# *Report of visit at IAP*

Masao KURIKI

Picosecond Master Oscillator

- LD pumped Yb fiber oscillator

- 1047nm

- 40.625 Mhz repetition (1300/5).

Macro Pulse Profiler+YFPA

- Reduce the repetition rate from 40.625 -> 2.708MHz (1300/480) by AOM.

- Pre-amplification by Yb fibre, 0.3nJ/pulse

- Macro-pulse duration is 0.9ms (fixed).

- Macro-pulse envelope modulation to compensate the gain in-uniformity.
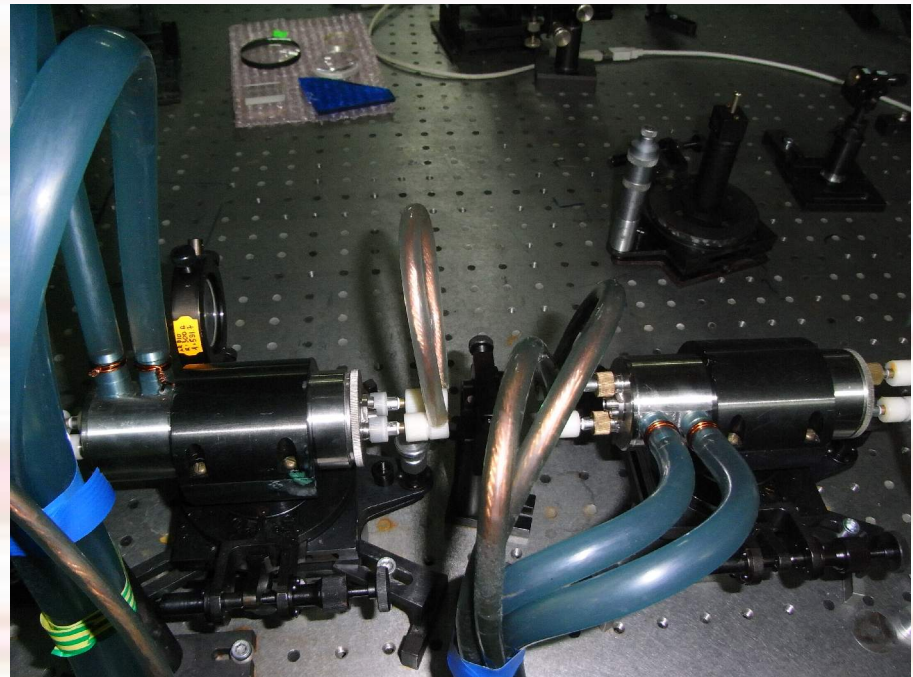
- 2.0mW average power (0.05nJ/pulse)

