AMENDED CLAIMS

1. A laser system comprising:

a seed laser;

a laser beam splitting and combining subsystem receiving an output from said seed laser and providing a combined laser output having noise; and

a noise cancellation subsystem operative to provide a noise cancellation phase correction output based on taking into consideration said noise at intermittent times at a noise sampling rate,

said laser beam splitting and combining subsystem varying a phase of said combined laser output during time interstices between said intermittent times at which said noise is taken into consideration, said varying of said phase during time interstices providing spatial modulation of said combined laser output.

2. A laser system according to claim 1 and wherein said laser beam splitting and combining subsystem varies said phase of said combined laser output to provide said spatial modulation of said combined laser output at a phase varying rate which exceeds said noise sampling rate.

3. A laser system according to claim 2, wherein said spatial modulation of said combined laser output is provided in combination with mechanical spatial modulation of said combined laser output, said spatial modulation in combination with said mechanical spatial modulation being faster than said mechanical spatial modulation in the absence of said spatial modulation.

4. A laser cutting system comprising a laser system according to claim 1.

5. A laser additive manufacturing system comprising a laser system according to claim 1.

6. A laser welding system comprising a laser system according to claim 1.

7. A free-space optical communication system comprising at least one laser system according to claim 1.

8. A method for performing noise correction on a phase varied laser output comprising:

receiving an output from a seed laser;

splitting and combining said output to provide a combined laser output having noise;

applying a noise cancellation phase correction output to said combined laser output based on taking into consideration said noise at intermittent times; and

varying a phase of said combined laser output during time interstices between said intermittent times at which said noise is taken into consideration, said varying of said phase during said time interstices providing spatial modulation of said combined laser output.

9. A laser system according to claim 1, and also comprising:

a plurality of detectors detecting said combined laser output at said intermittent times during said varying of said phase of said combined laser output, said noise cancellation subsystem being operative to provide said noise cancellation phase correction output based on taking into consideration said noise of said combined laser output, as detected by said plurality of detectors at said intermittent times; and

a plurality of optical pathways between said combined laser output and said plurality of detectors for providing therealong said combined laser output to said plurality of detectors, a spatial density of said plurality of optical pathways being greater than a spatial density of said plurality of detectors.

10. A laser system comprising:

a seed laser;

a laser beam splitting and combining subsystem receiving an output from said seed laser, splitting said output into a plurality of sub-beams and providing a combined laser output comprising said plurality of sub-beams, said combined laser output having noise; and

a phase modulation subsystem grouping at least a portion of ones of said plurality of sub-beams into a multiplicity of groups of sub-beams, said phase modulation subsystem:

in parallel across said multiplicity of groups of sub-beams, varying a phase of each sub-beam within each group relative to phases of other sub-beams within said group so as to vary a phase of each group, and

varying said phase of each group relative to phases of other ones of said multiplicity of groups, thereby varying a phase of said combined laser output, said varying of said phase of said combined laser output providing spatial modulation of said combined laser output;

said phase modulation subsystem being operative to provide a noise cancellation phase correction output based on taking into consideration said noise at intermittent times during said varying of said phase of said combined laser output.

11. A laser system according to claim 10, wherein said phase modulation subsystem comprises an array of mirrors and corresponding focusing lenses for performing said grouping.

12. A laser system according to claim 10, wherein said phase modulation subsystem comprises a plurality of phase modulators for varying said phases of said sub-beams.

13. A laser system according to claim 10, and wherein said phase modulation subsystem comprises a multiplicity of detectors corresponding to said multiplicity of groups, for detecting a far field intensity pattern of each of said multiplicity of groups.

14. A laser system according to claim 13, and also comprising a multiplicity of optical masks masking corresponding ones of said multiplicity of detectors, each optical mask comprising at least one of a transmissive region and a reflective region for respectively providing therethrough and therefrom said far

field intensity pattern to said corresponding detector of said multiplicity of detectors.

15. A laser system according to claim 13, wherein said multiplicity of detectors performs said detecting at least partially mutually simultaneously.

16. A laser system according to claim 12, and wherein said phase modulation subsystem comprises a multiplicity of additional phase modulators, each additional phase modulator being common to all sub-beams within each said group for varying said phase of each group relative to phases of other ones of said multiplicity of groups.

17. A laser system according to claim 13, wherein each of said multiplicity of detectors comprises a plurality of detectors, said system and also comprising a plurality of optical pathways between said far field intensity pattern of each of said multiplicity of groups and each plurality of detectors for providing said far field intensity pattern therealong to said plurality of detectors, a spatial density of said plurality of optical pathways being greater than a spatial density of said plurality of detectors.

18. A laser system according to claim 10, wherein said varying of said phase of said combined laser output comprises maximizing an intensity of said combined laser output.

19. A laser system according to claim 10, wherein said varying of said phase of said combined laser output provides said spatial modulation of said combined laser output, without involving mechanical spatial modulation of said combined laser output.

20. A laser system according to claim 10, and wherein said laser beam splitting and combining subsystem provides laser beam amplification downstream of said splitting and upstream of said combining.