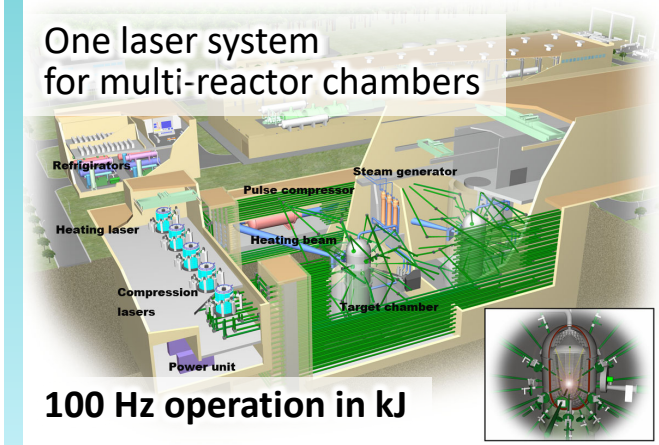
Core Key Technologies of Multi-Kilojoule Repeatable Laser System

Institute of Laser Engineering, Osaka University

J. Kawanaka, S. Tokita, J. Ogino, H. Yoshida, K. Tsubakimoto, K. Fujioka, Z. Li, S. Motokoshi, N. Morio, S. Matsuo, K. Kawabata, K. Takahashi, K. Matsumoto, Y. Kawakami, K. Sawai, K. Tsuji, M. Ishida, K. Matsushita, Y. Hirose, K. Fuwa, K. Shigemori, H. Matsuo, S. Oketani, T. Sezaki, T. Yanagida, N. Miyanaga, M. Fujita, K. Ueda, and R. Kodama

Requirement

One laser system
for multi-reactor chambers



100 Hz operation in kJ

Issue and Breakthrough

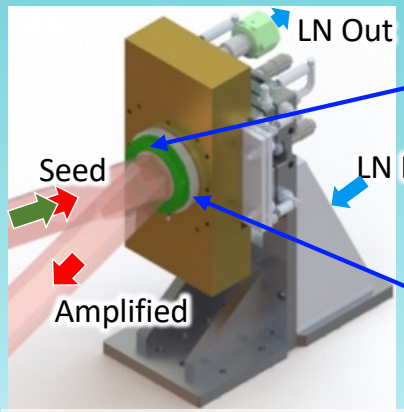
At 100 Hz, much heat induces strong internal stress in the laser materials.

- Wavefront distortion
- Birefringence

Use

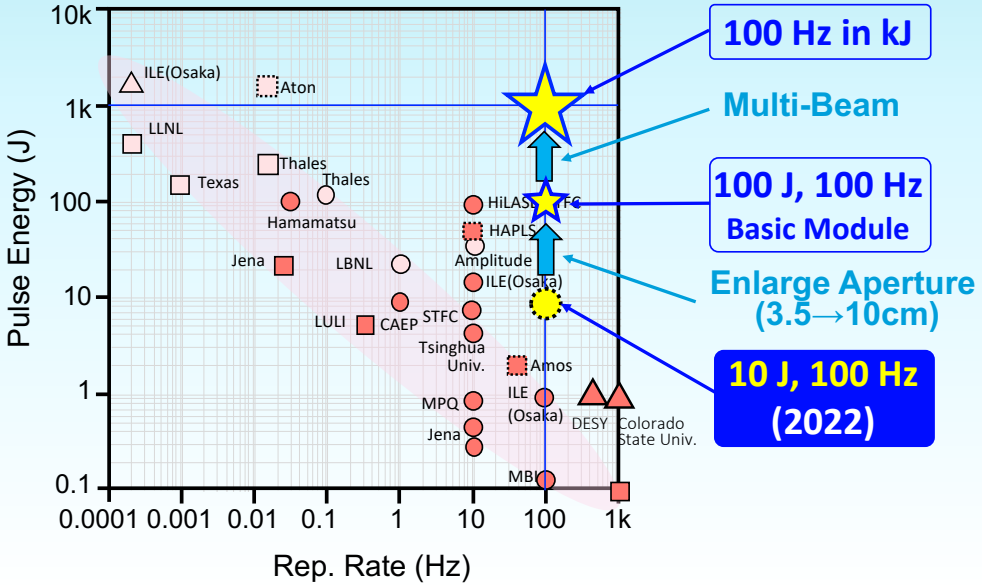
- Cryogenic laser material
- Active-mirror amplifier

But, difficult to realize a large aperture active mirror.



Reduced-stress active-mirror at 77K using original bonding technology

Strategy



100 Hz in kJ

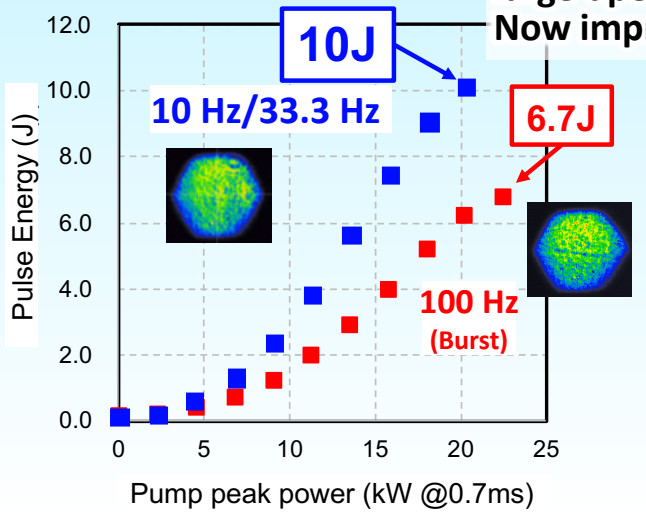
Multi-Beam

100 J, 100 Hz
Basic Module

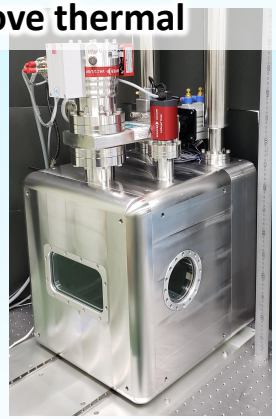
Enlarge Aperture
(3.5→10cm)

10 J, 100 Hz
(2022)

Experimental Results



10 J, 33 Hz was achieved with large-aperture active-mirror. Now improve thermal



Four active-mirrors inside