CLAIMS

1. An apparatus, comprising:

an electron source;

at least one optical device configured to produce a plurality of primary beam lets utilizing electrons provided by the electron source, the at least one optical device further configured to deliver the plurality of primary beam lets toward a target; and

an array of multi-channel detectors configured to receive a plurality of image beam lets emitted by the target in response to the plurality of primary beamlets, the array of multi-channel detectors further configured to render an array of dark field images to form a contiguous dark field image, wherein each multi-channel detector of the array of detectors comprises a set of detector elements.

2. The apparatus of claim 1, wherein each image beamlet of the plurality of image beamlets is received by a designated multi-channel detector.

3. The apparatus of claim 1, wherein at least some of the multi-channel detectors comprise a center channel and a plurality of outer channels around the center channel.

4. The apparatus of claim 3, wherein the outer channels are further configured to collect polar and azimuth angle information to facilitate rendering of a three-dimensional topology of the target or to facilitate measurement of a vertical distance to the target.

5. The apparatus of claim 1, wherein the array of multi-channel detectors is a high density detector array.

6. The apparatus of claim 5, wherein each image beam let of the plurality of image beamlets is received by a set of detectors within the high density detector array.

7. The apparatus of claim 6, wherein at least one subset of the set of multi-channel detectors is grouped to form a center partition and at least two subsets of the set of multi-channel detectors are grouped to form at least two outer partitions.

8. The apparatus of claim 7, wherein the center partition and the outer partitions are configured to facilitate rendering of a bright field image of the target and a dark field image of the target.

9. The apparatus of claim 7, wherein the outer partitions are further configured to collect polar and azimuth angle information to facilitate rendering of a three-dimensional topology of the target or to facilitate measurement of a vertical distance to the target.

10. An apparatus, comprising:

an electron source;

at least one optical device configured to produce a plurality of primary beamlets utilizing electrons provided by the electron source, the at least one optical device further configured to deliver the plurality of primary beamlets toward a target; and

an array of multi-channel detectors configured to receive a plurality of image beamlets emitted by the target in response to the plurality of primary beamlets, the array of multi-channel detectors further configured to form a contiguous dark field image, wherein each multi-channel detector of the array of detectors comprises a set of detector elements.

11. The apparatus of claim 10, wherein each image beamlet of the plurality of image beamlets is received by a designated multi-channel detector.

12. The apparatus of claim 11, wherein at least some of the multi-channel detectors comprise a center channel and a plurality of outer channels around the center channel.

13. The apparatus of claim 12, wherein the multi-channel detector is configured to facilitate rendering of a bright field image of the target and a dark field image of the target.

14. The apparatus of claim 12, wherein the multi-channel detector is configured to quantify image beam distribution on the multi-channel detector to determine one or more applicable corrections.

15. The apparatus of claim 12, wherein the outer channels are further configured to collect polar and azimuth angle information to facilitate rendering of a three-dimensional topology of the target or to facilitate measurement of a vertical distance to the target.

16. The apparatus of claim 10, further comprising:

a lens array positioned in front of the array of multi-channel detectors, the lens array configured to facilitate control of the plurality of image beamlets receivable by the array of multi-channel detectors.

17. An apparatus, comprising:

an electron source;

at least one optical device configured to produce a plurality of primary beamlets utilizing electrons provided by the electron source, the at least one optical device further configured to deliver the plurality of primary beamlets toward a target; and

a high density detector array configured to receive a plurality of image beamlets emitted by the target in response to the plurality of primary beamlets, the high density detector array further configured to render an array of dark field images to form a contiguous dark field image.

18. The apparatus of claim 17, wherein each image beamlet of the plurality of image beamlets is received by a set of detectors within the high density detector array.

19. The apparatus of claim 18, wherein at least one subset of the set of detectors is grouped to form a center partition and at least two subsets of the set of detectors are grouped to form at least two outer partitions.

20. The apparatus of claim 19, wherein the center partition and the outer partitions are configured to facilitate rendering of a bright field image of the target and a dark field image of the target.

21. The apparatus of claim 19, wherein the outer partitions are further configured to collect polar and azimuth angle information to facilitate rendering of a three-dimensional topology of the target or to facilitate measurement of a vertical distance to the target.