LASER DIODE ARRAY AND TRANSMISSION OPTICS

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LASER TYPE	AlGaAs Semiconductor Laser
WAVELENGTH	830 nm
POWER PER LASER DIODE	5 Watts
ELECTRICAL-TO-OPTICAL EFFICIENCY	42 %
LASER SYSTEM	Parallel Array Amplification

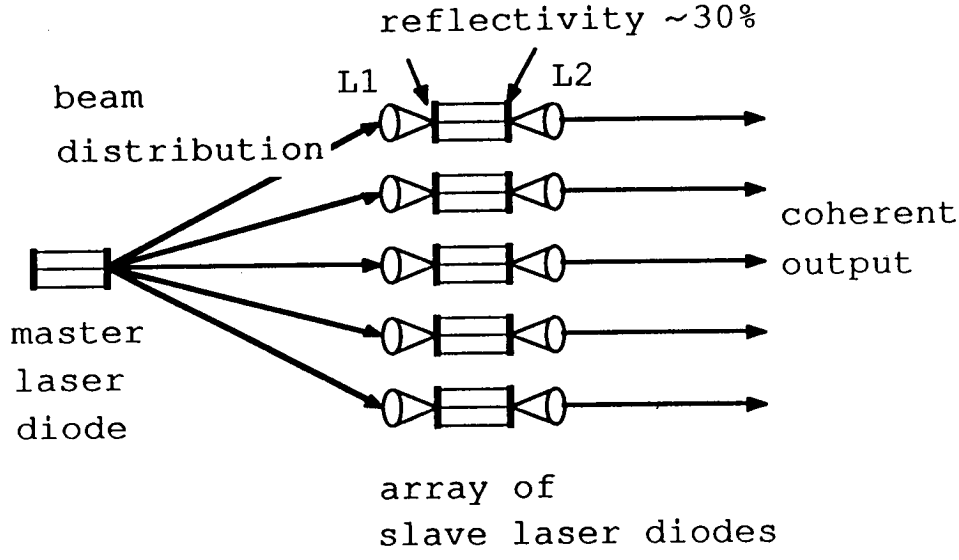
Coherent Combining of Laser Diode Arrays

1. Injection-Locking

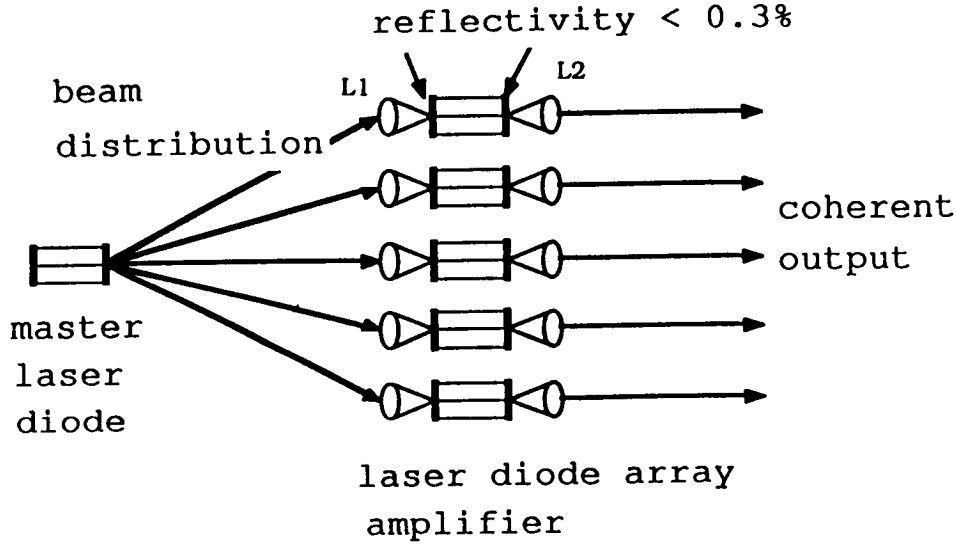
locking bandwidth	5 GHz(0.1Å)
temperature control	±0.1 C
near threshold operation	
power gain	17 dB

