NEW FILE NAME:

Research Journal for so called "Free Energy" Devices

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After an initial 7-year study started in 1994, this author concluded a few so called "free energy" devices really worked. One bit of evidence to this was that Lockheed Martin (on behalf of the government) wanted my help to track down everyone who claimed to have a working device. This presentation has morphed from a tutorial for others into my own research journal into how these electromagnetic devices could really work.

Latest Revisions:

Aug 18, 2023: *Added slide 129, "*Radioactive materials in "Free Energy" devices".

To request in person consulting with George Bugh or for more information about seminars on his gravity and energy research, contact us through this webpage:
https://vasantcorporation.com/email.php

The Purpose of this Presentation is to Explain:

- That Lenz's Law is meant to be applicable in situations where the source of EMF and the source of CEMF are much less than 1 wavelength apart.
- The effects when the distance between EMF and CEMF sources approach ¼ wavelength.
- The effects within an ellipsoidal resonant cavity between a source of EMF from 1 foci and a source of CEMF from the other foci.
- What happens when a ferromagnetic material is the source of CEMF at the 2nd foci within an ellipsoidal resonant cavity.

Definitions:

- The first series of slides will review applicable terms:
  - EMF and Counter (back) EMF
  - Lenz's Law
  - Conservation of Energy
  - Wavelength *lambda* (λ)

EMF and CEMF

- From Wikipedia, (The definitions are long so I'm truncating to the parts applicable to the following slides.):

EMF:

"Electromotive force, also called EMF, (… measured in volts), refers to voltage generated … by the magnetic force according to Faraday's Law, which states that a time varying magnetic field will induce an electric current…. Electromotive "force" is not considered a force, as force is measured in newtons, but a potential, or energy per unit of charge, measured in volts. …"

CEMF:

"Counter-electromotive force also known as back electromotive force (abbreviated counter EMF, or CEMF)[1] is the voltage, or electromotive force, that pushes against the current which induces it. CEMF is caused by a changing electromagnetic field. It is the effect of Lenz's Law of electromagnetism. …"

Example of EMF and CEMF

- If an AC voltage is applied to the primary winding of a transformer it causes a current flow and this creates a magnetic field that expands out from the primary winding and expands through the secondary winding.
- The magnetic field expanding creates an EMF in the secondary that causes current to flow in the secondary if it is connected to a load so as to complete a circuit current path.
- The current flows in the opposite direction of the primary current.
- This creates a magnetic field of its own with an orientation that opposes the magnetic field of the primary winding. It expands through the primary winding and creates a CEMF voltage potential in the primary winding.
- This causes a current flow that is opposite to the secondary current and so is in the same direction the primary current is flowing already.
- So a shorted secondary causes much primary current.

Lenz's Law

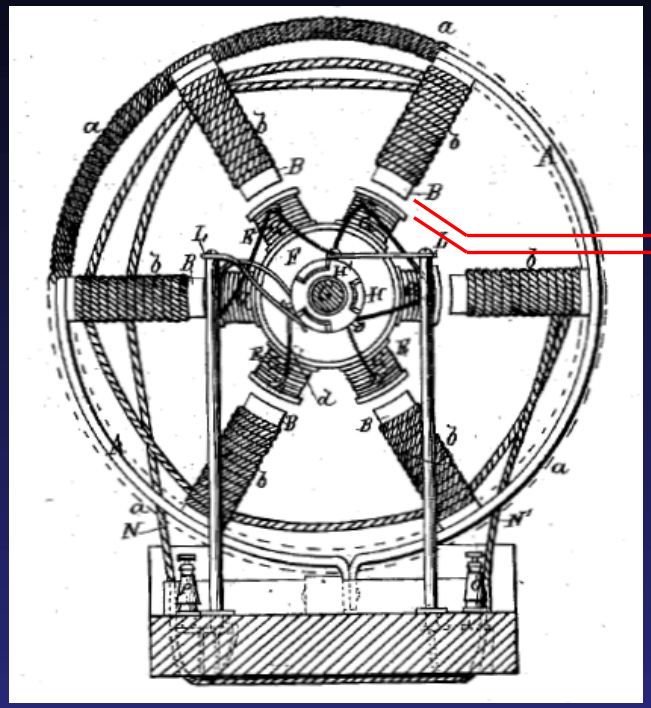
- From Wikipedia:

"Lenz's law /ˈlɛntsɬz lɔː/ is a common way of understanding how electromagnetic circuits obey Newton's third law and the conservation of energy.[1] Lenz's law is named after Heinrich Lenz, and it says:

*An induced electromotive force (emf) **always** gives rise to a current whose magnetic field opposes the original change in magnetic flux."*

- As will be discussed in this presentation, the use of the word: "***always***" is only appropriate with the unspoken assumption that the source of EMF and the source of CEMF are much less than 1 wavelength apart from each other.

Lenz's Law and a Dynamo



This gap width is much less than 1 wavelength of the AC signal to or from the dynamo.

- When the magnetized rotor is mechanically rotated, it induces a current in the stator if the stator is connected to an electrical load to complete a circuit.
- The stator's induced current causes a magnetic field that radiates back to the rotor and pushes against the rotor's magnetic field, requiring continuous mechanical force to push back against it to keep turning the rotor.
- Aside from friction losses, eddy current losses, etc., the electrical energy transferred from the stator to an electrical load equals the mechanical energy required to turn the rotor, so energy is conserved.

Conservation of Energy

- From Wikipedia:

"The total energy is said to be *conserved* over time. For an isolated system, this law means that energy can change its location within the system, and that it can change form within the system, for instance chemical energy can become kinetic energy, but that energy can be neither created nor destroyed. … *matter* particles (such as electrons) can be converted to *non-matter* (such as photons of electromagnetic radiation), or even into potential energy or kinetic energy. Matter could also be created out of kinetic or other types of energy, in the process of matter creation. … A consequence of the law of conservation of energy is that no intended "perpetual motion machine" can perpetually deliver energy to its surroundings.[2]"

Conservation of Energy continued

- An apparent perpetual motion machine must always be transferring energy from some source.
- That source could, for example, be matter converted to energy through some known or unknown process.
- That source could, for example, be some electromagnetic energy received from some unknown source.
- By these statements this author is not discounting “free energy” machines.
- Unknown sources and energy transfer processes are possible.
- Economically “free energy” is possible but the law of conservation of energy is never violated.

Wavelength lambda (λ)

- From Wikipedia:

"In physics, the wavelength of a sinusoidal wave is the spatial period of the wave, the distance over which the wave's shape repeats.[1] It is usually determined by considering the distance between consecutive corresponding points of the same phase, such as crests, troughs, or zero crossings, and is a characteristic of both traveling waves and standing waves, as well as other spatial wave patterns.[2][3] Wavelength is commonly designated by the Greek letter *lambda* (λ). … Assuming a sinusoidal wave moving at a fixed wave speed, wavelength is inversely proportional to frequency: waves with higher frequencies have shorter wavelengths, and lower frequencies have longer wavelengths.[6]"

When should Lenz's Law apply?

