

WHAT IS CLAIMED IS:

1. A laser-beam power-modulation system, comprising:
 - an acousto-optic modulator to receive a laser beam and separate the laser beam into a primary beam and a plurality of diffracted beams based on an input signal, wherein the power of the primary beam depends on the input signal;
 - a slit to transmit the primary beam and dump the plurality of diffracted beams;
 - a controller to generate a control signal based at least in part on feedback indicative of the power of the primary beam or the power of a beam generated using the primary beam; and
 - a driver to generate the input signal, based at least in part on the control signal.
2. The system of claim 1, further comprising:
 - one or more mirrors to direct the primary beam and the plurality of diffracted beams toward the slit; and
 - a sensor to receive light from the primary beam leaked by a respective mirror of the one or more mirrors and to provide the feedback indicative of the power of the primary beam based on the received light;wherein the controller is to generate the control signal based at least in part on the feedback indicative of the power of the primary beam.
3. The system of claim 2, wherein:
 - the one or more mirrors comprise a first mirror and a second mirror;
 - the first mirror is situated between the acousto-optic modulator and the second mirror in the optical paths of the primary beam and the plurality of diffracted beams; and
 - the second mirror is the respective mirror from which the sensor is to receive the leaked light from the primary beam.
4. The system of claim 2, further comprising an attenuator situated between the acousto-optic modulator and the one or more mirrors in the optical paths of the primary beam and the plurality of diffracted beams.
5. The system of claim 1, wherein:
 - the driver is a radio-frequency (RF) driver; and

the input signal is an RF signal.

6. The system of claim 1, wherein the control signal is a direct-current (DC) voltage.
7. The system of claim 6, wherein, to generate the control signal, the controller is to filter noise from the feedback.
8. The system of claim 1, further comprising a beam dump, wherein the slit comprises a pair of mirrors to direct the plurality of diffracted beams to the beam dump, the pair of mirrors being separated by a gap to transmit the primary beam.
9. The system of claim 1, further comprising:
 - a harmonic generator to convert a first portion of the primary beam into a converted beam that is a harmonic of the primary beam and to transmit a second portion of the primary beam; and
 - a frequency separator to receive the converted beam and the second portion of the primary beam, transmit the converted beam, and dump the second portion of the primary beam.
10. The system of claim 9, wherein the harmonic generator is a fourth harmonic generator.
11. The system of claim 9, further comprising a beam-reducing telescope, situated between the slit and the harmonic generator in the optical path of the primary beam, to focus the primary beam onto the harmonic generator.
12. The system of claim 9, wherein:
 - the converted beam is the beam generated using the primary beam;
 - the system further comprises a sensor to receive light from the converted beam leaked by the frequency separator and to provide the feedback indicative of the power of the beam generated using the primary beam; and
 - the controller is to generate the control signal based at least in part on the feedback indicative of the power of the beam generated using the primary beam.
13. The system of claim 12, wherein the primary beam is green, the converted beam is ultraviolet, and the sensor is an ultraviolet sensor.

14. The system of claim 12, wherein the frequency separator comprises:
a Pellin-Broca prism to separate the converted beam from the second portion of the primary beam;
a first, dichroic mirror to reflect the converted beam and transmit at least some of the second portion of the primary beam; and
a second mirror to reflect the converted beam and leak the light from the converted beam to the sensor;
wherein the first, dichroic mirror is situated between the Pellin-Broca prism and the second mirror in the beam path of the converted beam.
15. The system of claim 12, wherein the sensor is a first sensor, the system further comprising:
one or more mirrors to direct the primary beam and the plurality of diffracted beams toward the slit; and
a second sensor to receive light from the primary beam leaked by a respective mirror of the one or more mirrors and to provide the feedback indicative of the power of the primary beam based on the received light;
wherein the controller is to generate the control signal based at least in part on the feedback indicative of the power of the primary beam and the feedback indicative of the power of the beam generated using the primary beam.
16. The system of claim 15, wherein the primary beam is green, the converted beam is ultraviolet, the first sensor is an ultraviolet sensor, and the second sensor is a green sensor.
17. The system of claim 12, wherein:
the frequency separator is to provide the converted beam to an illumination system of a defect inspection tool;
the control signal is a first control signal;
the controller is to assert a second control signal in response to a signal from the defect inspection tool indicating that the size of a defect on a substrate satisfies a threshold; and

the driver is to generate the input signal based on the first control signal and the second control signal, wherein the acousto-optic modulator is to temporarily decrease the power of the primary beam in response to assertion of the second control signal.

18. A method, comprising:

separating a laser beam into a primary beam and a plurality of diffracted beams using an acousto-optic modulator, wherein the power of the primary beam depends on an input signal from a driver;

dumping the plurality of diffracted beams while transmitting the primary beam;

generating a control signal based at least in part on feedback indicative of the power of the primary beam or the power of a beam generated using the primary beam;

providing the control signal to the driver; and

generating the input signal based at least in part on the control signal, using the driver.

19. The method of claim 18, wherein:

dumping the plurality of diffracted beams while transmitting the primary beam comprises using one or more mirrors to direct the primary beam and the plurality of diffracted beams to a slit that transmits the primary beam and dumps the plurality of diffracted beams;

generating the control signal is performed based at least in part on the feedback indicative of the power of the primary beam; and

the method further comprises generating the feedback indicative of the power of the primary beam based on light from the primary beam that leaks through a respective mirror of the plurality of mirrors to a sensor.

20. The method of claim 18, wherein generating the control signal comprises filtering noise from the feedback.

21. The method of claim 18, further comprising:

converting a first portion of the primary beam into a converted beam that is a harmonic of the primary beam while transmitting a second portion of the primary beam; and

transmitting the converted beam while dumping the second portion of the primary beam.

22. The method of claim 21, wherein:
the converted beam is the beam generated using the primary beam;
generating the control signal is performed based at least in part on the feedback indicative of the power of the beam generated using the primary beam;
transmitting the converted beam while dumping the second portion of the primary beam comprises separating the converted beam from the second portion of the primary beam using a frequency separator; and
the method further comprises generating the feedback indicative of the power of the beam generated using the primary beam based on light from the converted beam that leaks through the frequency separator to a sensor.
23. The method of claim 22, wherein:
the sensor is a first sensor;
dumping the plurality of diffracted beams while transmitting the primary beam comprises using one or more mirrors to direct the primary beam and the plurality of diffracted beams to a slit that transmits the primary beam and dumps the plurality of diffracted beams;
generating the control signal is performed based at least in part on the feedback indicative of the power of the primary beam and the feedback indicative of the power of the beam generated using the primary beam; and
the method further comprises generating the feedback indicative of the power of the primary beam based on light from the primary beam that leaks through a respective mirror of the plurality of mirrors to a second sensor.
24. The method of claim 23, wherein the primary beam is green, the converted beam is ultraviolet, the first sensor is an ultraviolet sensor, and the second sensor is a green sensor.
25. The method of claim 22, wherein:
transmitting the converted beam comprises providing the converted beam to an illumination system of a defect inspection tool;
the control signal is a first control signal;

the method further comprises asserting a second control signal in response to a signal from the defect inspection tool indicating that the size of a defect on a substrate satisfies a threshold;

the input signal is generated based on the first control signal and the second control signal; and

the acousto-optic modulator temporarily decreases the power of the primary beam in response to assertion of the second control signal.