



The Magnetic Field and Magnetic Permeability of Magnetic Materials

Presented by George J Bugh

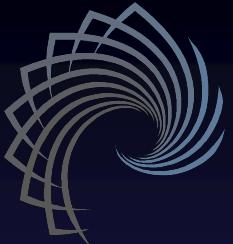
Updated August&Sepetmber 2020 starting on slide 14

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How Special Relativity connects the Electric Field and the Magnetic Field

- As presented in Einstein's paper: "On the Electrodynamics of Moving Bodies" (English translation of the title); The magnetic field is just the electric field that is experiencing the effects of length contraction-time dilation when there is relative motion. The electric field force vectors get morphed in direction to become the magnetic field forces. These links below present this Special Relativity theory better: *If these links go bad look them up at archive.org*
- http://galileo.phys.virginia.edu/classes/252/rel_el_mag.pdf
- https://ocw.mit.edu/courses/materials-science-and-engineering/3-a08-attraction-and-repulsion-the-magic-of-magnets-fall-2005/assignments/mag_relativity.pdf
- http://www.hep.uiuc.edu/home/g-gollin/relativity/p112_relativity_14.html



The Purpose of this Presentation is to:

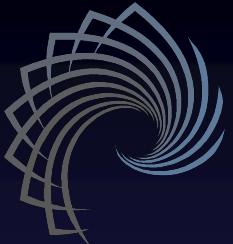
- Explain what magnetic permeability is.
- Discuss misconceptions about relative permeability.
- Discuss the processes involved within magnetic materials.
- Discuss insights and advancements possible when using a more correct explanation of the relative permeability of magnetic materials.



Why bother with a more correct explanation of the processes?

It is important to understand the actual processes taking place ... :

- when working at very high frequencies.
- when there are propagation delays between changes in external magnetic fields and when these changes arrive at a magnetic material's location.
- when magnetic fields subsequently propagate back from a magnetic material to the external electric circuit that stimulated their development in the magnetic material.



Magnetic Permeability and Relative Permeability

From Wikipedia:

- **Magnetic Permeability:**

“... is the measure of the ability of a material to support the formation of a magnetic field within itself. Hence, it is the degree of magnetization that a material obtains in response to an applied magnetic field. Magnetic permeability is typically represented by the (italicized) Greek letter μ . The term was coined in September 1885 by Oliver Heaviside.

In SI units, permeability is measured in Henries per meter (H/m or $\text{H}\cdot\text{m}^{-1}$), or equivalently in Newtons per ampere squared ($\text{N}\cdot\text{A}^{-2}$). The permeability constant (μ_0), also known as the magnetic constant or the permeability of free space, is a measure of the amount of resistance encountered when forming a magnetic field in a classical vacuum. The magnetic constant has the exact (defined) value ($\mu_0 = 4\pi \times 10^{-7} \text{ H}\cdot\text{m}^{-1} \approx 1.2566370614\dots \times 10^{-6} \text{ H/m}$ or $\text{N}\cdot\text{A}^{-2}$).

Notes to myself: In the formula $\mu = \text{H/m}$, the distance or length m in meters is in what direction?

- **Relative Permeability:**

“... denoted by the symbol μ_r , is the ratio of the permeability of a specific medium to the permeability of free space μ_0 :

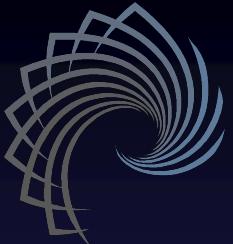
$$\mu_r = \mu/\mu_0$$

where $\mu_0 = 4\pi \times 10^{-7} \text{ N}\cdot\text{A}^{-2}$.



History of the term: “Relative Permeability”

- The term “Relative Permeability” was in use in the 1800’s to indicate, for example, how easily water could permeate one type of porous mortar versus some other type of less porous mortar.
- As mentioned already, Oliver Heaviside coined the term “magnetic permeability” in 1885.
- In the 1890’s people were using the term “relative permeability” in relation to the attributes of magnetic materials that appeared to allow a magnetic field to permeate the material with more or less ease compared to a magnetic field’s ability to permeate empty space.
- All this was prior to people having a good understanding of where or how a magnetic field originates.
- It was 1905 when Einstein wrote his paper: “On the Electrodynamics of Moving Bodies” which included his theory and math regarding magnetic fields being a relativistic translation of electric fields of electric charges in relative motion.



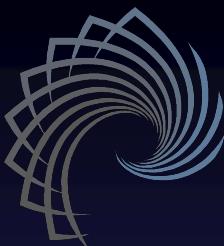
What we now know about magnetic processes

- Scientists now know that the strength of a magnetic field from moving charges is **NOT** dependant on the magnetic properties of magnetic materials in the area but rather dependant on the amount of electric charges and their rate of relative motion.
- Other magnetic materials in the area develop their own magnetic fields and these can be influenced by magnetic fields external to the magnetic materials.
- Changes in the magnetic fields from a magnetic material can propagate back to an electric circuit and induce a decrease in the rate of change of relative motion of electric charges in that circuit but still the magnetic field of the electric circuit comes from the amount of electric charges in the circuit and their rate of relative motion.
- The total magnetic field flux density at any particular location within a magnetic material is the vector summation of all external magnetic fields (often generated by electric circuits) plus the magnetic material's own internally created magnetic fields which are caused by its own internal processes (motions of electric charges).