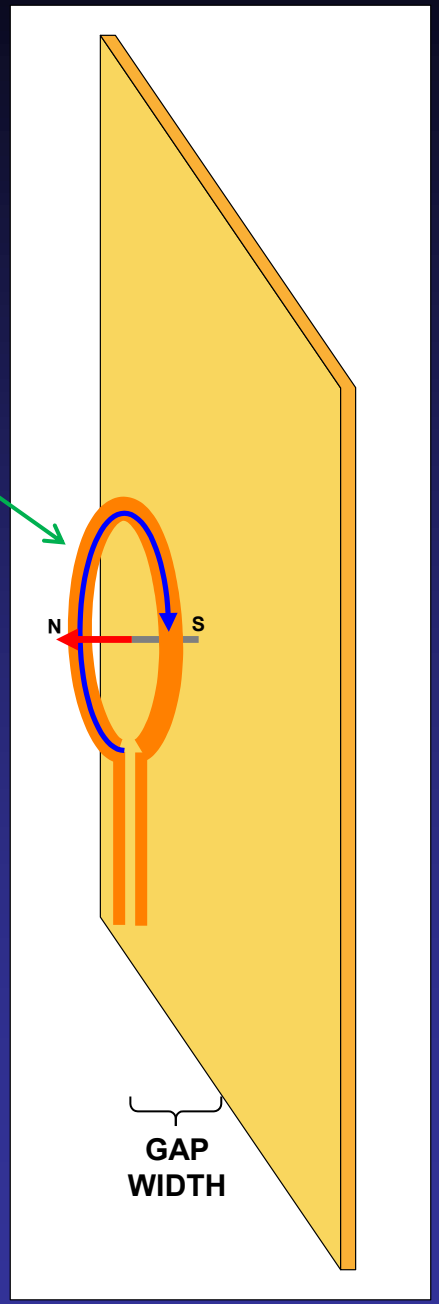
- The next series of slides discuss when it is appropriate to adhere to Lenz's Law and when it is not.

- NOTE: In diagrams that follow, a blue arrow is used to indicate electron current flow (negative charges) rather than the flow of positive charges.

Lenz's Law with small gap widths

Magloop antenna with a circumference of less than or equal to λ/10

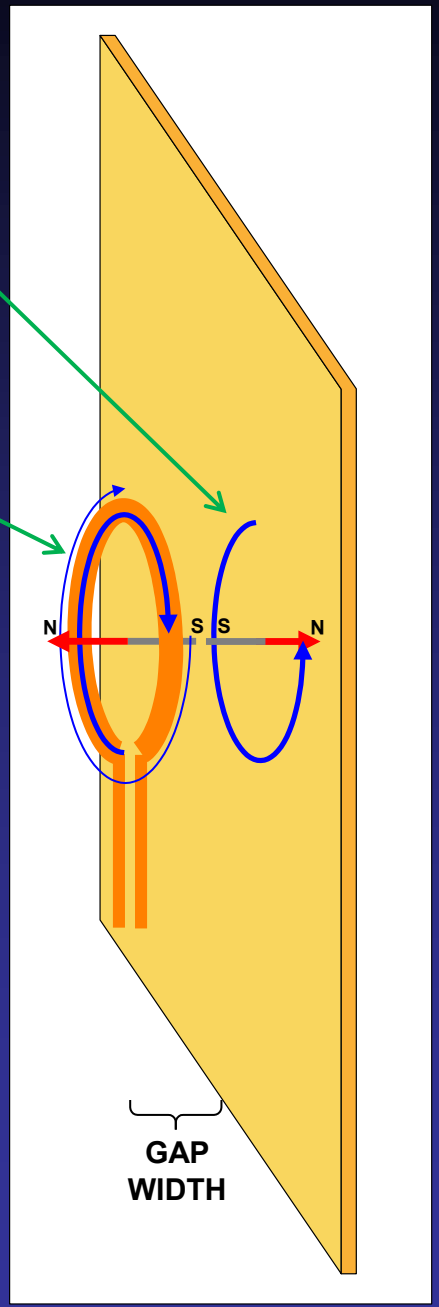
- The Magloop antenna is similar to and used to represent a 1 turn primary of a transformer or a 1 turn rotor winding of a dynamo.
- The thick copper plate is similar to and used to represent a 1 turn transformer secondary that is shorted or a 1 turn stator that is shorted.
- Consider when the GAP WIDTH is, for example, less than λ/100 as would be the case with typical transformers and dynamos (motor/generators).
- An AC signal generator connected through a transmission line and an impedance matching network (all not shown), causes electron current flow (blue arrow) in the magloop antenna.
- The magloop antenna's electron current flow creates a magnetic field that radiates out to the thick copper plate. It is really an electromagnetic field but the radiated electric field component is small from this type of antenna.



Lenz's Law with small gap widths *continued*

The current flow induced by the reflected SOUTH flux cutting through the magloop antenna adds to current induced by the signal generator's voltage.

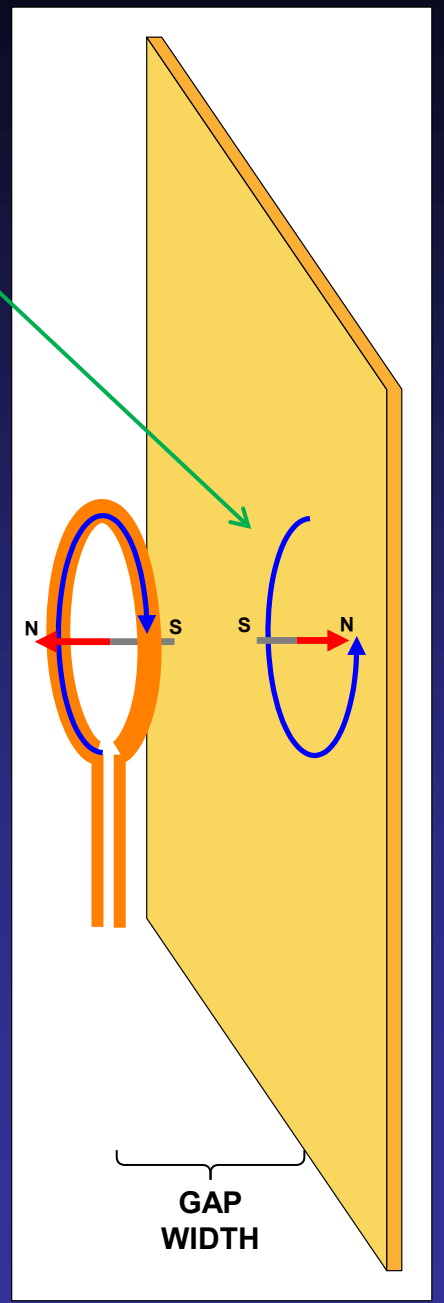
Induced current flow



- When this magnetic field reaches the copper plate, it creates an EMF voltage within the copper plate that generates electron current flow (blue arrow) in the copper plate in the opposite direction to the electron current flow in the magloop antenna.
- The copper plate's current flow generates a magnetic field that radiates back towards the magloop antenna's magnetic field and pushes against this magnetic field of the magloop antenna.
- The magnetic field from the copper plate also creates a CEMF voltage in the magloop antenna.
- This CEMF induces current in the magloop antenna in the same direction it is flowing already thus increasing its total current flow and so transfers the affect of the shorted secondary back to the signal source and loads down the signal generator.
- The transfer of the "shorted" condition of the secondary (copper plate) back to the primary (magloop antenna) is all in keeping with the law of conservation of energy.
- In this example, Lenz's Law **does** apply.

