Present status of the laser system for KAGRA

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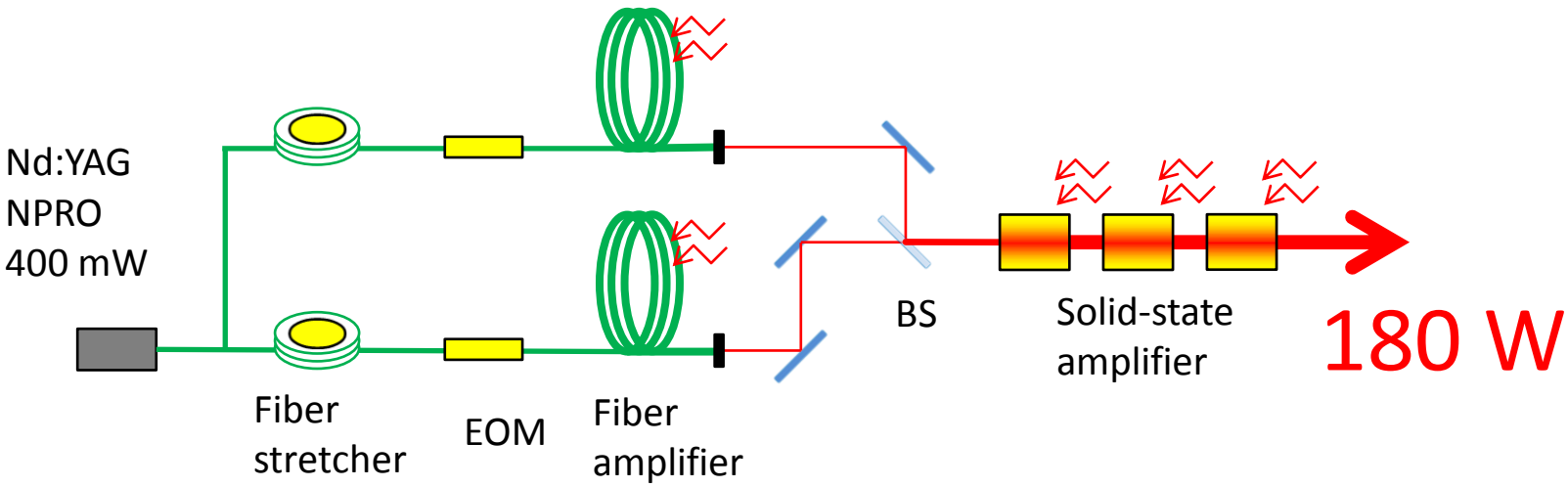
Outline

- Laser system & Requirements
- Update points
  - Realignment of solid-state amplifiers
  - Temperature stabilization
  - Auto-lock system
- Summary

Laser system & requirements

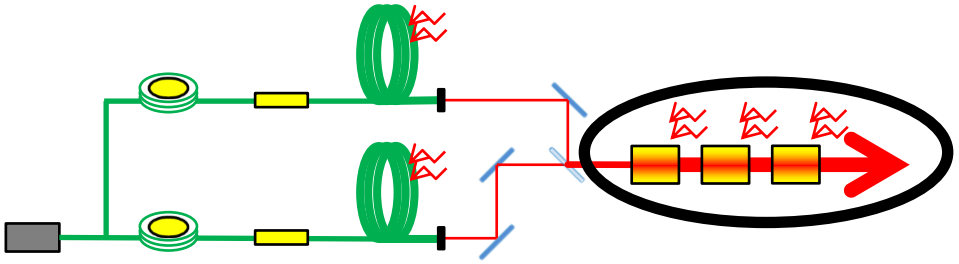
Requirements		
• Laser power	180 W	• Linear polarization
• Single frequency	1064 nm	• Low intensity noise
• Single transverse mode	TEM_{00}	• Low frequency noise



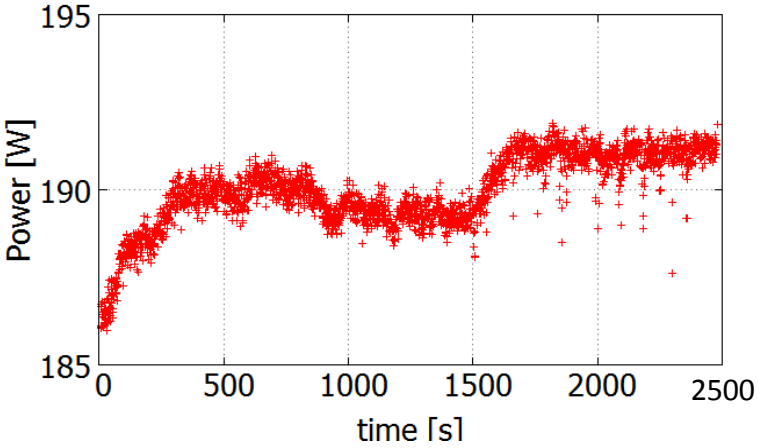
- MOPA
  - Fiber amplifier
  - Solid-state amplifier
- Coherent addition
  - Phase correction is maintained by Fiber stretcher & EOM