What's wrong with the term “Relative Permeability”

- The term “Relative Permeability” was originally used when there was a false assumption that the source of the total magnetic field was an external magnetizing electric circuit.
- This incorrectly implies that a magnetic material can have the ability to let an external magnetic field permeate it more easily than it can permeate free space and thus increase the magnetic flux density through the magnetic material.
- In fact, the processes taking place within a magnetic material will create a greater or lesser magnetic field density but this is not caused by making it easier or more difficult for the original external magnetic field source to permeate the magnetic material.
- A magnetic circuit is often incorrectly compared to an electric circuit in which objects along the circuit path with greater or lesser conductivity allow the flow of more or less electric current from a current source like a battery.
- This inaccurate way of explaining relative permeability is wide spread in today's college textbooks and amateur radio handbooks.



Examples of the incorrect way of visualizing magnetic processes:

From:

http://1.bp.blogspot.com/_Gky8ItNWVFk/ScCYgLRqoMI/AAAAAAAEM/4hF79D35MIM/w1200-h630-p-k-nu/Magnetic+versus+Electrical+circuits01.JPG

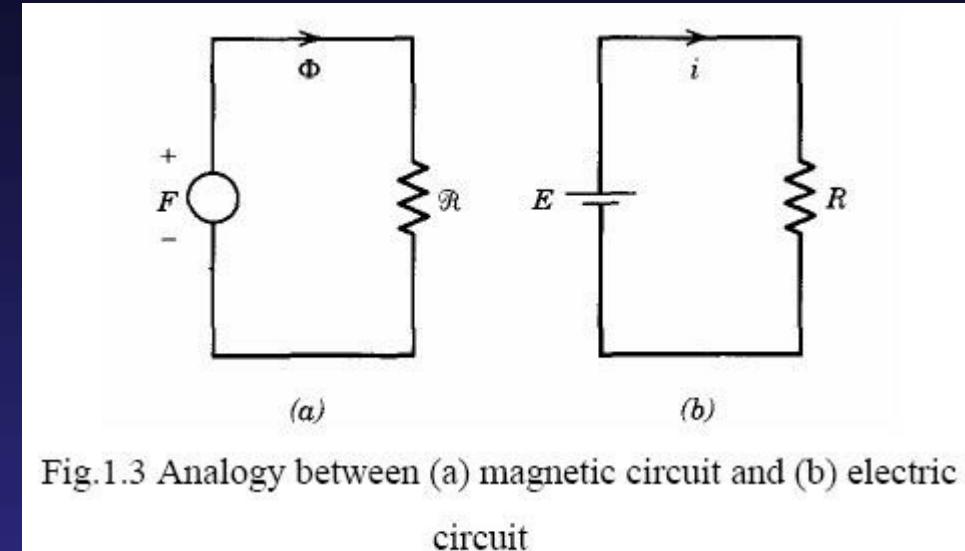


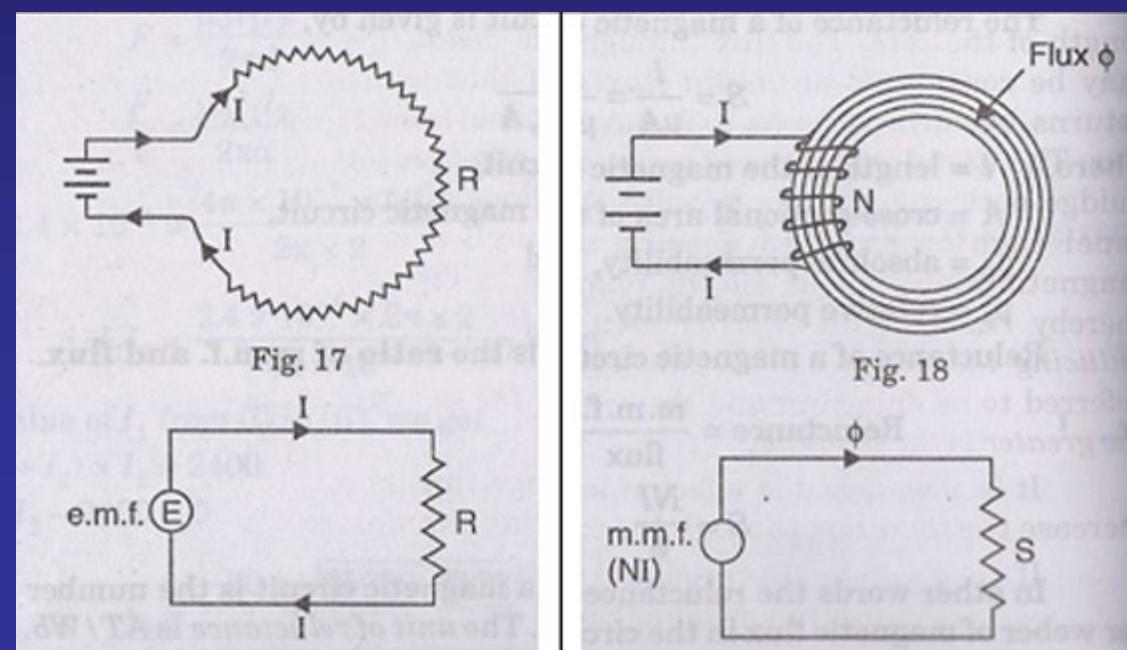
Fig.1.3 Analogy between (a) magnetic circuit and (b) electric circuit