Lenz's Law with large gap widths

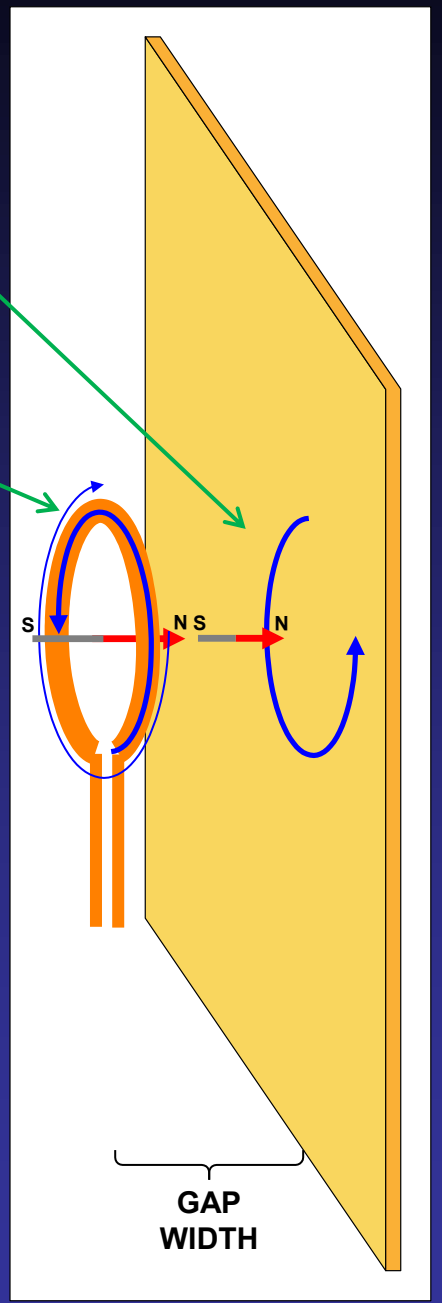
- Now consider when the GAP WIDTH is λ/4.
- The magloop antenna and the copper plate are only partially coupled due to the greater distance between them and the plate being flat doesn't focus its reflected signal on the magloop antenna.
- The total delay before a CEMF in generated in the magloop antenna will then be λ/2. In addition, the act of reflecting off the copper plate also creates a λ/2 phase shift. This is the affect of the copper plate's current being in the opposite direction from the current in the magloop.
- As shown on the next slide, the electromagnetic field from the copper plate, by the time it reaches the magloop antenna, is in phase with the electromagnetic field radiating from the magloop antenna at that time.
- The CEMF generated in the magloop antenna induces current flow in the opposite direction to the magloop antenna's current flow that the signal generator is creating at the time the CEMF occurs.



Lenz's Law with large gap widths *continued*

The current flow induced by the reflected SOUTH flux cutting through the magloop antenna reduces current induced by the signal generator voltage.

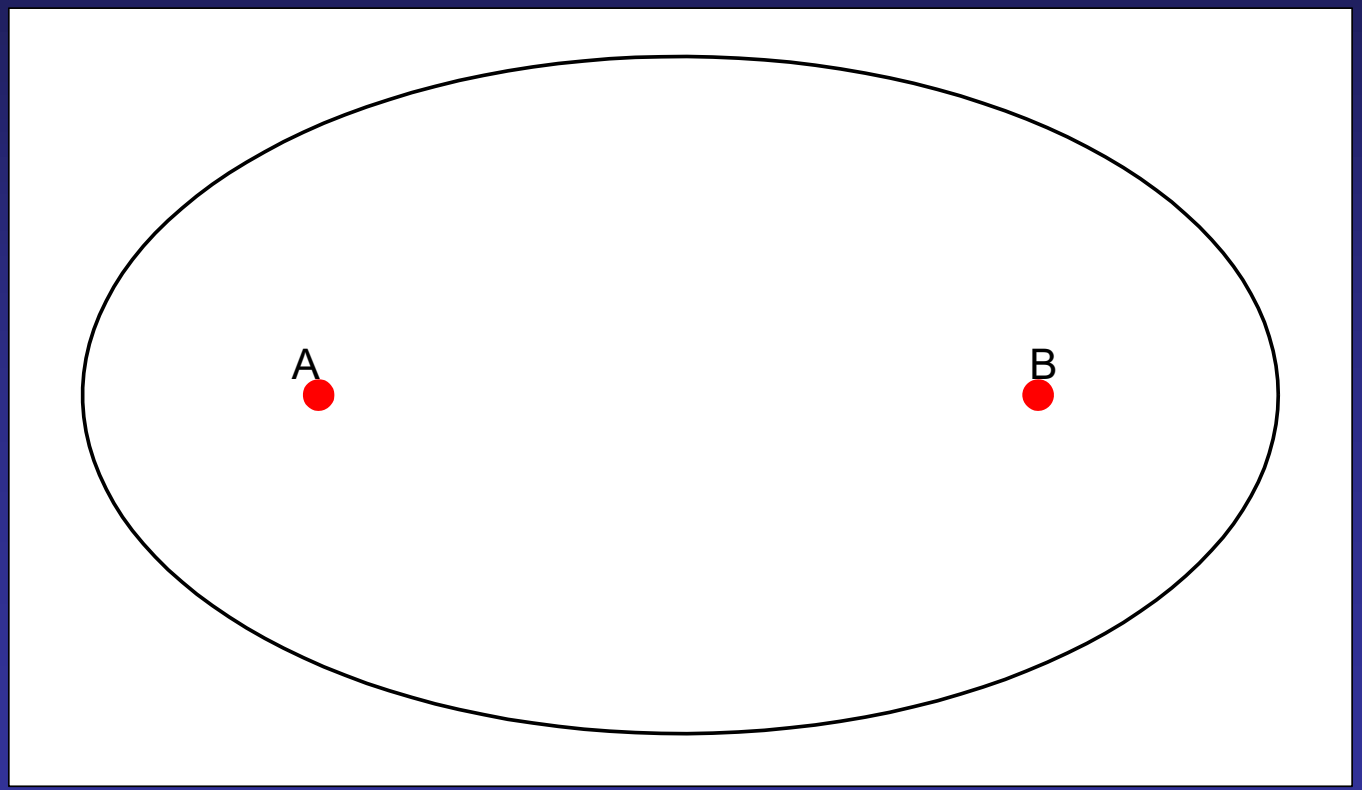
Induced current flow



- This CEMF counter acts and so reduces the current in the magloop antenna and so this is reducing the loading on the signal generator rather than increasing the loading on the signal generator.
- The reflected electromagnetic field from the copper plate continues on through the magloop antenna and radiates out into space along with the in phase electromagnetic field radiating from the magloop antenna.
- The 2 magnetic fields pull on each other rather than push each other.
- This is a typical configuration of many directional antenna designs.
- However, most of the electromagnetic energy is radiated out into space and so will not be doing much useful work locally.
- In this example, Lenz's Law ***does not*** apply.

Containing and using the EM radiation

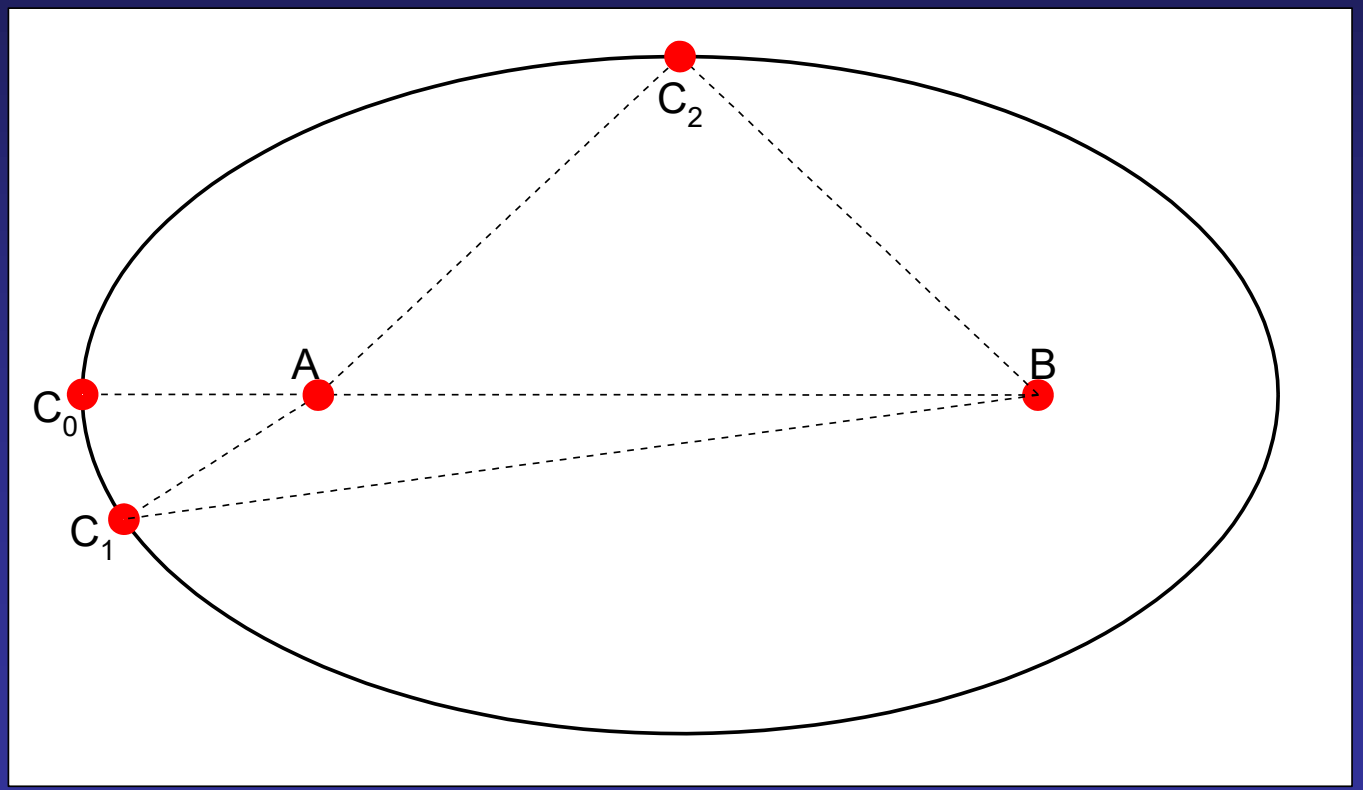
- So, what if we stop the electromagnetic fields from radiating away?
- What if we reflect them back to the source after an optimum amount of delay and analyze what happens?
- We can do that with an ellipsoidal cavity which has 2 foci.