Output of MPP
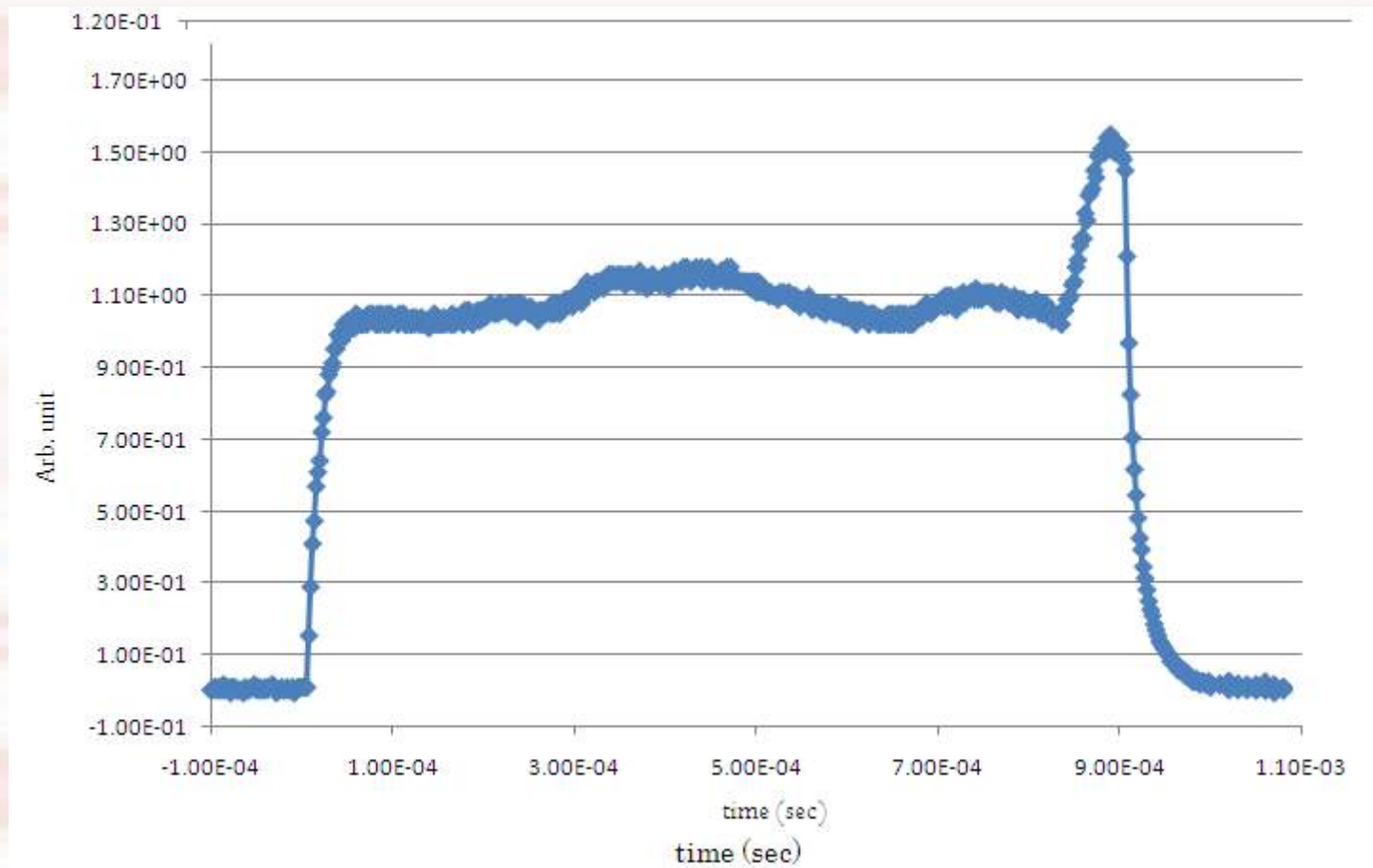
No modulatiedulation

Nd:YLF Amplifier

- 2 double-pass Nd:YLF amplifiers pumped by flush-lamps.