2. Travelling-wave Amplification

amplification bandwidth	THz(20Å)
temperature control	±5 C
power gain	18.6 dB

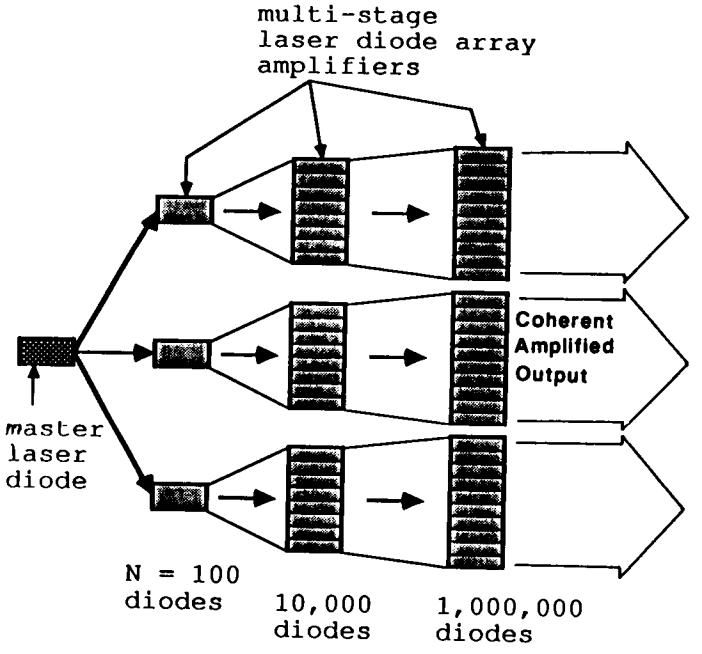


Injection-locking of laser diodes.

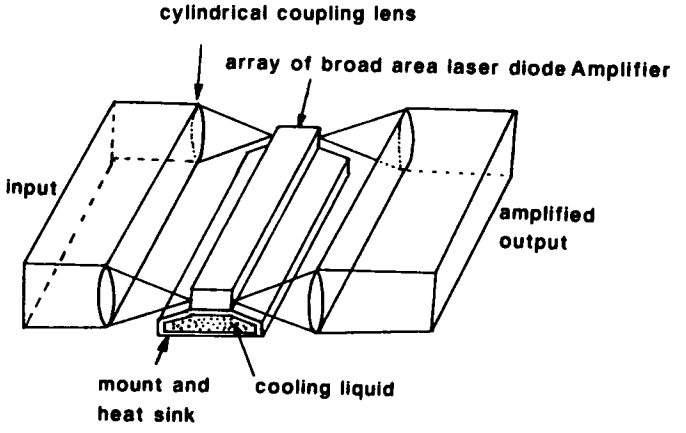


L1, L2 Input and Output Microlens Arrays

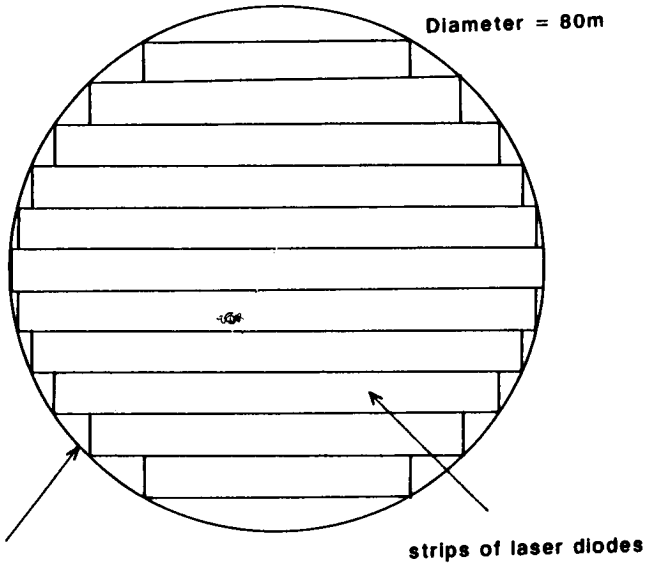
Amplification through laser diode array.



Multi-stage beam-combining and amplification.



Basic Building Block of LD Array System
made with Broad Area Laser Diode Amplifier