An Ellipsoidal Cavity

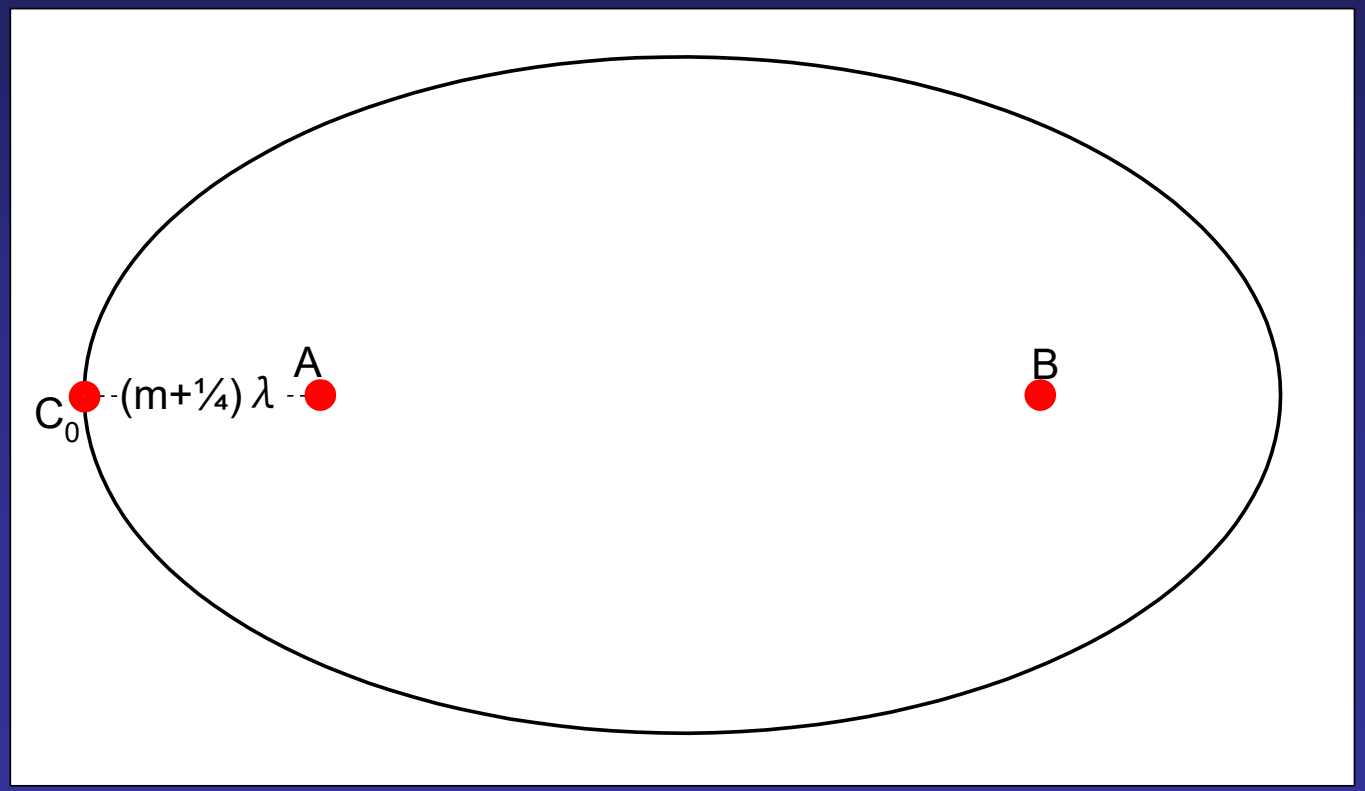
- Radiation from an antenna at foci A, when reflecting off any part of the inner surface, will reach an object at foci B after traversing the same total distance traveled by any other reflected radiation regardless of the reflected path, so all reflected radiation reaches foci B in phase with all other portions of reflected radiation, as demonstrated in the following equation:

$$\overline{AC_0} + \overline{BC_0} = \overline{AC_1} + \overline{BC_1} = \overline{AC_2} + \overline{BC_2}$$



Design Criteria for the Ellipsoidal Cavity

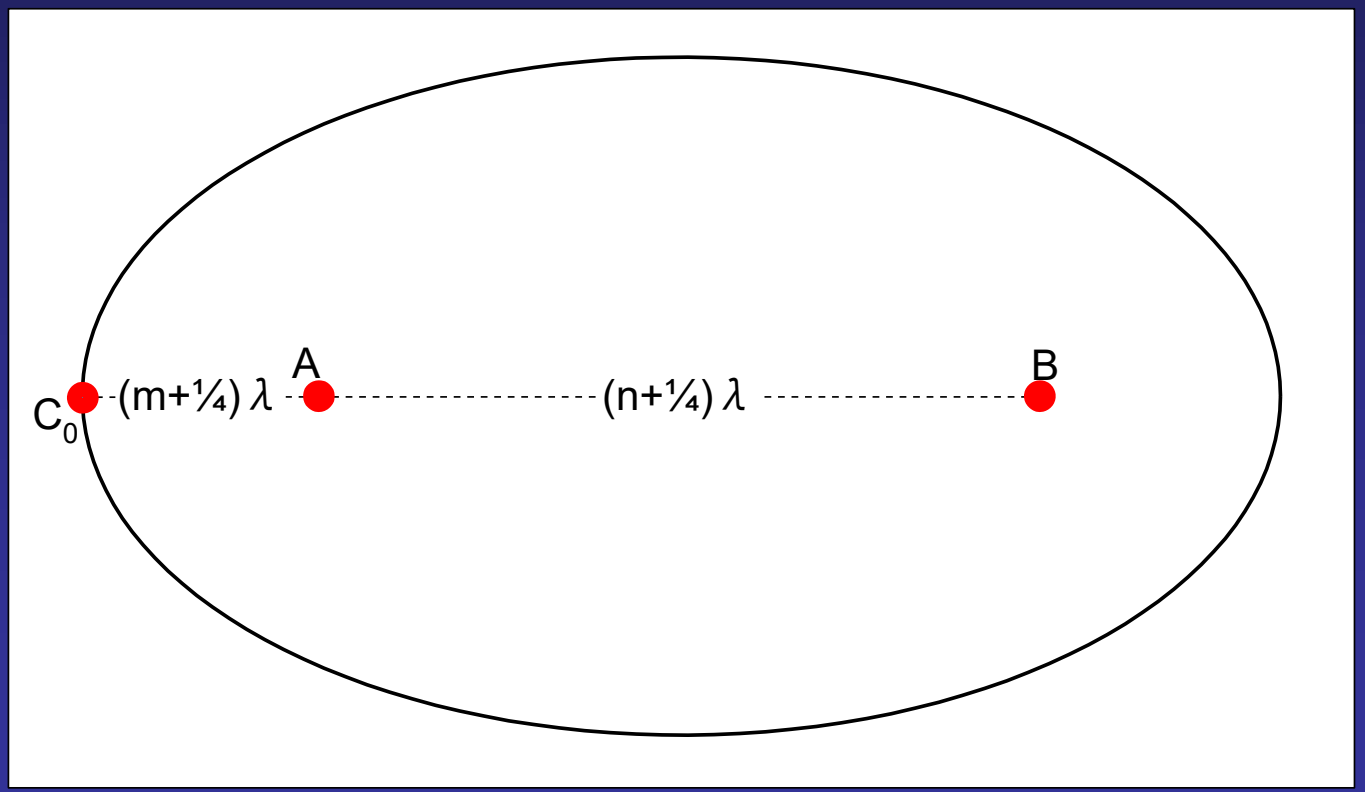
- A signal radiated from either foci to its respective nearest wall should reflect back from the nearest point on each wall so as to be in phase with each respective foci's signal at the time of its return, similar to antenna designs with a reflector spaced λ/4 from the driven antenna element. This provides the lowest loading of a signal source at each foci. So the length A to C_0 must be mλ + λ/4 where "m" is either zero or increments of 1/2, for a total phase shift to the nearest wall and back of 0.5λ or 1.5 λ or 2.5λ, etc.. Keep in mind that by reflecting off the wall, the signal experiences another λ/2 phase shift (mirror image) and this is what causes the signal to be in phase with the signal at each nearest foci when it arrives back at each foci.



