a pump for actively circulating the coolant through the cooling lines to a device external to a vacuum where heat is removed.

5. The fusion reactor of Claim 1, wherein the cooling system comprises a system for moving coolant through the interior of the magnetic coils, wherein wires in the interior of the magnetic coils are bathed in a coolant and the coolant is cycled through the interior of the plurality of internal magnetic coils, the plurality of encapsulating magnetic coils, the center magnetic coil, and the plurality of mirror magnetic coils using a system for moving coolant.

6. The fusion reactor of Claim 1, wherein the coolant comprises one of liquid nitrogen, helium, and FliBe.

7. The fusion reactor of Claim 1, wherein the direction of current in the center magnetic coil, the plurality of encapsulating magnetic coils, and the two mirror magnetic coils is the same and wherein the direction of current in the two internal magnetic coils is opposite the direction of current in center magnetic coil, the plurality of encapsulating magnetic coils, and the two mirror magnetic coils.

8. The fusion rector of Claim 1, wherein the two internal magnetic coils are surrounded by, and shielded from, the plasma and suspended within the enclosure by at least one support.

~~79~~. A fusion reactor comprising:

an enclosure comprising:

a first end and a second end that is opposite from the first end; and

a midpoint that is substantially equidistant between the first and second ends of the enclosure;

two internal magnetic coils suspended within the enclosure, each internal magnetic coil positioned on an opposite side of the midpoint of the enclosure from the other internal magnetic coil;

one or more encapsulating magnetic coils positioned on each side of the midpoint of the enclosure, each encapsulating magnetic coil being coaxial with the internal magnetic coils; and

two mirror magnetic coils coaxial with the internal magnetic coils, each mirror magnetic coil positioned on an

opposite side of the midpoint of the enclosure from the other mirror magnetic coil;

wherein the magnetic coils are operable, when supplied with electrical currents, to form magnetic fields for confining plasma within the enclosure; and

one or more cooling lines within each of the internal magnetic coils, the cooling lines carrying a coolant and operable to remove heat from the internal magnetic coils.

~~8~~10. The fusion reactor of Claim ~~7~~9, wherein the coolant lines extend from the interior of the internal magnetic coils, through one or more brackets and one or more support stalks, to a system for moving coolant through the cooling lines.

~~9~~11. The fusion reactor of Claim ~~7~~9, wherein the system for moving coolant through the cooling lines comprises:

a pump for actively circulating the coolant through the cooling lines to a device external to a vacuum where heat is removed.

~~10~~12. The fusion reactor of Claim ~~7~~9, wherein the coolant is selected based at least in part on the superconductive properties of one or more materials forming the internal magnetic coils.

~~11~~13. The fusion reactor of Claim ~~7~~9, wherein the coolant comprises one of liquid nitrogen, helium, or FLiBe.

~~12~~14. The fusion reactor of Claim ~~7~~9, wherein an amount of heat removed through the cooling lines is sufficient to

maintain a steady-state within each of the at least one internal magnetic coils.

~~13~~15. The fusion reactor of Claim ~~7~~9, wherein the cooling lines comprise channels or pipes.

~~14~~16. The fusion reactor of Claim ~~7~~9, wherein the cooling lines are isolated from a vacuum by compression fittings, metal walled pipes, or channels.

17. The fusion reactor of Claim 9, wherein the direction of current in the center magnetic coil, the plurality of encapsulating magnetic coils, and the two mirror magnetic coils is the same and wherein the direction of current in the two internal magnetic coils is opposite the direction of current in center magnetic coil, the plurality of encapsulating magnetic coils, and the two mirror magnetic coils.

18. The fusion rector of Claim 9, wherein the two internal magnetic coils are surrounded by, and shielded from, the plasma and suspended within the enclosure by at least one support.

~~15~~19. A fusion reactor comprising:

two internal magnetic coils suspended within an enclosure;

a center magnetic coil coaxial with the two internal magnetic coils and located proximate to a midpoint of the enclosure;

a plurality of encapsulating magnetic coils coaxial with the internal magnetic coils, the encapsulating magnetic coils being operable to preserve the magnetohydrodynamic (MHD) stability of the fusion reactor by maintaining a magnetic wall that prevents plasma within the enclosure from expanding; and

two mirror magnetic coil coaxial with the internal magnetic coils; and

one or more cooling lines within the interior of the internal magnetic coils, the cooling lines operable to carry a coolant and coupled to a system for moving coolant through the cooling lines to remove heat from the internal magnetic coils.

~~16~~20. The fusion reactor of Claim ~~15~~19, wherein the system for moving coolant through the cooling lines comprises:

a pump for actively circulating the coolant through the cooling lines to a device external to a vacuum where heat is removed.

~~17~~21. The fusion reactor of Claim ~~15~~19, wherein the coolant is selected based at least in part on the superconductive properties of one or more materials forming the at least one internal magnetic coil, the at least one encapsulating magnetic coil, and the at least one mirror magnetic coil.

~~18~~22. The fusion reactor of Claim ~~15~~19, wherein the coolant comprises one of liquid nitrogen, helium, or FLiBe.

~~19~~23. The fusion reactor of Claim ~~15~~19, wherein an amount of heat removed through the cooling lines is sufficient to maintain a steady-state within each of the internal magnetic coils.

~~20~~24. The fusion reactor of Claim ~~15~~19, wherein the cooling lines are isolated from a vacuum by compression fittings or metal walled pipes or channels.

25. The fusion reactor of Claim 19, wherein the two mirror magnetic coils comprise first and second mirror magnetic coils disposed on opposite sides of the center magnetic coil.

26. The fusion reactor of Claim 19, wherein the direction of current in the center magnetic coil, the plurality of encapsulating magnetic coils, and the two mirror magnetic coils is the same and wherein the direction of current in the two internal magnetic coils is opposite the direction of current in center magnetic coil, the plurality of encapsulating magnetic coils, and the two mirror magnetic coils.

27. The fusion rector of Claim 19, wherein the two internal magnetic coils are surrounded by, and shielded from, the plasma and suspended within the enclosure by at least one support.