From:

<http://www.electrical-engineering-assignment.com/wp-content/uploads/2013/05/114.png>

See also:

http://processmodeling.org/model_em/em_heat/res/electric%20magnetic%20fields%20analogy.gif





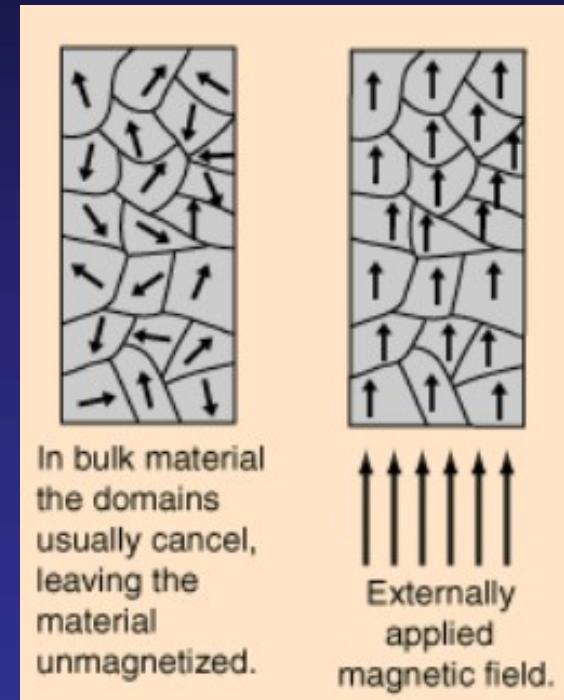
How Magnetic Materials emulate having greater permeability

- The individual magnetic domains within a paramagnetic or ferromagnetic material will re-align to align with an external magnetic field.

Example from:

<http://hyperphysics.phy-astr.gsu.edu/hbase/Solids/ferro.html#c4>

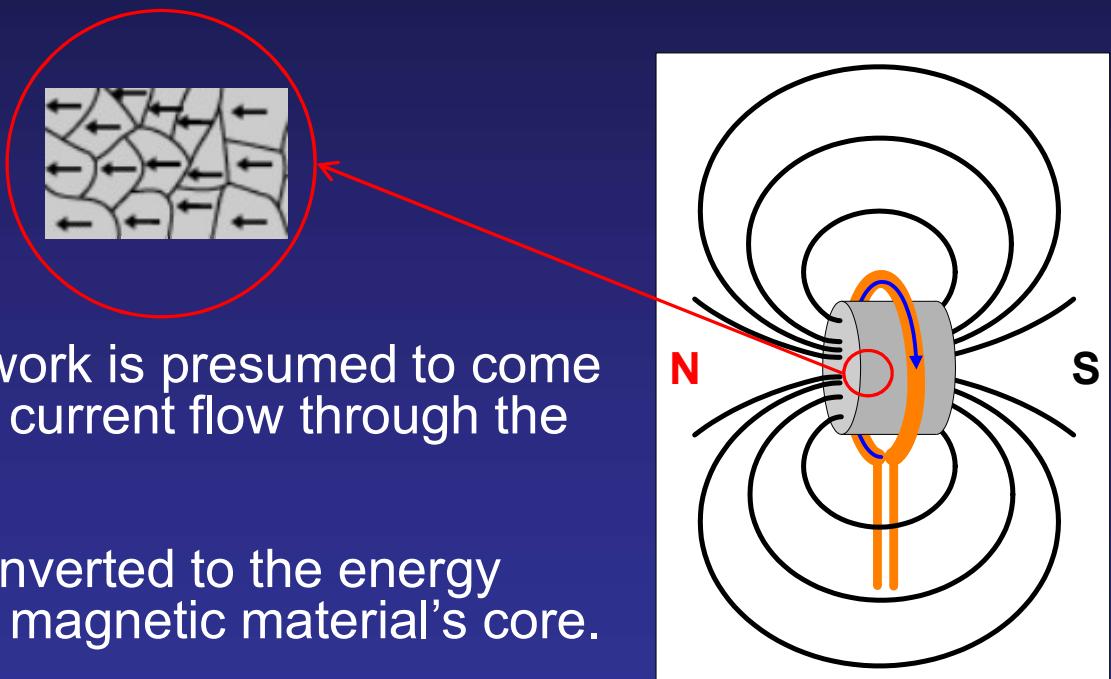
- The total magnetic field strength and direction at any particular location is the vector summation of all external and internal magnetic fields at that location.
- In the actual processes occurring, the external magnetic field source does **NOT** output greater magnetic flux in response to a magnetic material that becomes more easy to permeate.
- **Typically, it is the magnetic material itself that becomes the source of the majority of the stronger magnetic field.**





Who does the work and where does the energy come from?

