

LCGT f2f Meeting Laser

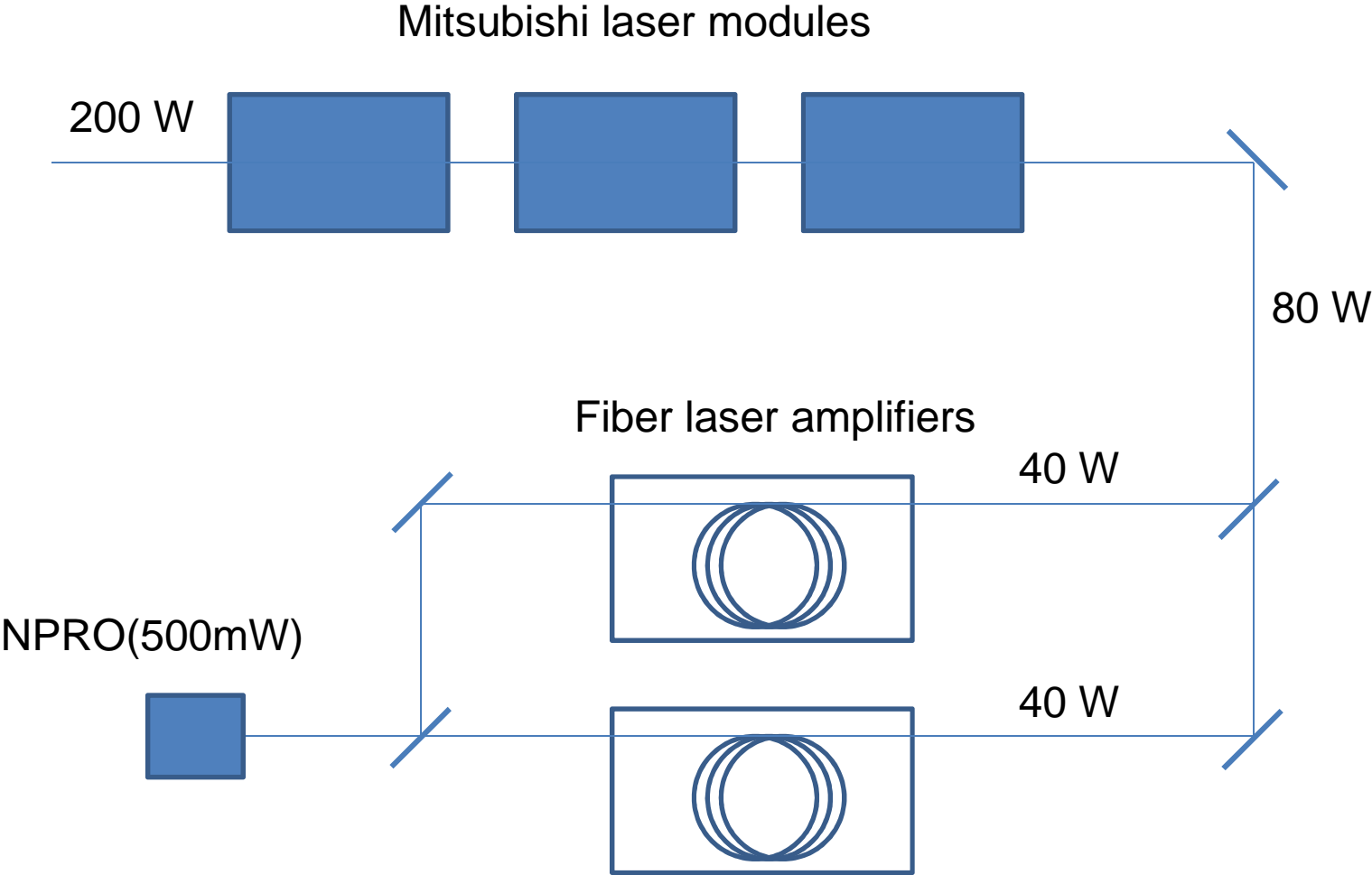
1 August, 2012

Norikatsu Mio

Requirements for the laser

- Power > 180 W
- Single frequency
- Linear polarization
- Single transverse mode
- Wide-band control for stabilization systems
 - About 1MHz for frequency control
 - About 100kHz for intensity control