Design Criteria for the Ellipsoidal Cavity

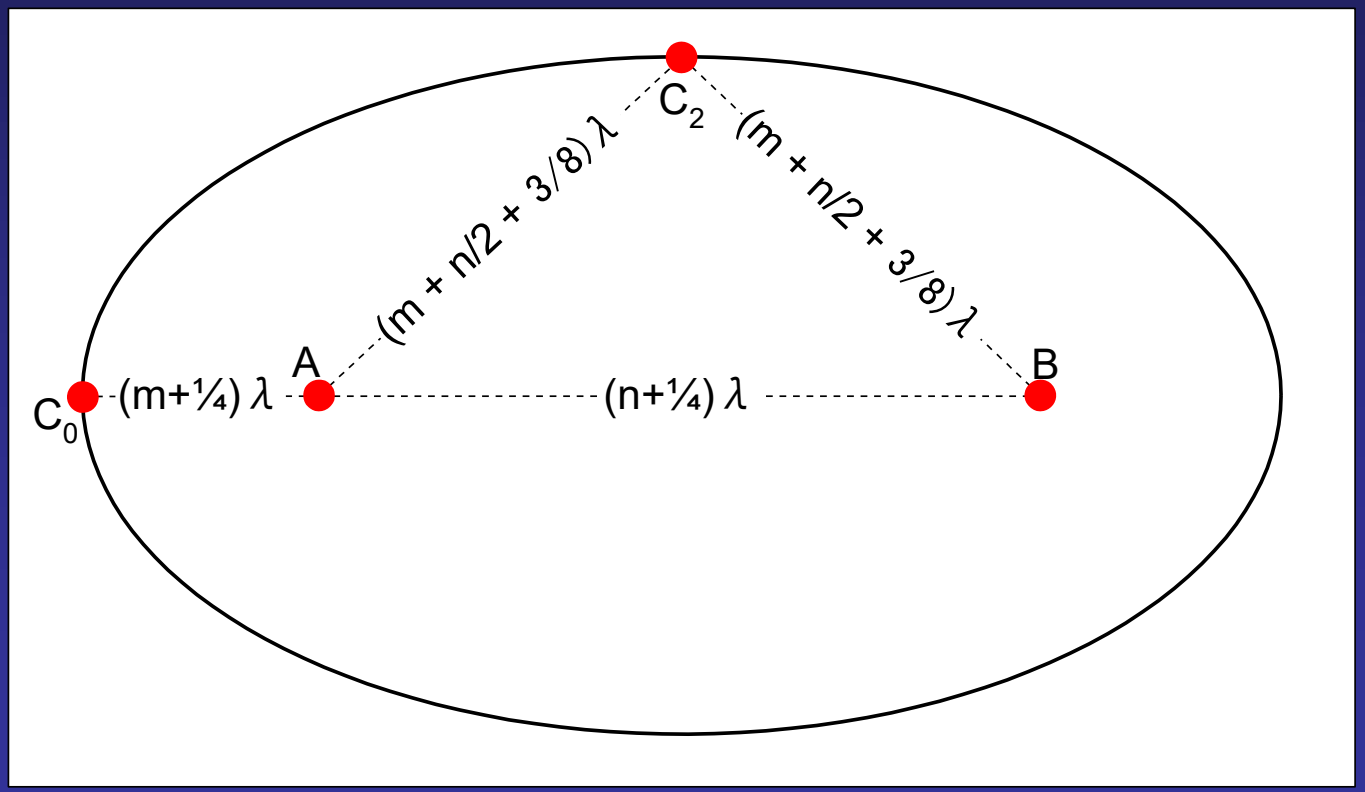
continued

- All direct path signals from A to B must arrive after some number of half wavelengths plus a λ/4 additional phase shift so that when its reflection off B returns to A by a direct path, it arrives at A with a total delay of some number of wavelengths plus an additional 1/2λ phase shift so as to be in phase with the signal at A when it arrives. So the length A to B must be nλ + λ/4 where “n” is either zero or increments of 1/2, for a total phase shift of 0.5λ, 1.5 λ, 2.5λ, etc..



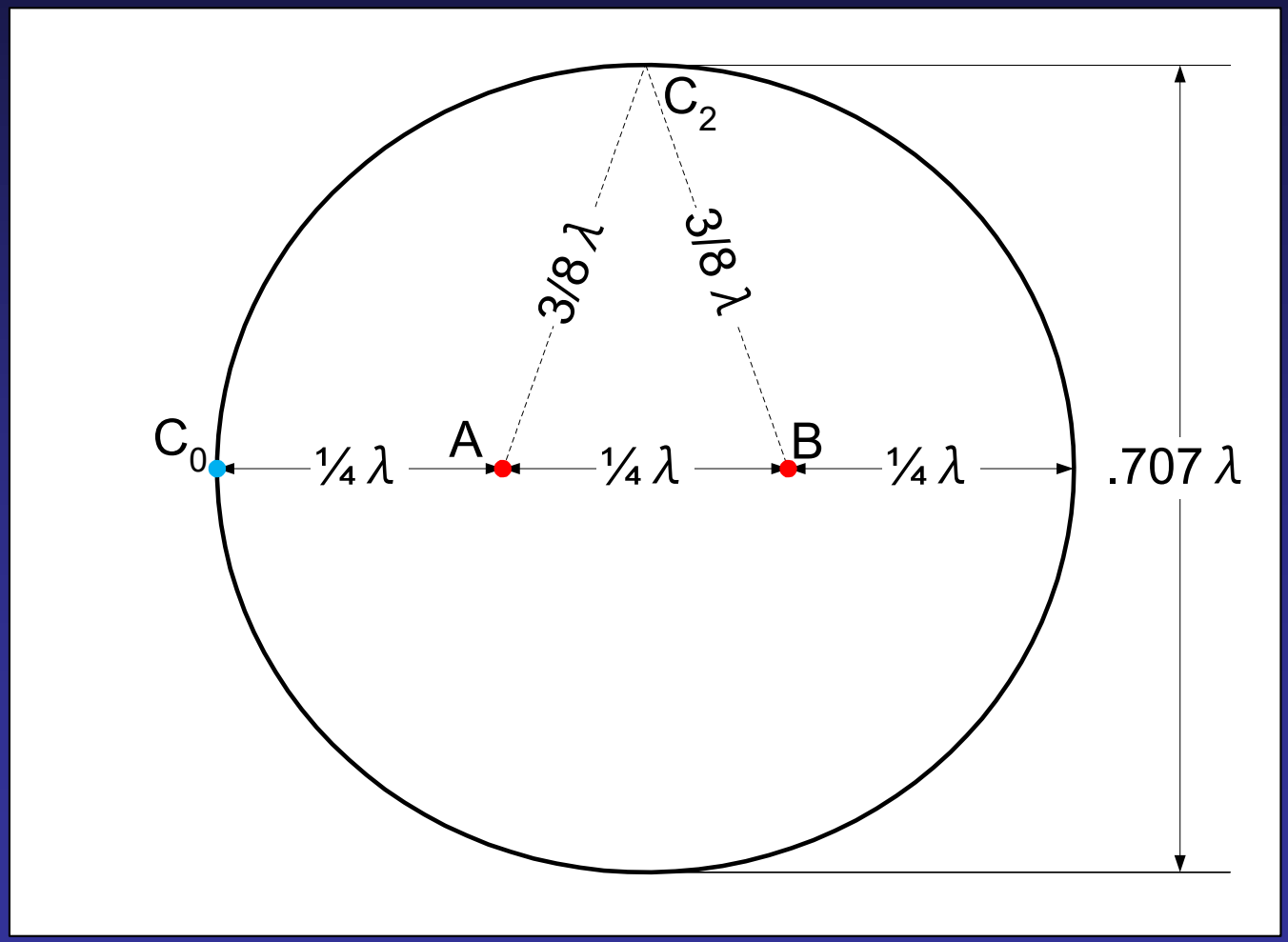
Design Criteria for the Ellipsoidal Cavity
continued