- 140mW average power in macro-pulse, 30μJ/pulse @1047nm.
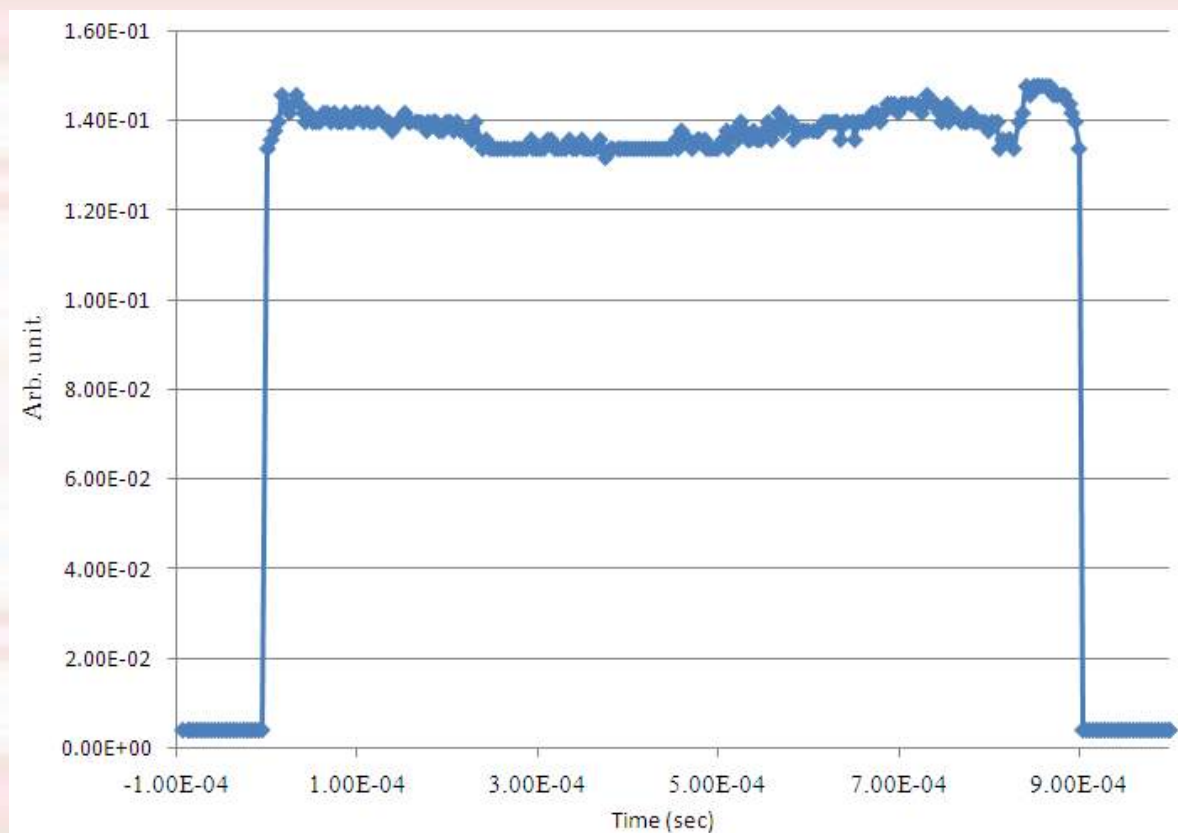
- Micro Pulse duration is 10ps at 1047nm.

HGs

- ◆ SHG : 7.5mm KTP

  - ◆ 80mW average power, 6.5µJ/pulse
  - ◆ 8.5ps micro-pulse duration
- ◆ FHG: 10.0mm BBO

