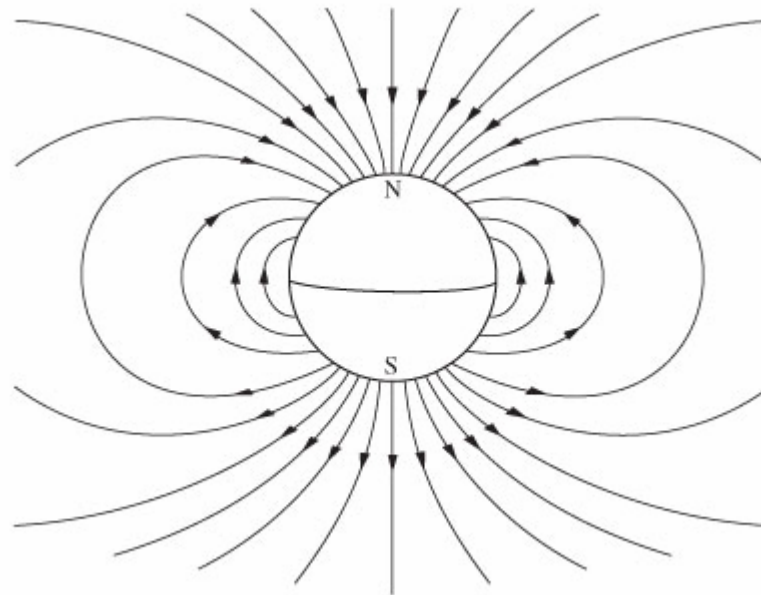


Levitated Dipole Experiment LDX



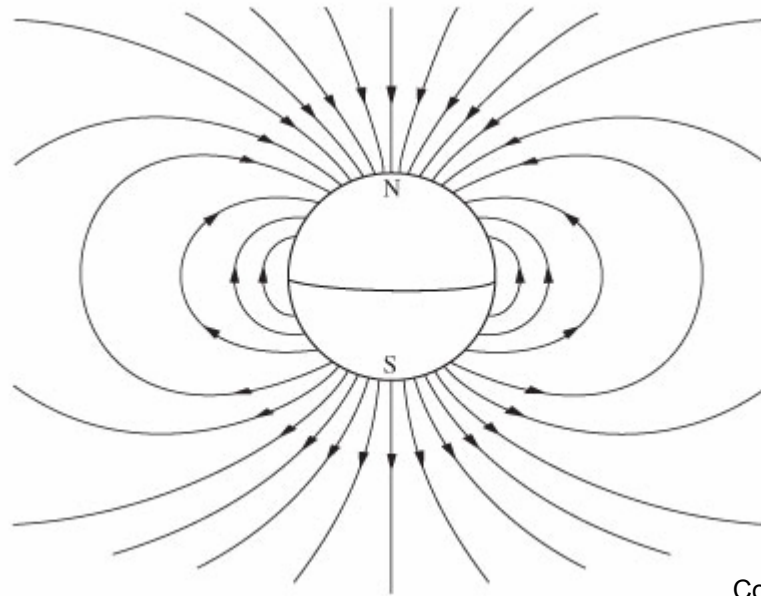
Courtesy of the U.S. Geological Survey.

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Susannah Brown

Concept

- Single loop of current producing a confining magnetic field.