- When an EMF is applied to a loop of wire it causes a current flow through the wire which causes a magnetic field from the loop which magnetizes a core magnetic material.
- Work is performed to change the orientation of magnetic domains within the magnetic material.

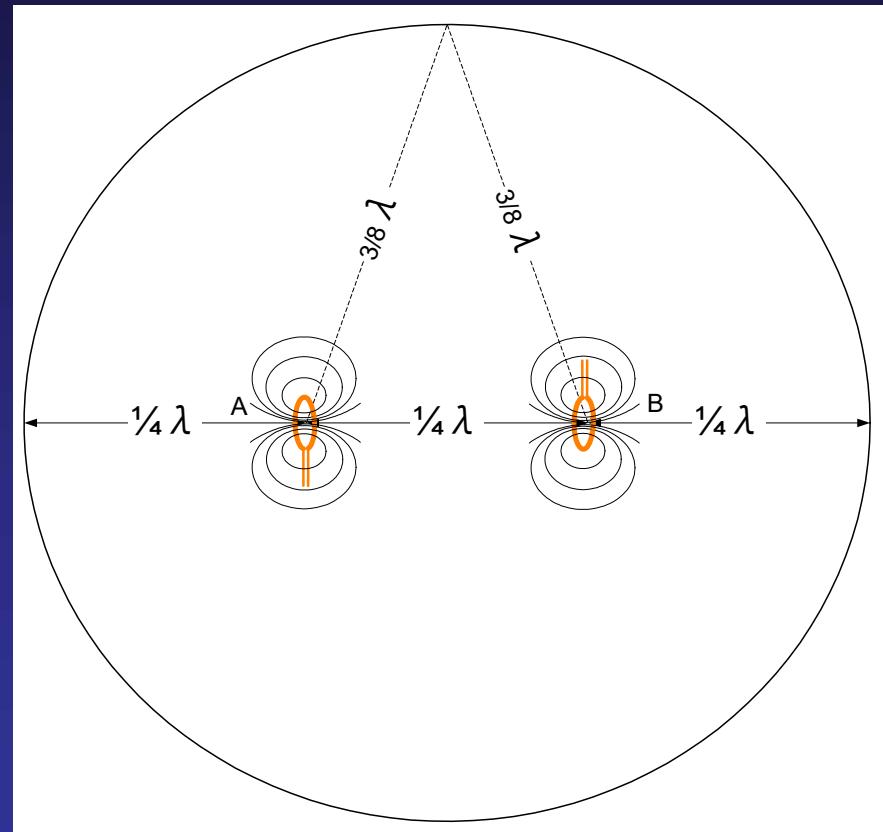


- The energy used to perform this work is presumed to come from the EMF source that causes current flow through the loop of wire.
- This energy is presumed to be converted to the energy stored in the magnetic field of the magnetic material's core.
- As the core becomes magnetized, its magnetic field expands out and induces counter EMF in the current loop around the core which extends the time for current flow to build up after an initial EMF is applied to the current loop.



What if there are significant propagation delays between the coil and the core?

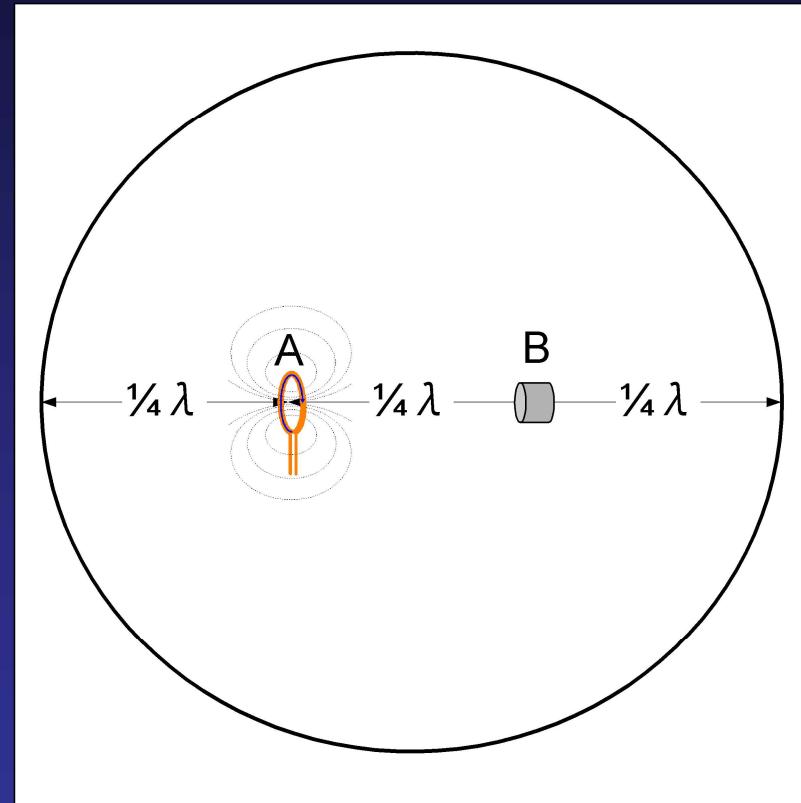
- Reference this side view cross section of an ellipsoid reflective cavity
- In an ellipsoid reflective cavity, waves propagating from one foci will reach the other foci all at the same time because all reflecting propagation paths are of equal total distance.
- RF energy propagating from a wire coil at the ellipsoid foci A will also seem to come from a virtual image of the wire coil at foci B.





