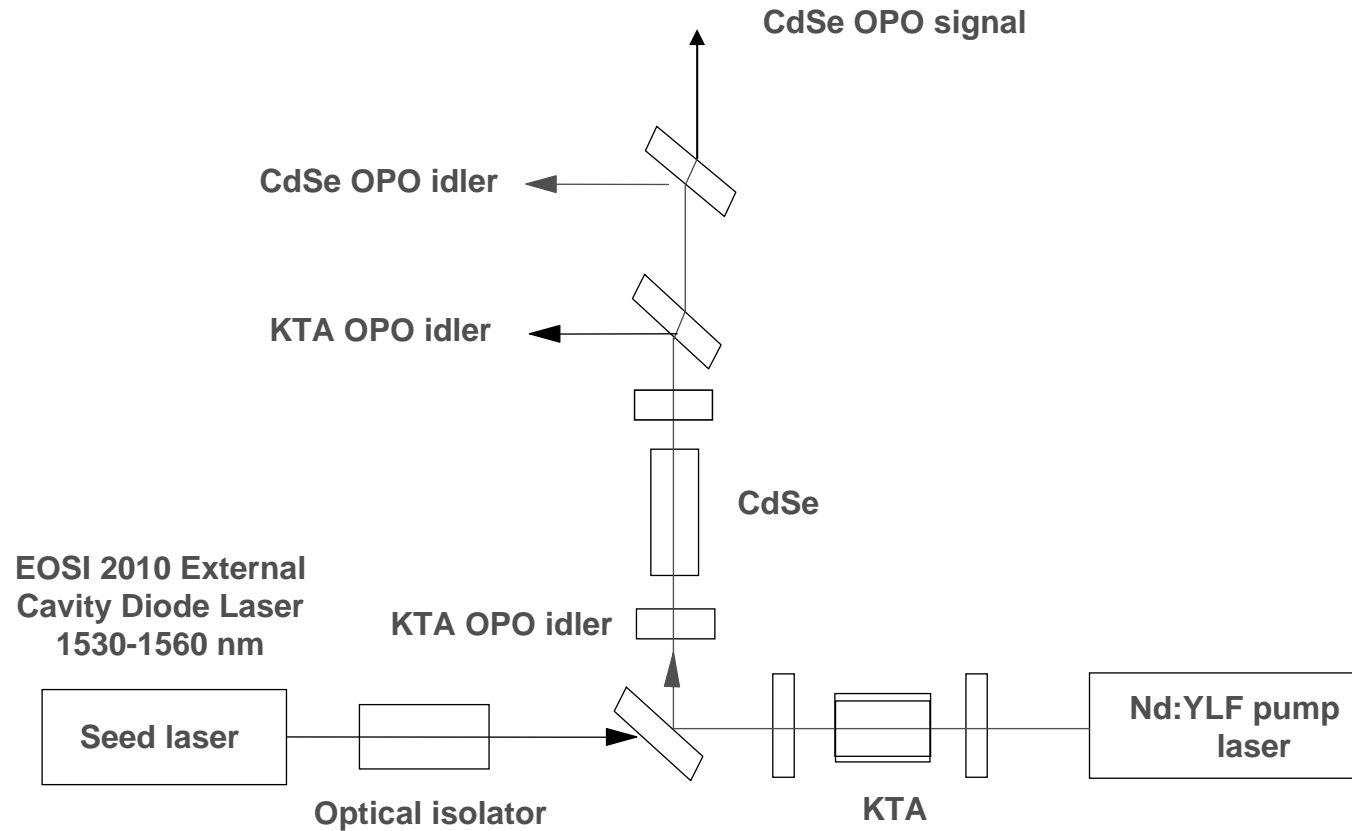
1 - pump pulse
2 - signal pulse

Angle-tuning data on KTA OPO



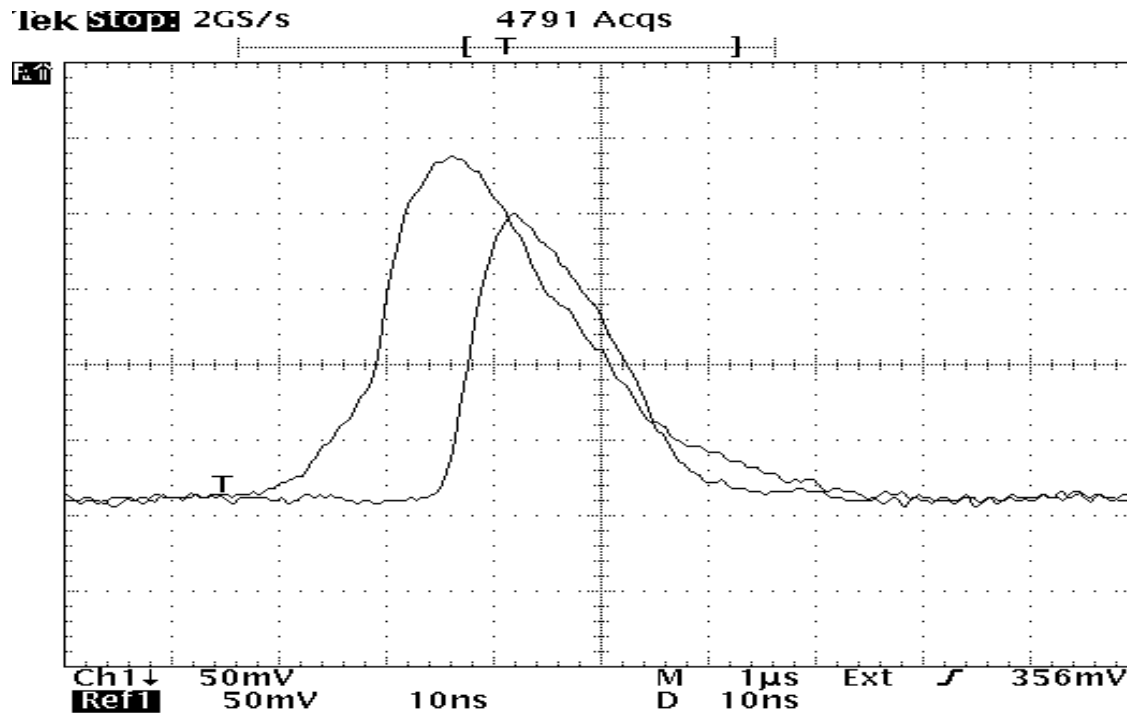


Tandem OPO seeding demonstration





CdSe OPO pump and signal pulse profiles



Composite tuning curve for Tandem OPO