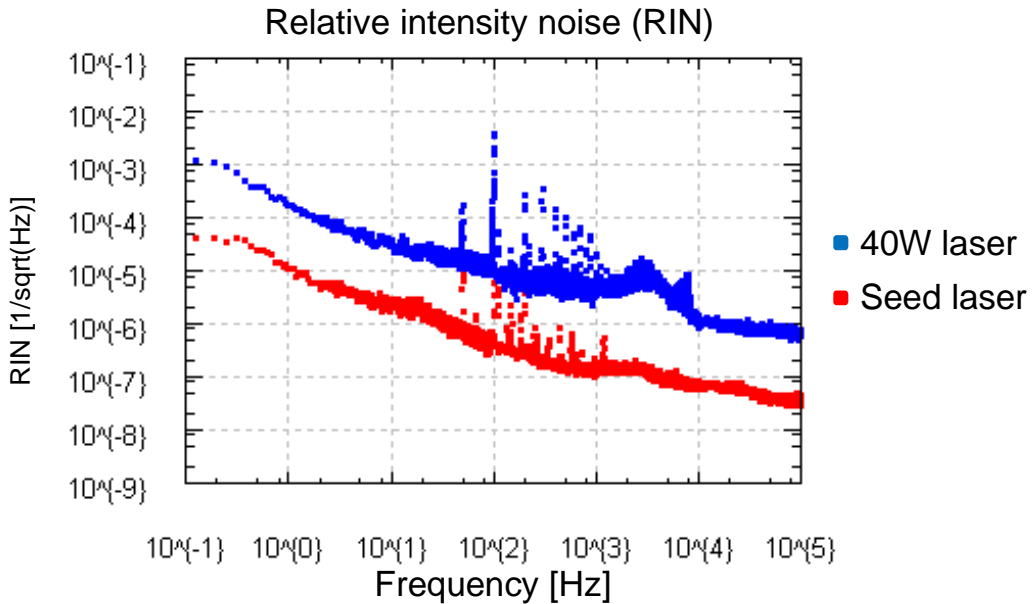
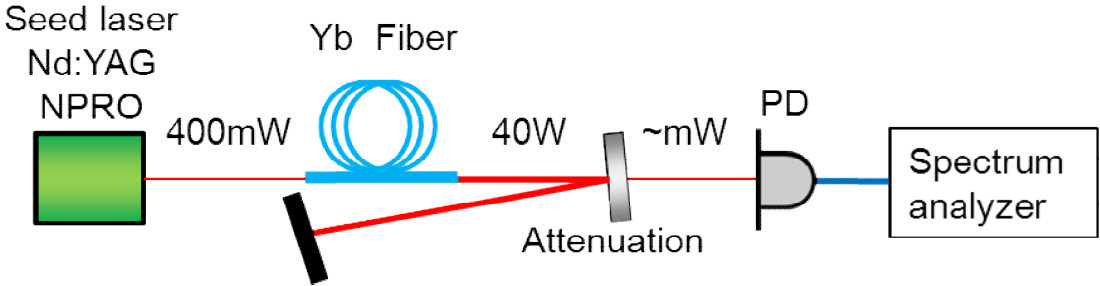
Schematic diagram