What if there are significant propagation delays between the coil and the core continued?

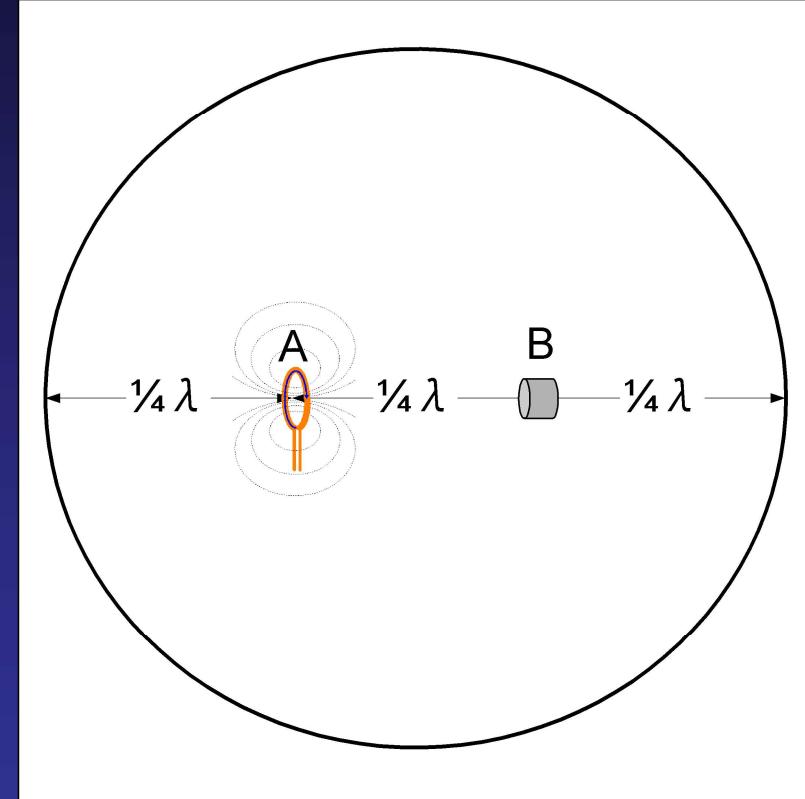
- If we apply an RF AC current to a wire loop at foci A and at a frequency with wavelength “ λ ”,
- then the magnetic core at foci B will not know that the RF energy did not originate from the virtual wire coil at foci B.
- In fact, the magnetic core will not respond until a $\lambda/4$ time delay after the signal leaves foci A.
- In this configuration, rather than performing “WORK” as usual on the magnetic core, the energy from the virtual coil provides stimulation to make the magnetic core emit a magnetic field that is in phase with the signal that stimulates its emission.
- If the magnetic core has a coefficient of relative permeability of 100, for example, and if it is made of a magnetic material capable of responding at high frequencies,
- then electromagnetic energy of a magnetic field approximately 99 times stronger will begin propagating back to the real wire coil at foci A.





The magnetic core material becomes a source of excess power output?

- By the time this signal arrives at A, rather than opposing the change in current in the wire loop, it generates a larger current flow in the same direction as is flowing in the loop already.
- During a decrease in the core's magnetic field strength, a portion of the magnetic field around the core will collapse back in on the core and another portion of the core's magnetic field couples to the radiation resistance of free space and continues to radiate away from the magnetic core material.
- Only that portion that radiates away will reflect off the cavity walls and converge on the wire loop at foci A.
- If this portion of electromagnetic energy is large enough then the strength of the electromagnetic field generated/reflected by the wire loop can be strong enough to magnetize the magnetic core in the opposite direction and continue the process.