  - ◆ 23mW average power, 1.9µJ/pulse (1.6µJ/pulse to 3.2nC with 1.0% QE)
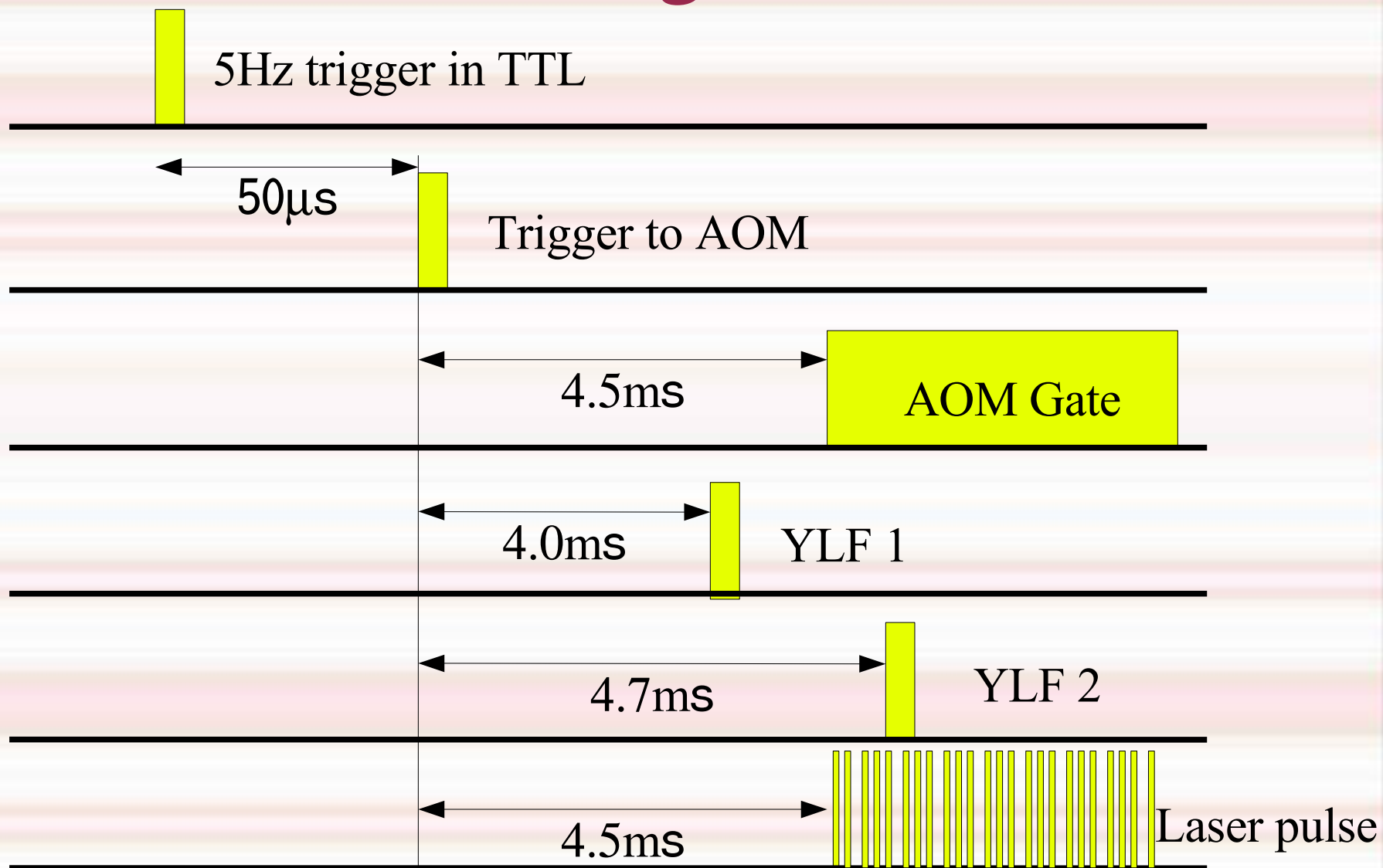 - ◆ 8.0ps micro-pulse duration
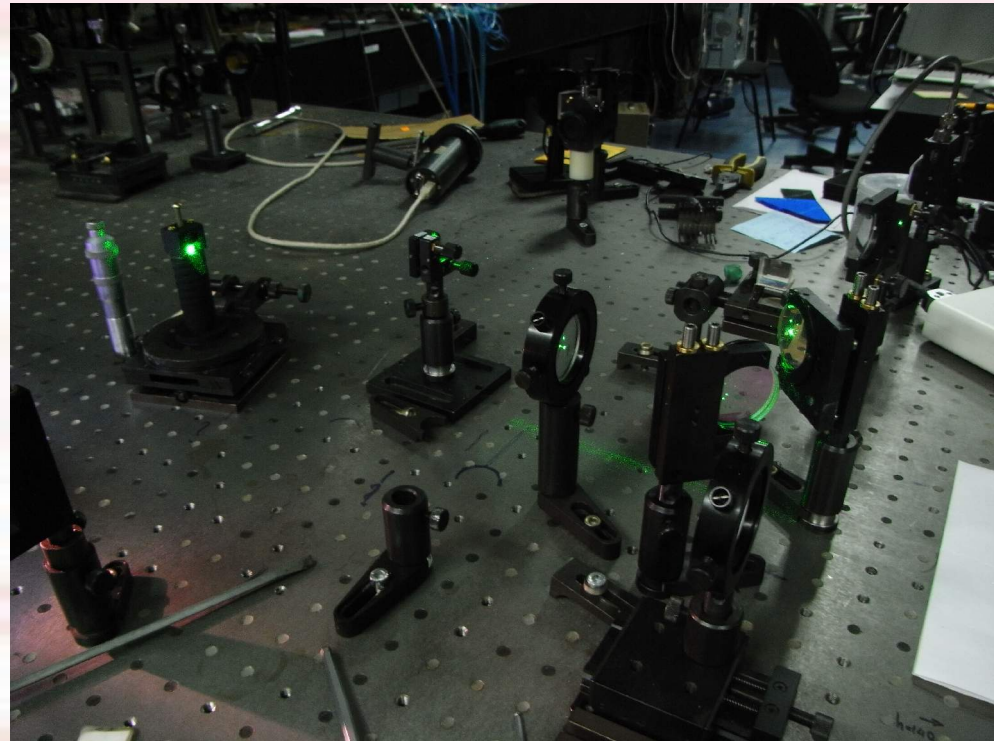
Macro Pulse Uniformity