Laser

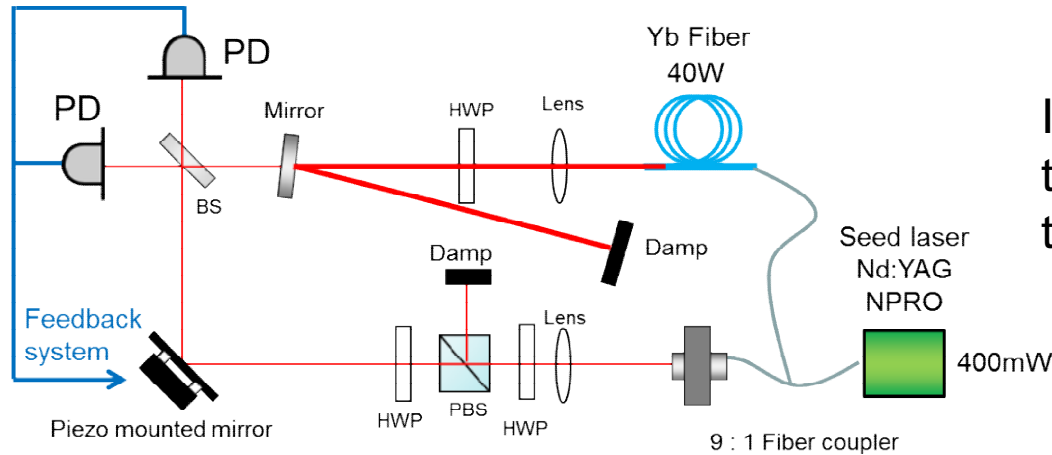
- Noise performance of the fiber laser amplifier has been tested; the phase noise of the 40-W amplifier is as small as we expected, while its intensity noise is larger than that of a 10-W laser.
- Coherent addition of two amplifier outputs has been tested. The current best was $32\text{ W} + 32\text{ W} \rightarrow 57\text{ W}$; the max power was partly limited by the imperfect mode-matching.
- Solid state amplifiers are still in boxes.
- The research fund application concerning the collaboration with Korea, submitted to Mitsubishi Foundation was rejected.

Intensity noise measurement

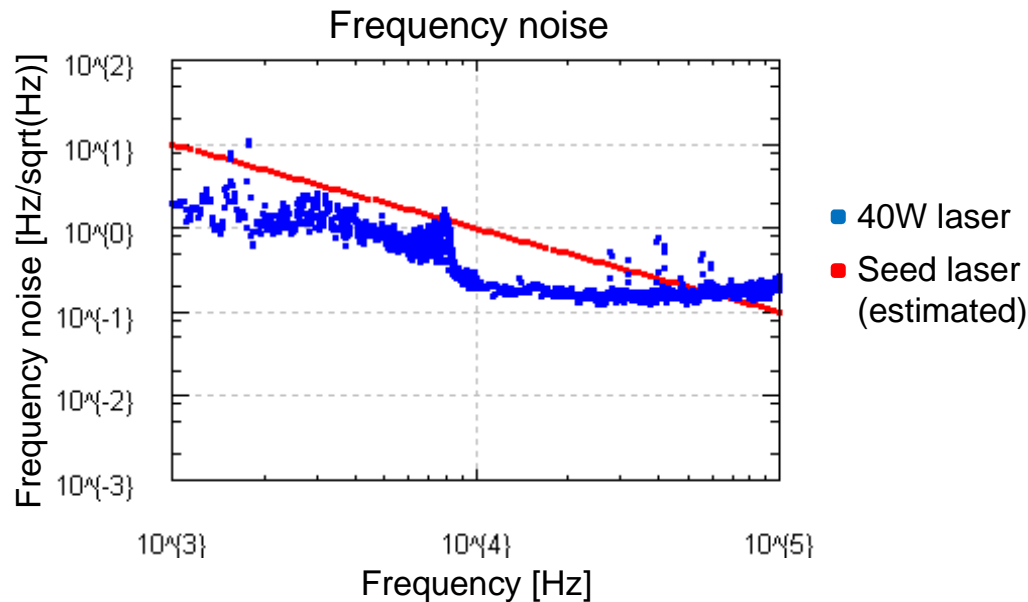


RIN of the 40-W amplifier is about 20 times larger than that of the seed laser but still 10 times smaller than that of the 100-W injection-locked laser.