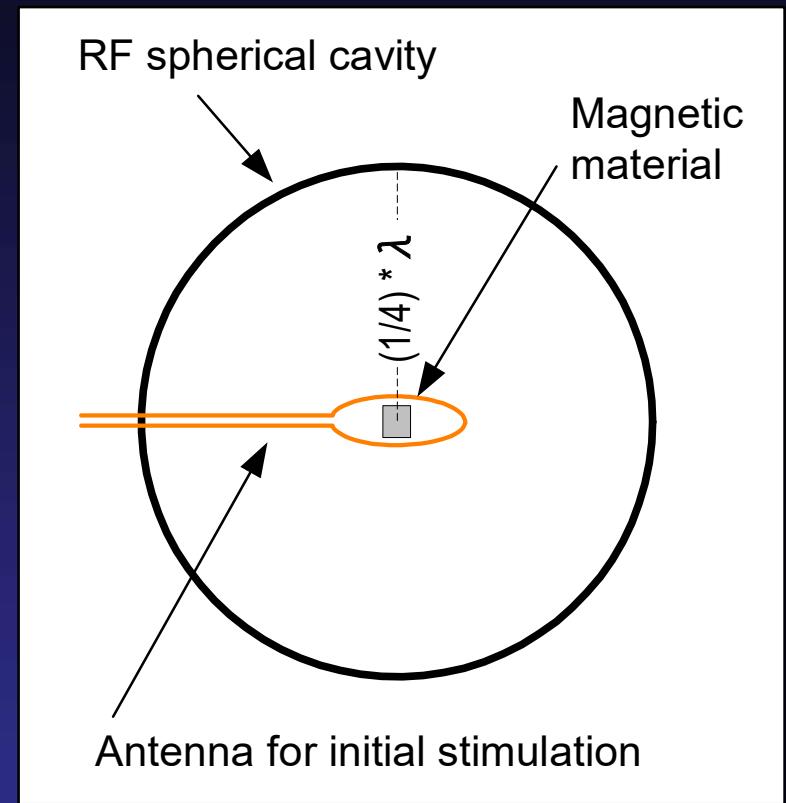


A Simpler Experiment?

- The cavity size can be much smaller if it is filled with a low loss medium that will slow the propagation speed “c” of electromagnetic energy.
- Use a low loss dielectric material with high coefficient of relative permittivity
- For example, BST(barium/strontium titanate) with 67/33 ratio and a particle size around 800nm.

https://www.tplinc.com/uploads/HBS-8000_Technical_Bulletin.pdf

- Probably cheaper at Alibaba or IndiaMart
- Also possibly a low loss magnetic material with a high coefficient of relative permeability.
- However, the magnetic media might interfere with the central magnetic material’s own magnetic properties.
- This needs further analysis.
- Test best design and placement of the antenna.

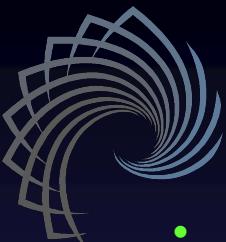


$$\varepsilon_0 \quad \text{permittivity of free space } 8.8510^{-12} \frac{\text{farad}}{\text{m}}$$
$$\mu_0 \quad \text{permeability of free space } 4\pi10^{-7} \frac{\text{henry}}{\text{m}}$$
$$c = \sqrt{\frac{1}{(\varepsilon_0\mu_0)}} = 2.99792458 \times 10^8 \text{ m/s}$$