- Pulse uniform-ity in a macro-pulse is found to be around 3% in rms after optimiza-tion.
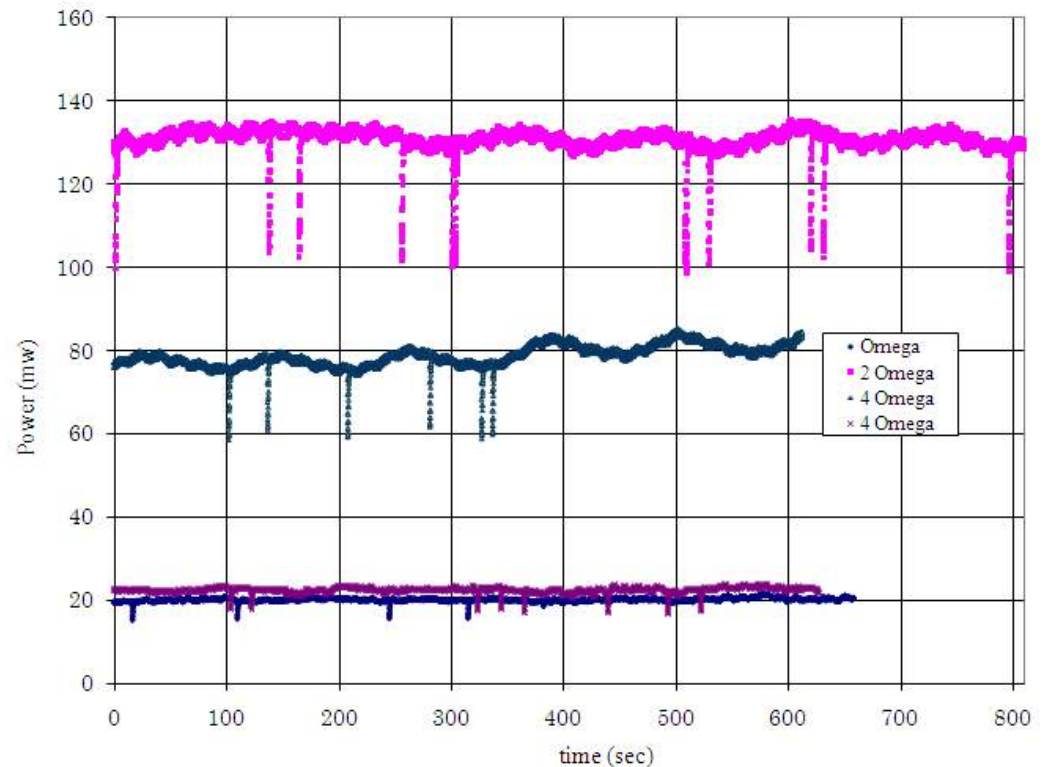- Pulse-by-pulse jitter has been observed, but it is not qulified yet.

Timing Chart

5Hz trigger in TTL

50μs

Trigger to AOM

4.5ms

AOM Gate

4.0ms

YLF 1

4.7ms

YLF 2

4.5ms

Laser pulse

Stability

- Temporal power stability was measured for 1ω, 2ω, and 4ω.
- 4ω had the best stability and 2ω has the worst stability.
- The good stability on 4ω is due to the saturation of conversion.