Frequency noise measurement

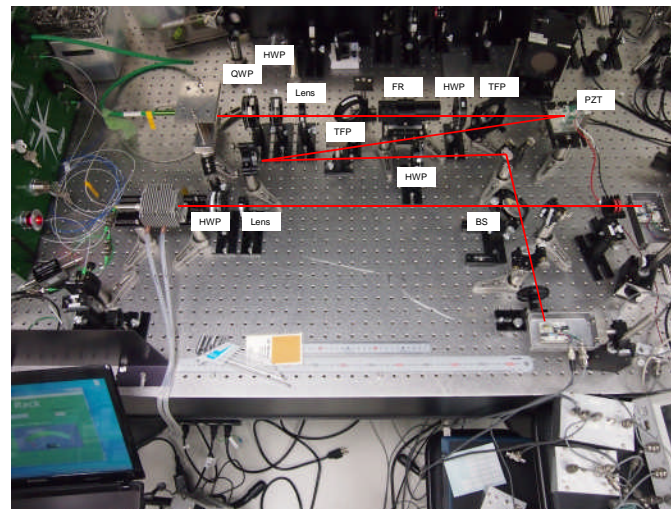
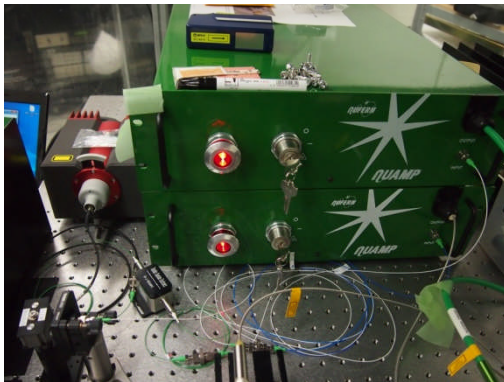
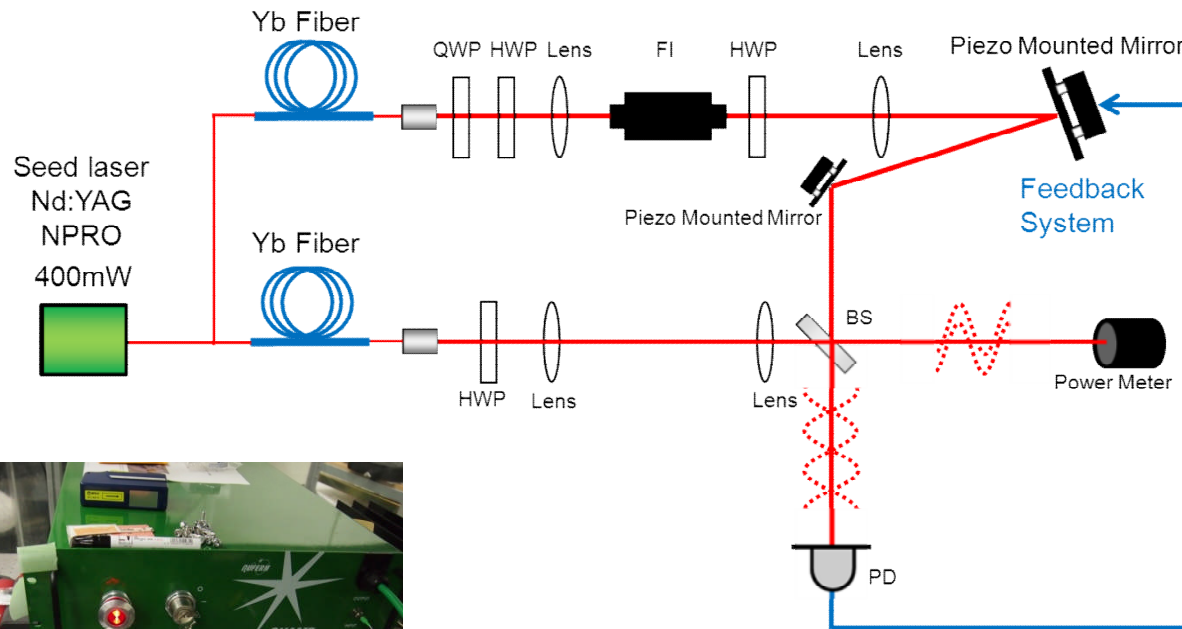


Interference signal between the amplified output and that of the seed laser was measured.



The frequency noise evaluated from the interference signal is smaller than that of the seed laser. This means the additional frequency noise from the amplifier is negligible.

Coherent addition of two laser outputs



32 W + 32 W → 57W

Summary

- Preparation of the laser system is going on.
- The performance of the fiber laser amplifier is almost satisfactory.
- International collaboration is still difficult to start owing to the financial issue.