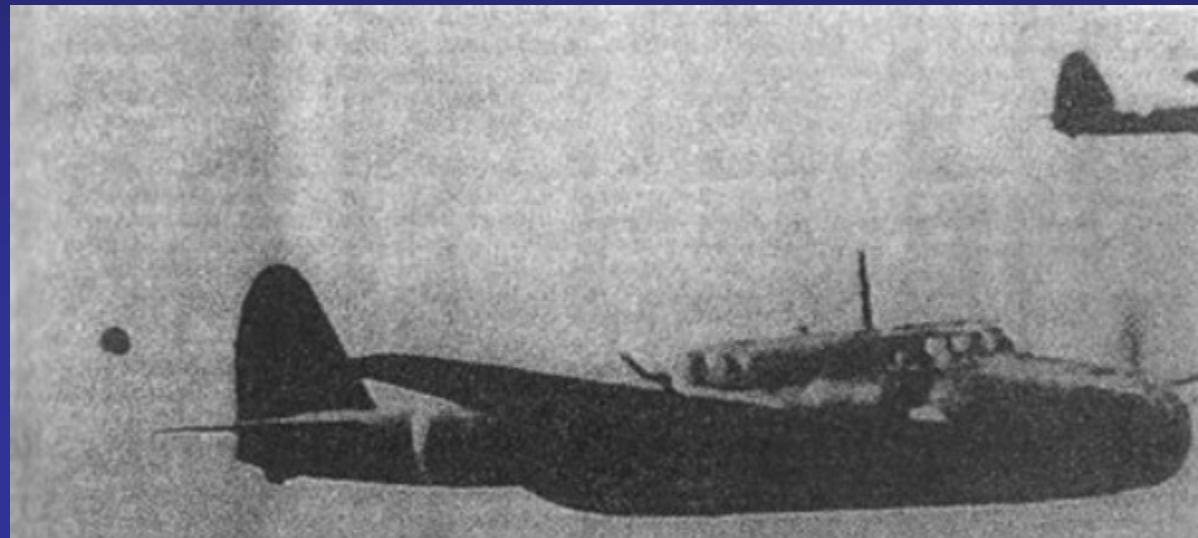
Don't forget safety

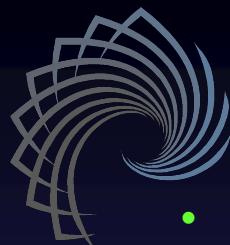
- A resonant cavity capable of generating excess electrical power does so by extracting a very small portion of electromagnetic energy from the very long range exchange interactions with all other matter that are responsible for gravity and inertia.
- This causes the resonant cavity's matter to get out of sync with other external matter's exchanged electromagnetic energy and this in turn reduces the pull of gravity on the device.
- When it works then the new most important part of the design is a fail safe way to turn it off.
- A few past experimenters have lost all their hard work when their device lost weight so dramatically that their device flew up into outer space.
- Another equally important safety criteria is to insure the output can not be shorted out.
- A few experimenters have reported very dangerous results when they shorted the output of their device.
- As soon as your experiment is successful it is giving off a unique gravity modifying signal that is almost immediately detectable to those who have already perfected this technology decades ago.



The very first antigravity devices

- The foo fighters of World War II were incredibly simple.
- Basically, the same spherical resonant cavity design presented in these slides.
- Just drawing off some electrical power from the resonance reduces the pull of gravity.
- Drawing greater electrical power and dissipating it through the electrical resistance of the outer hull causes a greater loss of gravity and so an upward thrust.
- Steering it might be as simple as moving the center magnetic material off center in one direction or another.





World War II antigravity aircraft

- Just mount 3 foo fighters under a flight worthy platform and you have a flying saucer or German Haunebu.
- One thing is for sure, those are not gun turrets like shown in the overwhelming disinformation campaign launched later.
- This is earthly technology already available at the end of World War II.
- Below is an actual photo but don't get distracted by the photo on the internet of a very similar looking plastic/metal toy.



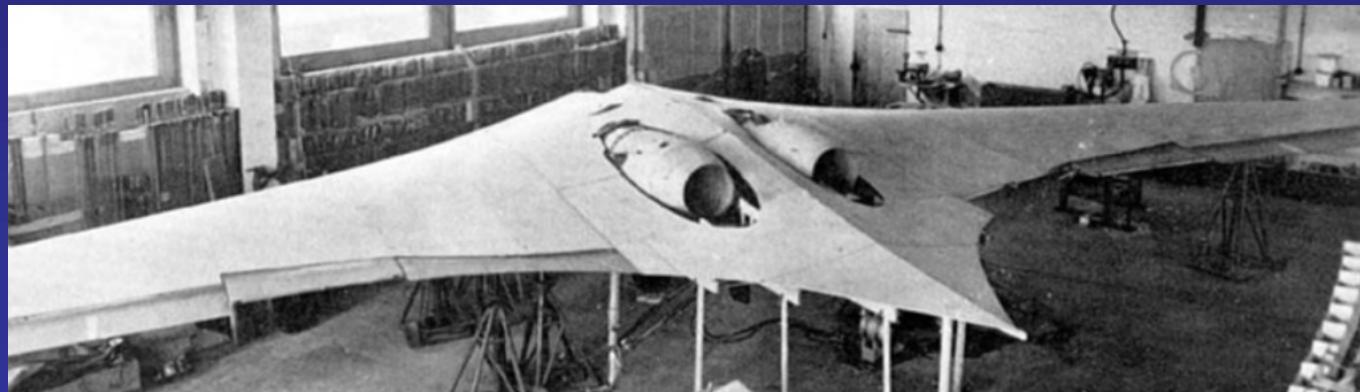


Kenneth Arnold's Mount Rainier flying saucers

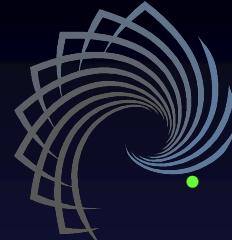
- Kenneth Arnold's Mount Rainier flying saucers were not labeled "saucers" because they were round.
 - They were labeled "saucers" because Kenneth Arnold said they moved like saucers skipping across the water.
 - In other words, an interior resonant cavity or cavities were pulsed on at a slow repetition rate and each time its altitude momentarily jumped up a little.
 - The swept back wings are what aerospace designers of the day came up with so it could still fly like a plane. That's how they were used to doing things.
 - ET would know an antigravity vehicle did not need wings like that.
 - But its exactly what you would expect of an Earthly designer back in 1947



Pilot Kenneth Arnold pointing to what he saw near Mount Rainier on June 24, 1947



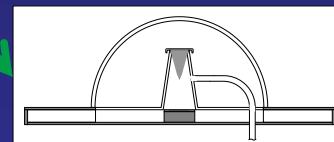
The German Horten Ho 229 was likely the inspiration for the design that had one or more “foo fighter” style resonant cavities added to its interior for lift and thrust.