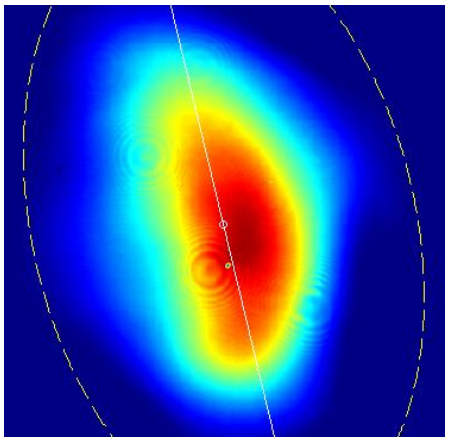
Realignment of solid-state amplifiers

- We made realignment



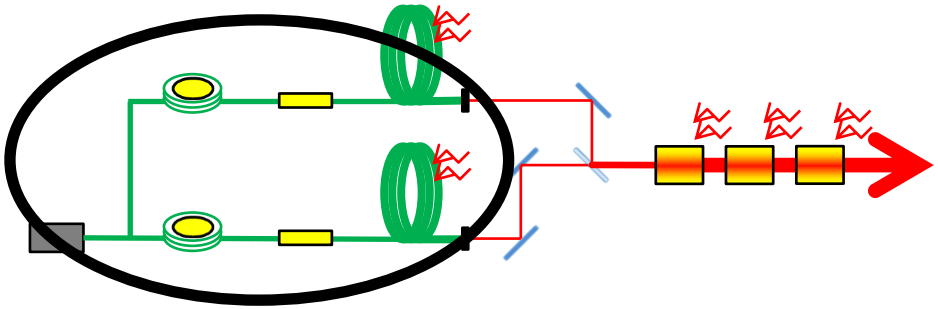
- Output power was decreased (210 W → 190 W)
- The beam profile was improved (Ellipse)
- Power & Profile of the beam is very sensitive to the alignment



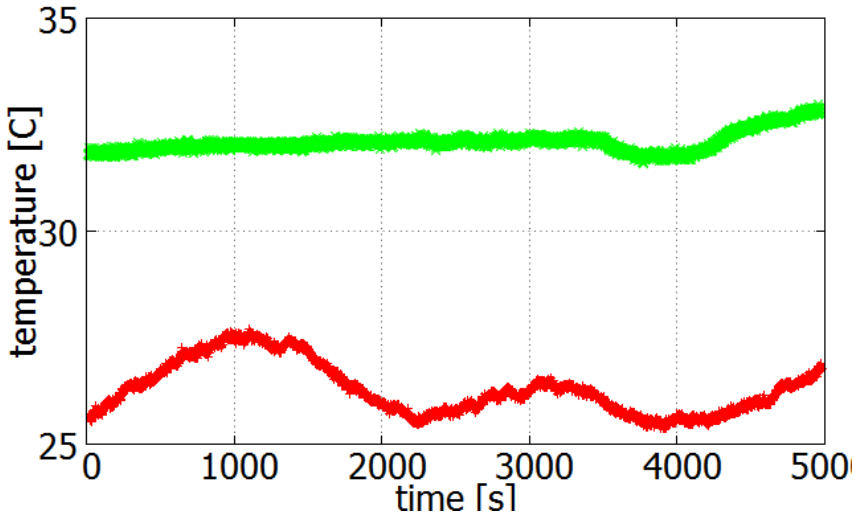


Temperature stabilization

- To stabilize temperature of fiber optics, we use a small greenhouse

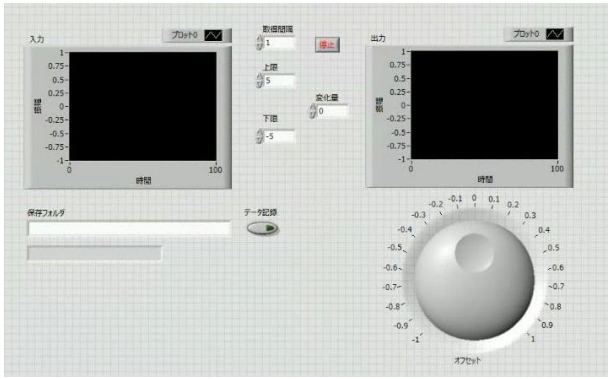


- In long-time operation, temperature became stabilized



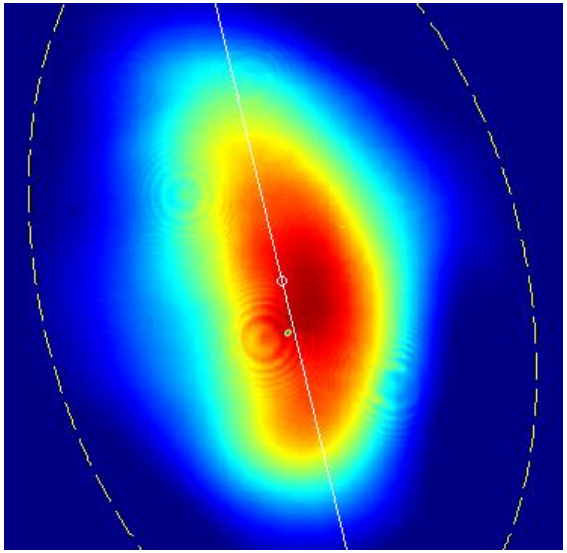
Auto-lock system

- For frequency stabilization, laser frequency is locked to the resonator.
- Using some actuators
  - NPRO temperature (DC)
  - NPRO PZT (Low frequency)
  - EOM (High frequency) (In preparation)
- With LabVIEW program,
  NPRO temperature is automatically changed
- Long-time lock was accomplished
  - more than 1 hour



Summary

- Solid-state amplifiers were realigned
  - 190 W, Ellipse
  - Cylindrical lenses?



- Temperature was stabilized

- Lock system was automated
  - Long-time lock
  - EOM is in preparation now