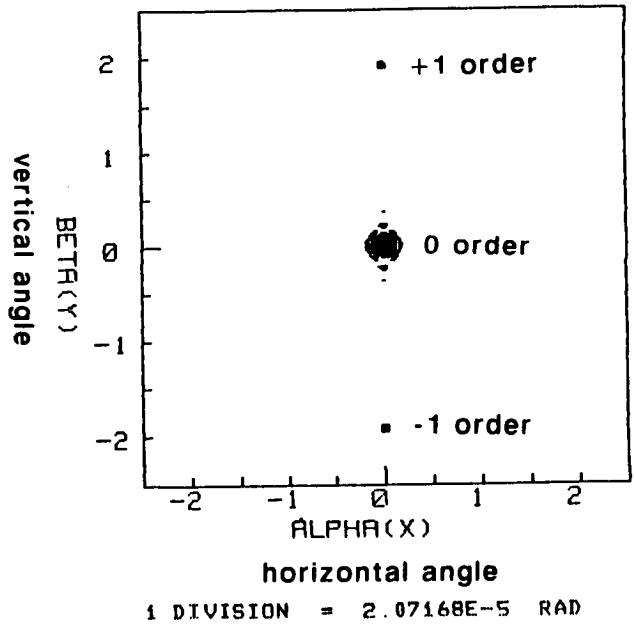


Laser System Output Aperture

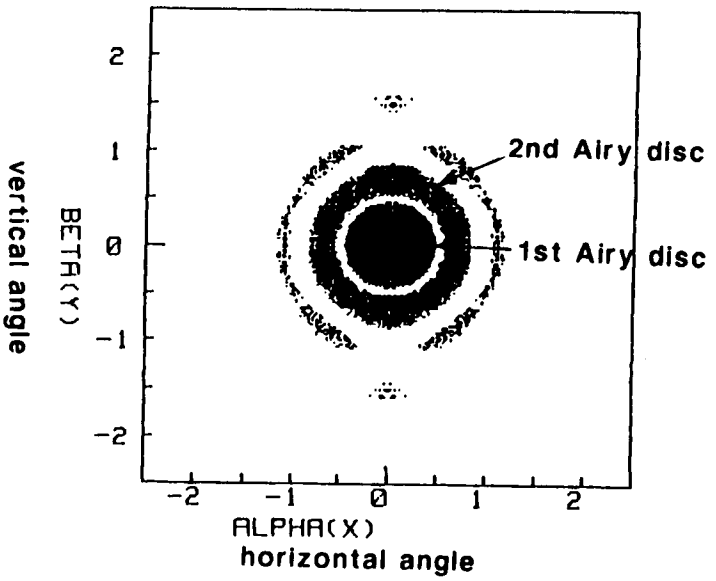
made of 4,000 strips for 235 MW Output

Shape of Laser Diode Transmitter

at the Final Amplification Stage



Far Field Pattern of Laser Diode Array Transmitter

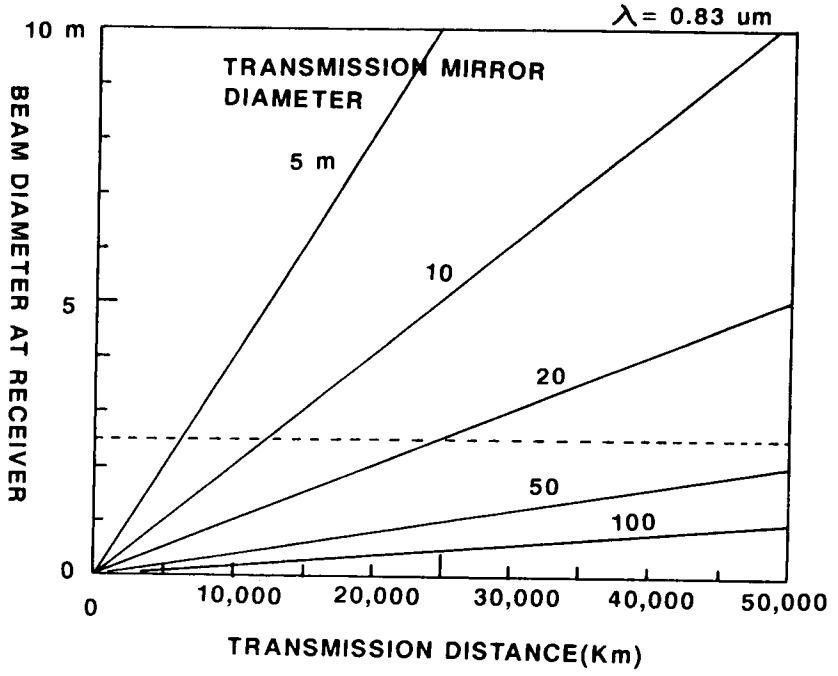


1 DIVISION = 1.90607058824E-6 RAD

Power inside 1st Airy disc = 84 %

Power inside 2nd Airy disc = 91 %

Detailed Structure of 0th order BeamPattern



Beam Diameter at Receiver vs. Transmission Distance.

CONCLUSION

Laser System:	Parallel Diode Array Amplifier (500MW)
Power Collection Efficiency at Receiver	85 %
Transmitter Diameter	80 m
Receiver Diameter	3 m
Transmission Distance	50,000 Km