Bob Lazar's 1980's Sport Model

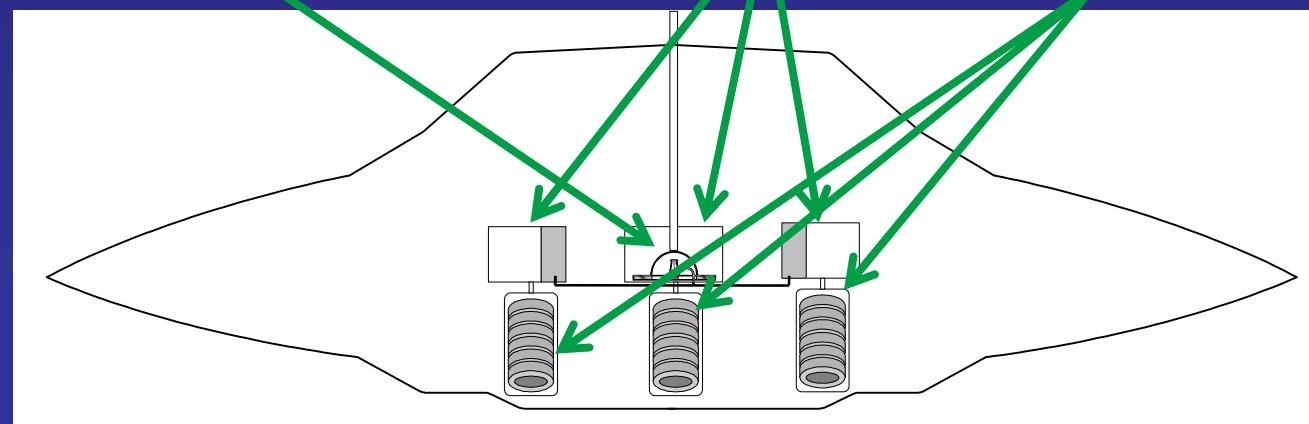
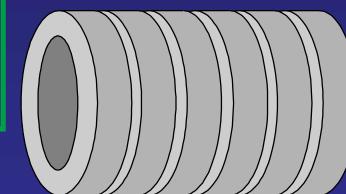
- In the beginning, antigravity was achieved by getting out of sync with the electromagnetic exchange interactions between all other external matter.
- By the 1980's designers had figured out how to sync with the exchanged electromagnetic energy among all matter and then generate a phase shift.
- Both the exchanged electromagnetic energy responsible for gravity and inertia are together shifted in phase relative external matter.
- Super fast acceleration and deceleration with all atoms of the vehicle and its contents getting their inertia modified all together, as in no G-forces to the pilot.

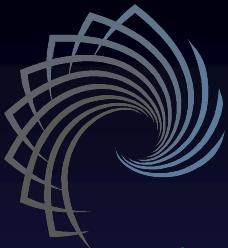
This Spin Superradiance resonant cavity also
senses external signal phase, converts to
traditional microwaves & sends to processors



Microwave signal
processors to
control power
level and phase

Magnetic waves
antenna array





How matter creates gravity

- If you don't understand how matter generates gravity then the previous slides might sound like gibberish.
- Please study the below Youtube videos carefully.
- Study all three and don't assume you get it all after the first video.
- I know I'm retarded at linguistics but try to follow what I'm trying to get across.

https://www.youtube.com/watch?v=IB5qG5wHJ_s

<https://www.youtube.com/watch?v=KSbG1vaxSWE>

<https://www.youtube.com/watch?v=J02-iLzjFbE>



Re-examining slide 15 and the “free energy” aspects of the design

- The process described by Lenz's Law, when applied to magnetic materials, is **somewhat** analogous to an amplifier circuit where counter electromotive force (CEMF) provides negative feedback.
- Most textbooks describe the process (when applied to magnetic materials) as if the signal input is the source of power for the signal output but this is not correct.
- Exchange interactions with local and distant matter provide the power.
- The signal input is just that, the signal input which controls the signal output by steering the direction of individual electrons' magnetic dipole orientations.
- This is slightly similar to a sprinkler system valve in which the electrical input allows the flow but the water pressure does the work of opening the valve.
- Relative permeability describes the amplification or gain of the circuit.
- If the feedback is delayed then negative feedback becomes positive feedback.
- A delayed positive feedback signal suffers losses before it can get back to the input because only some of the signal radiates out to a reflecting surface.
- If the losses are low enough and the gain high enough the circuit can go into oscillations with the power source still the exchange interactions with local and distant matter.



Re-examining slide 15 and considering the bigger picture

- The gain element does not necessarily have to be a magnetic material.
- A different amplifying configuration may be possible in which the amplifying element is a dielectric material in which the material's relative permittivity represents the gain.
- The delayed signal would be a delayed electric field instead of a delayed magnetic field.
- Some designs might use both magnetic gain elements and dielectric gain elements.
- Optimum designs would have fast frequency response and better coupling through free space over a delaying distance to a reflecting surface.
- If a magnetic material with fast enough frequency response cannot be found on the global open market then a dielectric material in an alternate design might be possible.
- Regarding the use of BST (barium strontium titanate): Its very high dielectric constant is only achieved when the nano-powder is properly milled after delivery, compressed and vacuum sintered by those gifted in the art. Even then there is shrinkage during sintering and possible cracking.
- For everyone not gifted in the art, maybe water would work with relative permittivity of about 80.
- Square root of 80 = 8.944 so a water filled resonant cavity size could be 1/8.944 as big.