	1ω	2ω	4ω	4ω
Average	131	78.9	22.5	20.1
RMS	3.33	2.8	0.72	0.46
Ratio	2.54%	3.55%	3.20%	2.29%

Laser Spot Profile

- Laser profile at 4w is observed by CCD camera with attenuation.
- Pointing stability is not qualified yet.
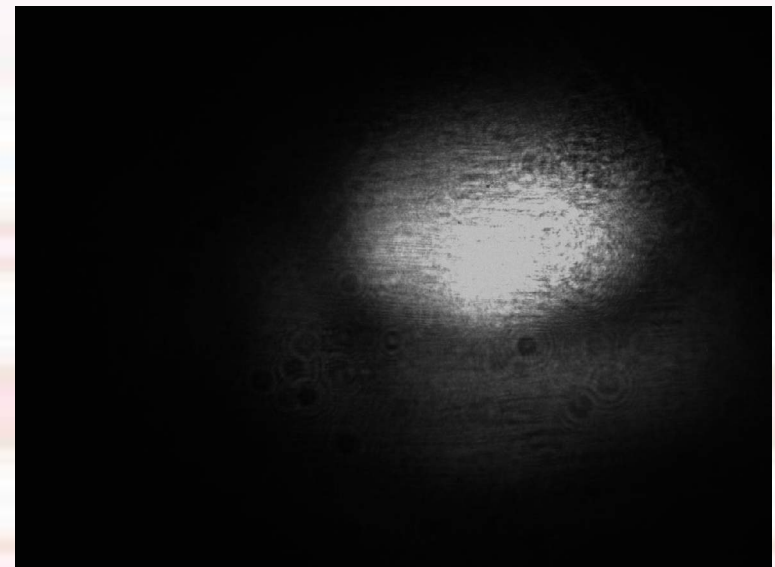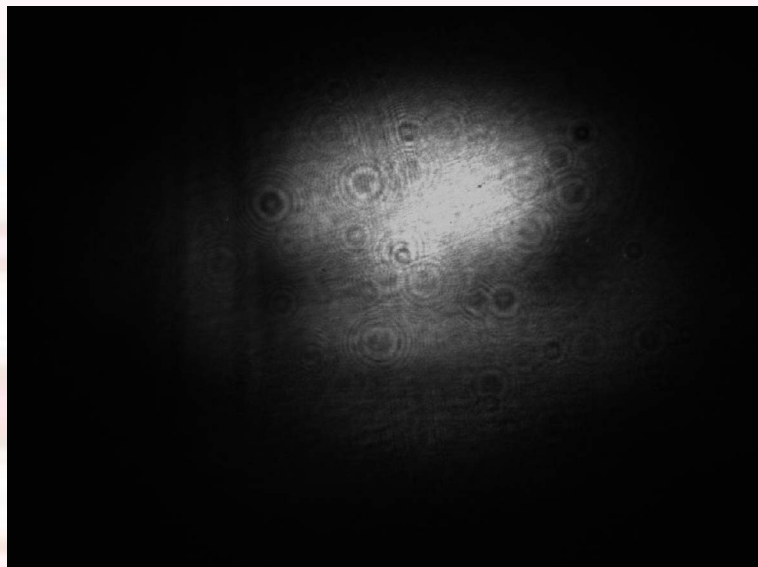
The system in Operation

Jitter in 4ω

Plan and Procedure

- February 2010: Transporting to Japan
  - Less than 1 week for actual transportation.
  - 1-2 weeks for custom inspection and paper work.
  - The system is delivered to KEK at the end of February.
- March 2010
  - 4 IAP researchers/engineers stays at KEK to implement the system at STF location.

Summary

◆ The laser system for STF is developed by IAP under collabora-
tion between JINR and KEK/Hiroshima.

◆ The two day investigation confirmed that the required perform-
ances are satisfied by the system.

◆ The operation training was done during the stay. The sequence of
usual operation, macro-pulse uniformity correction, HG crystal
adjustment, Flush-lamp exchange procedure, profile measure-
ment, repetition rate adjustment, etc. were exercised.

◆ The first task is prepare infrastructures and items to implement
the system at KEK-STF.

◆ PLL should be implemented to make synchronization to external
RF signal.

◆ We need several modifications to improve the system usability,
e.g. Macro-pulse length adjustment, power adjustment, etc.