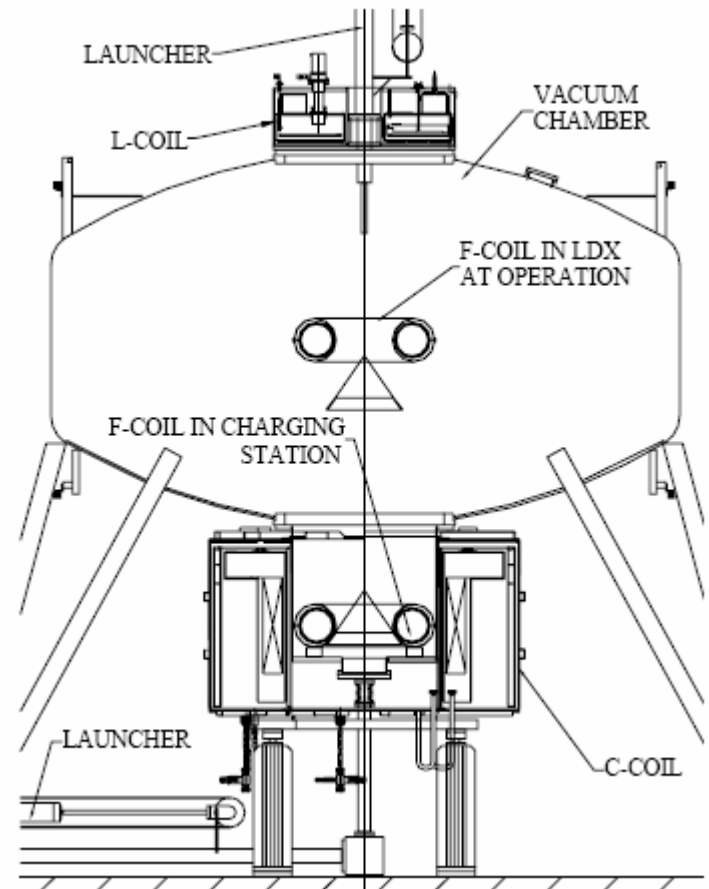


Courtesy of the U.S. Geological Survey.

- As in the middle magnetospheres of planets and neutron stars

How it works...

- 3 superconducting magnets
 - Charging coil
 - Floating coil
 - Levitation coil
- Induced current in f-coil
- Radiation shielding
- Plasma contained



Courtesy of Oak Ridge National Laboratory.

How it actually works....

- Energize charging coil
- Cool floating coil with liquid He
- De-energize charging coil

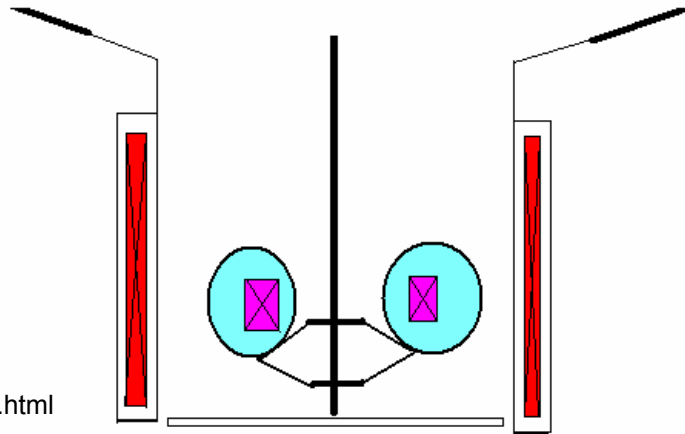


Figure removed for copyright reasons.
Image of LDX base case.
See <http://psfcwww2.psfc.mit.edu/ldx/ldx.html>

How it actually works...

- F-coil lifted into plasma with launcher
- Current in I-coil rises
- Launcher lowered away

Figure removed for copyright reasons.
Image of LDX base case.
See <http://psfcwww2.psfc.mit.edu/ldx/ldx.html>

How it actually works...

Figure removed for copyright reasons.

See: http://www.apam.columbia.edu/fusion/LDX/First_Plasma/

- Lasers monitor f-coil
- Gas released and heated with microwaves
- 1 second shots every 5 minutes

How it actually works....

- Launcher/catcher brings f-coil down
- F-coil de-energized
- Heated above superconducting temp
- Charging coil de-energized

Figure removed for copyright reasons.
Image of LDX base case.
See <http://psfcwww2.psfc.mit.edu/ldx/ldx.html>

Short-term goals

- Test confinement/stability
- 4-8 second discharges

Figure removed for copyright reasons.

See: http://www.apam.columbia.edu/fusion/LDX/First_Plasma/

Next step

- Longer-lived plasma for fusion
- Create and maintain plasma in LDX without much loss of energy

Figure removed for copyright reasons.

See: http://www.apam.columbia.edu/fusion/LDX/First_Plasma/

Long term goal: LDR

- Levitated Dipole Reactor

Figure removed for copyright reasons.

Still from LDX animation.

See animation at: <http://psfcwww2.psfc.mit.edu/ldx/movie.html/>

Advantages of LDR

- Inherently steady state
- Low particle confinement & high energy confinement
 - Contrast to tokamak
 - Would allow D-D or D-He3 fusion
 - Less power in form of neutrons
 - Don't have to breed tritium

Disadvantages

- Hard to engineer
 - Stabilizing a levitated ring
 - Superconductor surrounded by hot plasma

Works Cited

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