- The total distance of a signal from A to C_0 and then from C_0 to B will be:
  Total distance = $(m + 1/4)\lambda + ((m + 1/4)\lambda + (n + 1/4)\lambda) = (2m + 1/2)\lambda + (n + 1/4)\lambda$
  or Total distance = $(2m + 1/2 + n + 1/4)\lambda = (2m + n + 3/4)\lambda$
- The distance from either A or B to the equal distance point C_2 will be half the Total distance so:
  A to C_2 = C_2 to B = $(2m + n + 3/4)\lambda/2 = (m + n/2 + 3/8)\lambda$



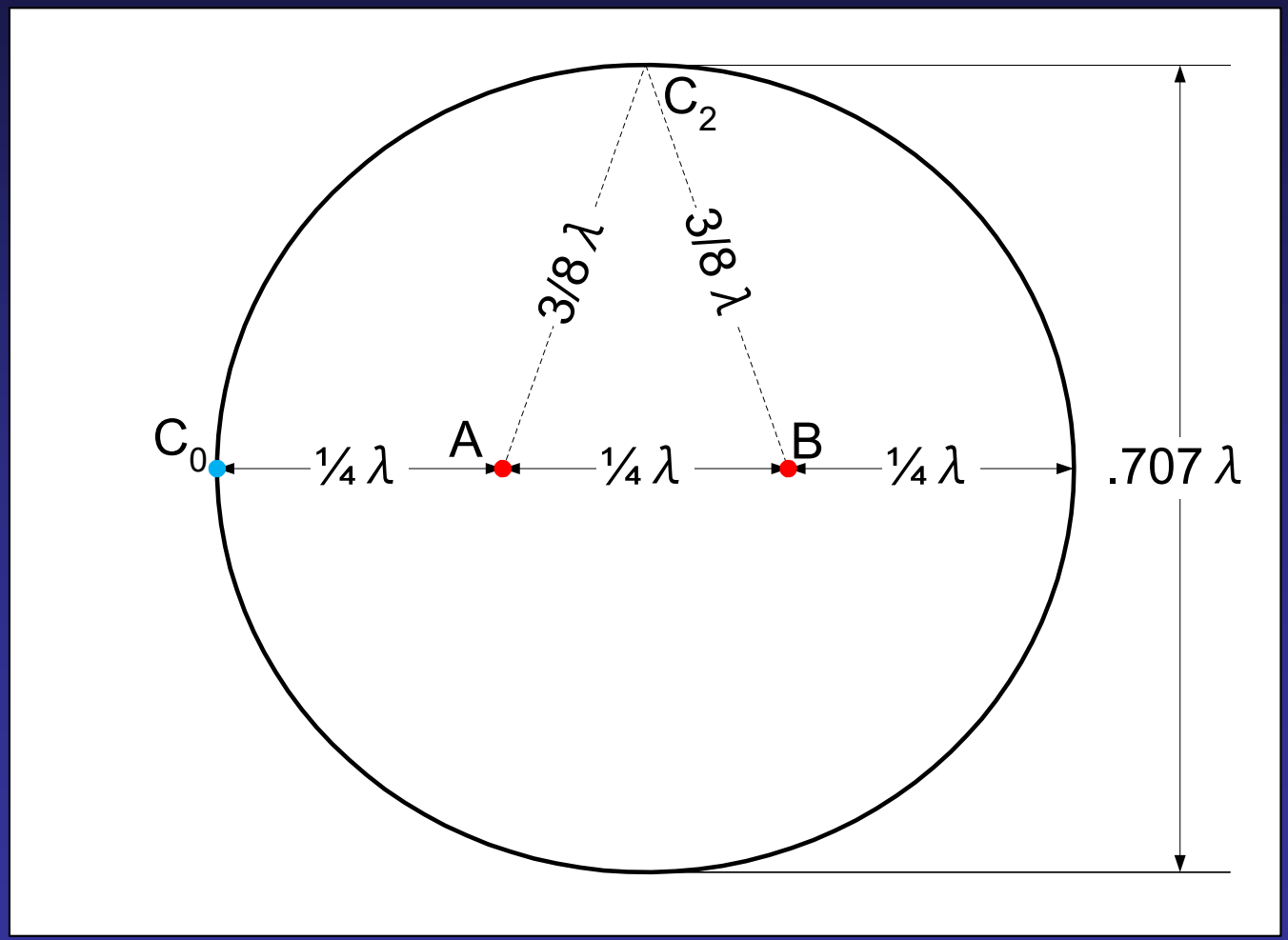
Example Ellipsoidal Cavity

- If m and n are both set to zero for the smallest possible ellipsoid for a given wavelength, then the ellipsoid cross section dimensions will be as shown below.



