What is claimed is:

1. A magnetic imaging apparatus comprising:

a power source for providing a current; and

a coil electrically connected to the power source, the coil comprising:

a first ring; and

a second ring, wherein the first ring and the second ring have different diameters, wherein the first ring and the second ring are connected via one or more rungs, and wherein the first ring, the second ring, and the one or more rungs are non-planar to each other;wherein the power source is configured to flow current through the first ring, the second ring, and the one or more rungs to generate an electromagnetic field outwards from the coil in a region of interest.

2. The apparatus of claim 1, wherein the electromagnetic field is between about 1 μT and about 10 mT.

3. The apparatus of claim 1, wherein the electromagnetic field is pulsed at a radio frequency between about 1 kHz and about 2 GHz.

4. The apparatus of claim 1, wherein the first ring, the second ring, and the one or more rungs are connected to form a single current loop.

5. The apparatus of claim 1, wherein the coil is non-planar and oriented to partially surround the region of interest.

6. The apparatus of claim 1, wherein the coil comprises a plurality of rungs, and wherein the first ring, the second ring, and the rungs are non-planar to each other.

7. The apparatus of claim 1, wherein one of the first and second ring is tilted with respect to the other ring.

8. The apparatus of claim 1, wherein one of the first or second ring is closer to the region of interest than the other ring.

9. The apparatus of claim 1, wherein the first ring and the second ring comprise different materials.

10. The apparatus of claim 1, wherein the first ring and the second ring have diameters between about 10 μm to about 10 m.

11. The apparatus of claim 1, wherein the first ring has a larger diameter than the second ring.

12. The apparatus of claim 1, wherein a diameter of the second ring is between a size of the region of interest and a diameter of the first ring.

13. The apparatus of claim 1, wherein the coil further comprises one or more electronic components for tuning the electromagnetic field.

14. The apparatus of claim 13, wherein the one or more electronic components include at least one of a varactor, a PIN diode, a capacitor, an inductor, a MEMS switch, a solid state relay, or a mechanical relay.

15. The apparatus of claim 13, wherein the one or more electronic components used for tuning includes at least one of dielectrics, capacitors, inductors, conductive metals, metamaterials, or magnetic metals.

16. The apparatus of claim 1, wherein the coil is cryogenically cooled.

17. The apparatus of claim 1, wherein at least one of the first ring, the second ring, and the one or more rungs comprise hollow tubes for fluid cooling.

18. The apparatus of claim 1, wherein at least one of the first ring and the second ring comprise a plurality of windings or litz wires.

19. The apparatus of claim 1, wherein at least one of the first ring, the second ring, and the one or more rungs are connected to a capacitor.

20. The apparatus of claim 1, wherein the one or more rungs comprise a rung, wherein the first ring is attached to a first portion of the rung and the second ring is attached to a second portion of the rung, and wherein the first and second portion of the rung form an overlapping contact area.

21. The apparatus of claim 20, wherein the overlapping contact area is adjustable.

22. The apparatus of claim 20, wherein the first portion is a cylinder or a tube, and the second portion is a concentric tube, or vice versa, and wherein the first portion and the second portion are configured to slide past each other.

23. A method of operating a magnetic imaging apparatus comprising:

providing a power source;

providing a coil electrically connected to the power source, the coil comprising a first ring and a second ring, wherein the first ring and the second ring have different diameters, and wherein the first ring and the second ring are connected via one or more rungs; and

turning on the power source so as to flow a current through the coil thereby projecting a magnetic field outwards and away from the coil to a region of interest.

24. The method of claim 23, wherein the magnetic field is between about 1 μT and about 10 mT.

25. The method of claim 23, wherein the magnetic field is pulsed at a radio frequency (RF) between about 1 kHz and about 2GHz.

26. The method of claim 23, wherein the coil further comprises one or more electronic components, the method further comprising:

tuning the magnetic field using one or more components provided with the coil.

27. The method of claim 26, wherein tuning the magnetic field is performed via at least one of changing the current of the one or more electronic components or by changing physical locations of the one or more electronic components.

28. The method of claim 26, wherein the one or more electronic components include at least one of a varactor, a PIN diode, a capacitor, an inductor, a MEMS switch, a solid state relay, or a mechanical relay.

29. The method of claim 23, wherein at least one of the first ring, the second ring, and the one or more rungs are connected to a capacitor.

30. The method of claim 28, the method further comprises:

selectively turning on a particular set of electronic components so as to pulse the magnetic field in a narrower frequency range.

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