What is claimed:

1. A laser amplifier system comprising:

at least one fiber-coupled laser diode array configured to output at least one pump signal having a wavelength from 850nm to 1250nm;

at least one telecentric telescope in optical communication with the at least one fiber-coupled laser diode array configured to receive the at least one pump signal and output at least one amplifier pump signal;

at least one signal source configured to output at least one input signal;

at least one resonator-like amplifier in communication with the at least one telecentric telescope and the at least one signal source, the resonator-like amplifier defined by at least one signal mirror, at least one pump injection mirror, at least one pump output mirror, and at least one mirror, wherein the at least one resonator-like amplifier has an optical path length from 50mm to 700mm defined by the at least one signal mirror, at least one pump input mirror, and least one pump output mirror, and at least one mirror; and

at least one optical crystal position within the at least one resonator- like amplifier and configured to receive at least a portion of the at least one pump signal and the at least one input signal and output at least one amplifier output signal from the at least one resonator-like amplifier.

2. The laser amplifier system of claim 1 wherein the fiber-coupled laser diode array comprises two or more fiber optic bodies, each fiber optic body configured to output at least one pump beamlet wherein the multiple beamlets forming the at least one pump signal.

3. The laser amplifier system of claim 1 wherein the at least one pump signal has a wavelength from 960nm to 990nm.

4. The laser amplifier system of claim 1 wherein the at least one pump signal has a wavelength from 970nm to 980nm.

5. The laser amplifier system of claim 1 wherein the at least one telecentric telescope has a target spot size ranging from 200μm to about 800μm.

6. The laser amplifier system of claim 1 wherein the at least one telecentric telescope has a target spot size ranging from 380μm to about 475μm.

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7. The laser amplifier system of claim 1 wherein the at least one telecentric telescope has a magnification of 4x.

8. The laser amplifier system of claim 1 wherein the at least one telecentric telescope has a magnification of at least 2x.

9. The laser amplifier system of claim 1 wherein at least one of the at least one signal mirror, at least one pump injection mirror, at least one pump output mirror, and at least one mirror includes at least one dichroic coating configured to transmit that the at least one pump signal therethrough and reflect the at least one input signal.

10. The laser amplifier system of claim 1 wherein the optical path length ranges from 80mm to 120mm.

11. The laser amplifier system of claim 1 wherein the optical path length ranges from 100mm to 110mm.

12. The laser amplifier system of claim 1 wherein that least one input signal repeatedly traverses through the resonator-like amplifier such that the at least one input signal is repeatedly incident on a different spot on a facet of the at least one optical crystal.

13. The laser amplifier system of claim 1 wherein at least one signal mirror, at least one pump injection mirror, at least one pump output mirror, and at least one mirror is tilted relative to an optical axis of the resonator-like amplifier, wherein at least one amplified signal traversing within the resonator-like amplifier such that the at least one input signal traverses along a different optical path through the resonator-like cavity.

14. The laser amplifier system of claim 13 wherein at least one signal mirror, at least one pump injection mirror, at least one pump output mirror, and at least one mirror comprises a wedged body, wherein the at least one amplified signal traversing within the resonator-like amplifier such that the at least one input signal traverses along a different optical path through the resonator-like cavity.

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15. The laser amplifier system of claim 1 wherein the at least one amplifier pump signal is comprised of multiple pump beamlets, each beamlet imaging at least one fiber-coupled laser diode forming the at least one fiber-coupled laser diode array wherein each beamlets forms an individual pump spot on at least one facet of the at least one optical crystal.

16. The laser amplifier system of claim 1 wherein the a least one optical crystal is manufactured from Yb:YAG.

17. The laser amplifier system of claim 1 wherein the a least one optical crystal is manufactured from at least one material selected from the group consisting of Yb:Lu2O3, Yb:Sc2O3, Yb:GGG, Yb:KYW, Yb:CALGO, Yb:CaF2, and Yb:CNGG.

18. The laser amplifier system of claim 1 wherein the at least one optical crystal has a uniform doping concentration.

19. The laser amplifier system of claim 1 wherein the at least one optical crystal has a non-uniform doping concentration.

20. The laser amplifier system of claim 1 wherein the at least one signal source comprises a mode-locked femtosecond laser source.

21. The laser amplifier system of claim 1 wherein the at least one signal source comprises at least one signal source selected from the group consisting of laser sources having one or more preamplifiers, broadband optical sources, picosecond optical sources, nanosecond optical sources, CW optical source, and resonator-like amplifiers.

22. The laser amplifier system of claim 1 further comprising at least one optional optical element positioned within the resonator-like amplifier, wherein the at least one optical element is selected from the group consisting of lens systems, micro lens arrays, filters, spatial filters, mechanical blockers in the form of one or more holes or lines, transmissive optical elements, gain media, optical crystals, polarizers, and wave plates.

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23. A laser amplifier system comprising:

at least one fiber-coupled laser diode array configured to output at least one pump signal formed from multiple pump beamlets individually emitted from the at least one fiber-coupled laser diode array;

a telecentric telescope in optical communication with the at least one fiber-coupled laser diode array configured to receive the individual pump beamlets forming the at least one pump signal and output multiple individual amplifier pump signals;

at least one signal source configured to output at least one input signal;

at least one resonator-like amplifier in communication with the telecentric telescope and the at least one signal source, the resonator-like amplifier defined by at least one signal mirror, at least one pump injection mirror, at least one pump output mirror, and at least one mirror; and

an optical crystal position within the at least one resonator- like amplifier and configured to be pumped by the multiple individual amplifier pump signals and the at least one input signal and output at least one amplifier output signal from the at least one resonator-like amplifier.

24. A laser amplifier system comprising:

at least one fiber-coupled laser diode array configured to output at least one pump signal formed from multiple pump beamlets individually emitted from the at least one fiber-coupled laser diode array;

a telecentric telescope in optical communication with the at least one fiber-coupled laser diode array configured to receive the individual pump beamlets forming the at least one pump signal and output multiple individual amplifier pump signals;

at least one signal source configured to output at least one input signal;

at least one resonator-like amplifier in communication with the telecentric telescope and the at least one signal source; and

at least one optical crystal position within the at least one resonator- like amplifier and configured to be pumped by the individual pump beamlets and the at least one input signal and output at least one amplifier output signal from the at least one resonator-like amplifier.

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