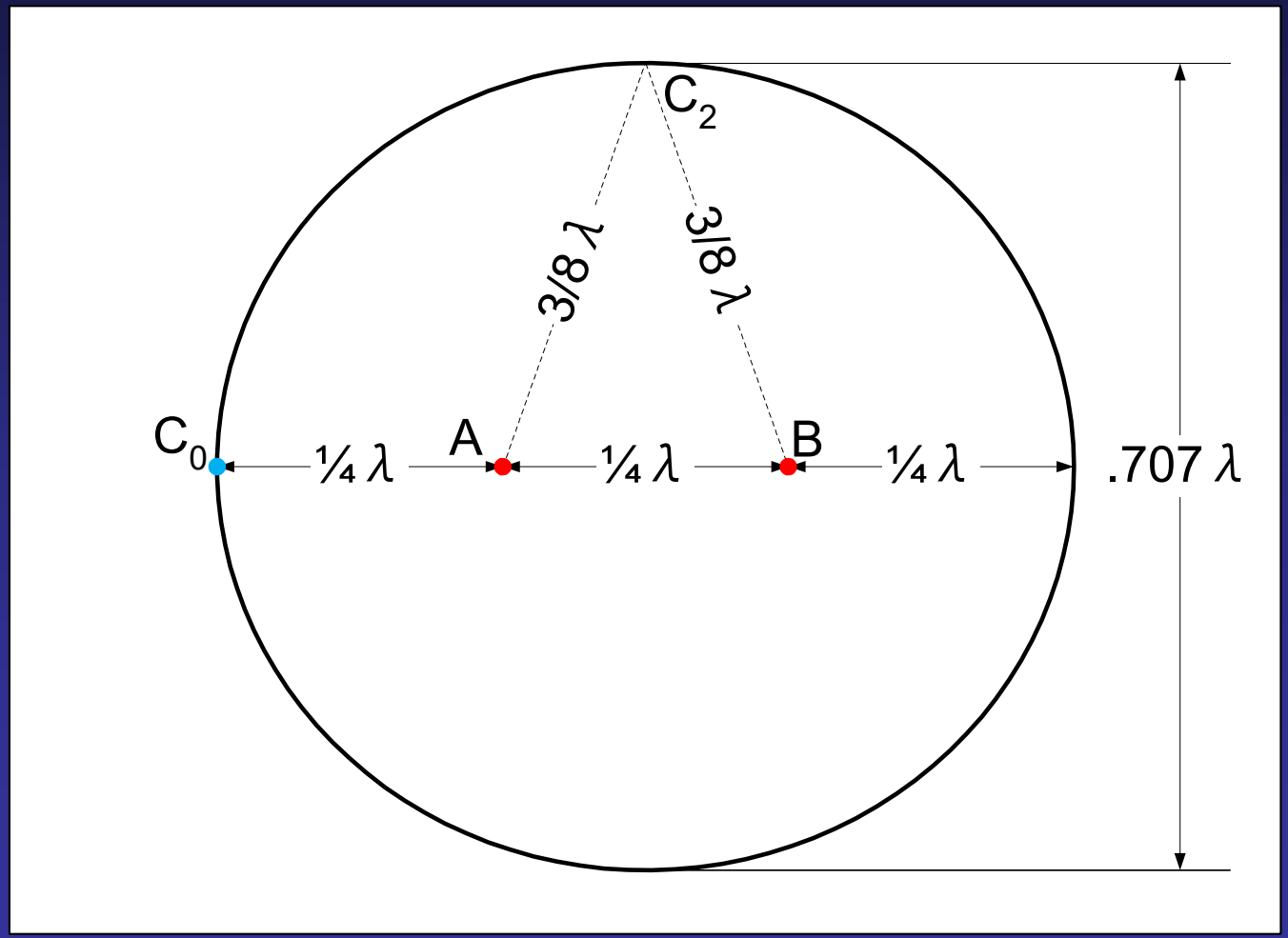
Effects of a Reflected load

- If we use a magloop antenna (primary) at A as a source of a sinusoidal EM wave that has a wavelength λ, and we connect a load to a signal receiving antenna (secondary) at B, then the effects will be different than when the are much less than 1 wavelength apart. Things will not behave per Lenz's Law.



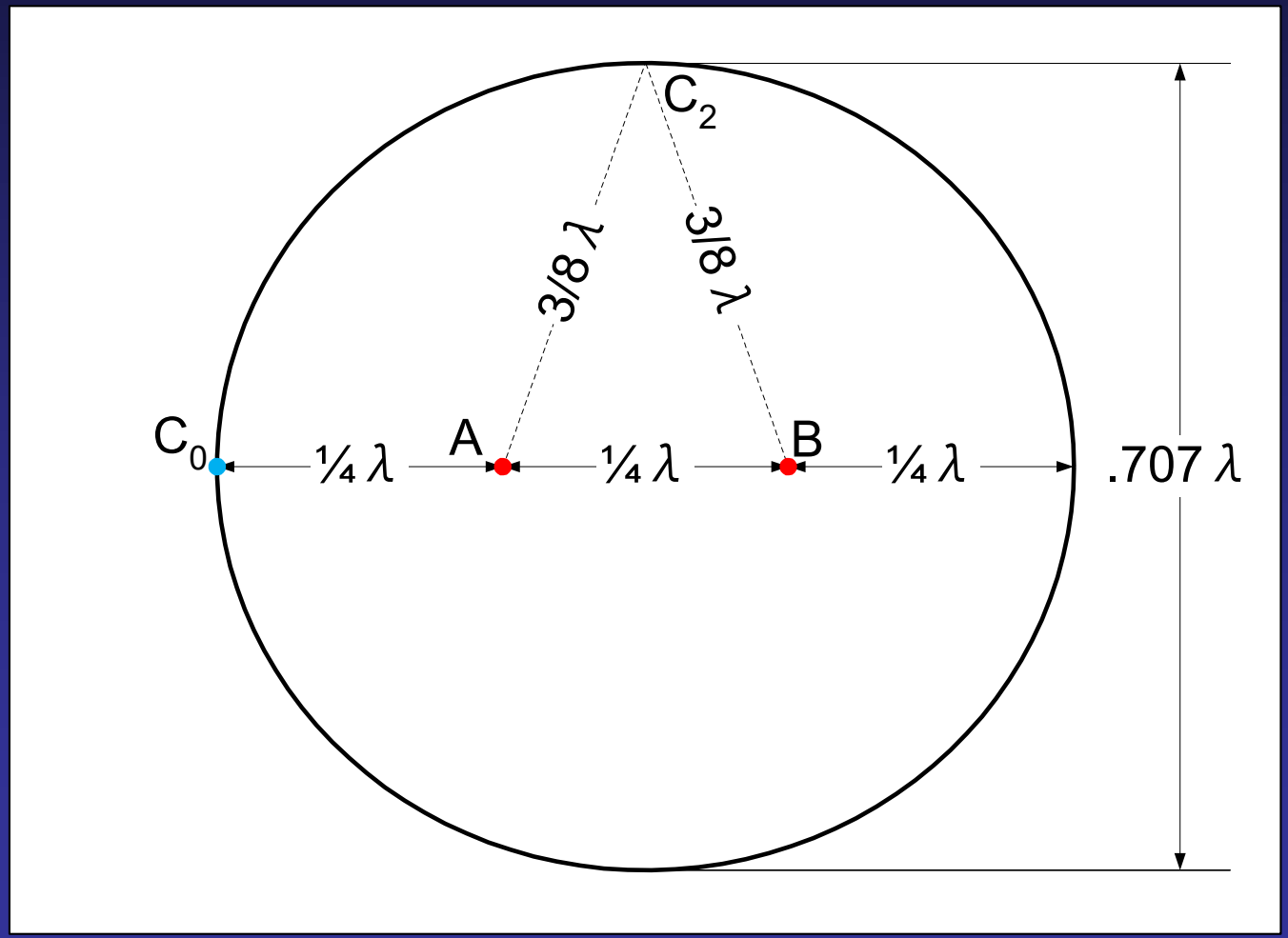
Shorts become Opens

- With a magloop antenna at B connected to a value of capacitor that creates a tuned tank, then the high tank current reflects a large signal back to A with a 180° phase shift, plus the phase shift from the time delay, plus a 180° phase shift each time it reflects off an inner wall. The return signal arrives at A with a total phase shift that minimizes the loading on the magloop antenna at A rather than maximizing the loading.



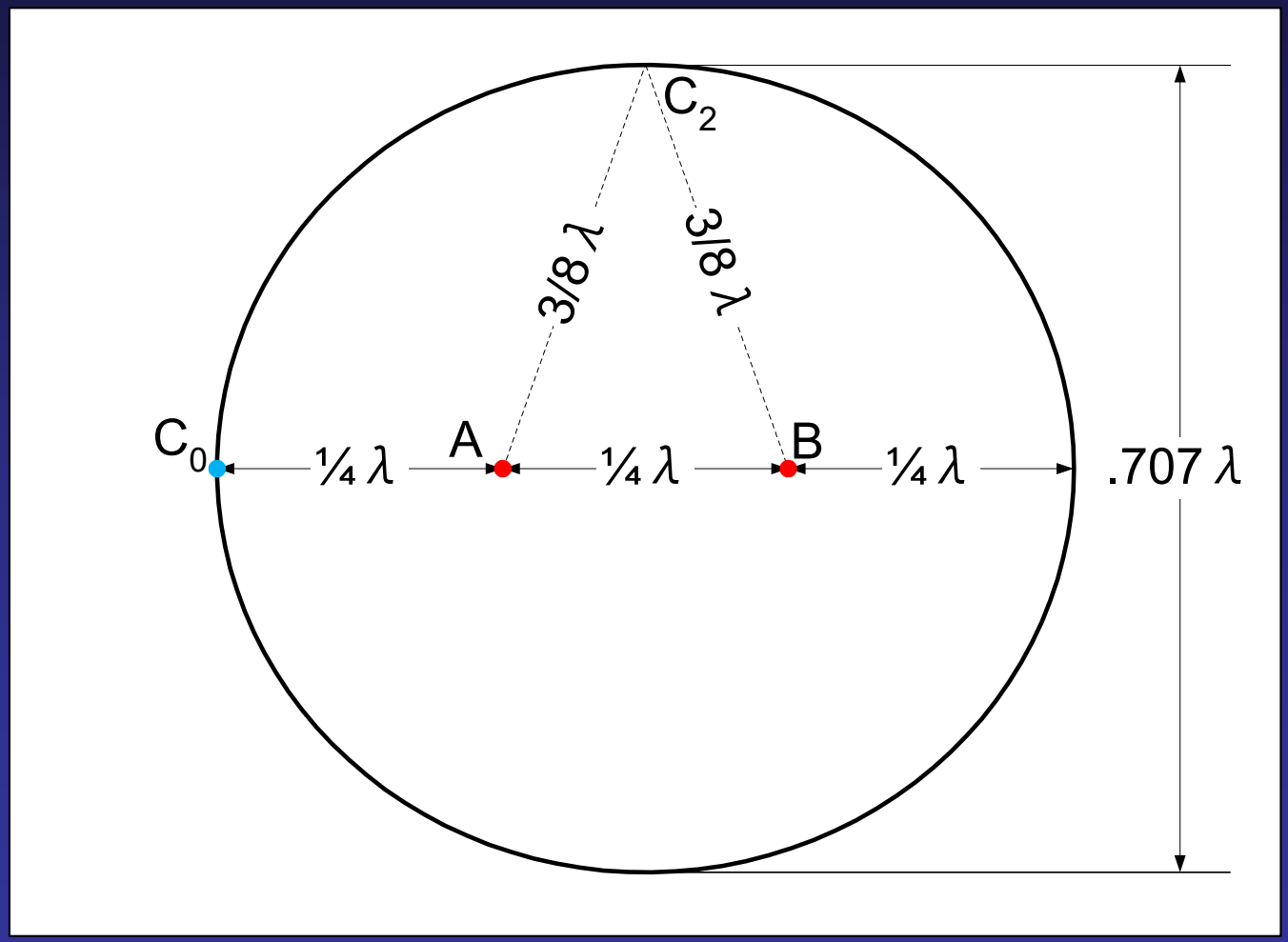
Opens become Shorts

- When nothing is placed at B, when it is an open circuit, then the signal from A, reflecting off the inner walls and converging on B, will pass through B and go back to A. Since the signal does not experience a 180° phase shift from reflecting off anything at B, the signal will arrive at A at a phase that causes maximum current in the magloop antenna at A.



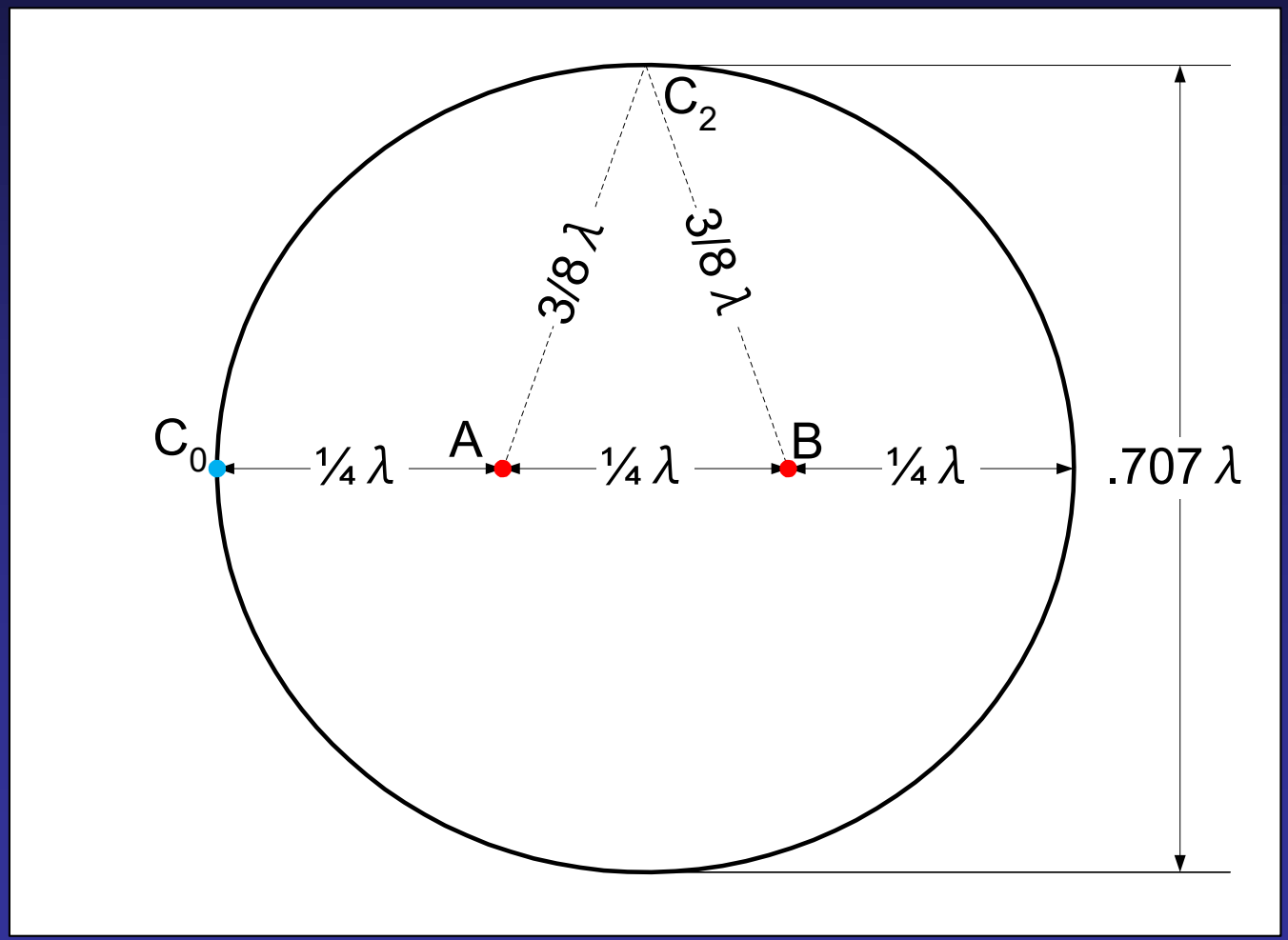
Connecting a Load

- Again, if a magloop antenna at B is part of a tuned tank and we connect a load across that tuned tank, power is transferred to that load. For example, light bulbs will light up, and at the same time, the signal reflected back to A, rather than reflecting the load back, will reflect back a signal that reduces the loading on A. With an important stipulation!



Impedance Matching can be Important

- It might be, that a load across a tuned tank at B would reduce the maximum current at B. That might cause less load reducing at A. Similarly, if a load is connected in series with the tank at B rather than in parallel, it might not be possible to have good impedance matching so as to get power transferred from A without loading A equal to the power transferred. Experimentation is needed to gain understand.



What if we place a ferromagnetic material at B?

- Examples from: http://hyperphysics.phy-astr.gsu.edu/HBASE/solids/ferro.html#c5

Some representative relative permeabilities:

magnetic iron	200	at a magnetic flux density of 0.002 W/m^2
nickel	100	
permalloy (78.5% nickel, 21.5% iron)	8,000	
mumetal (75% nickel, 2% chromium, 5% copper, 18% iron)	20,000	

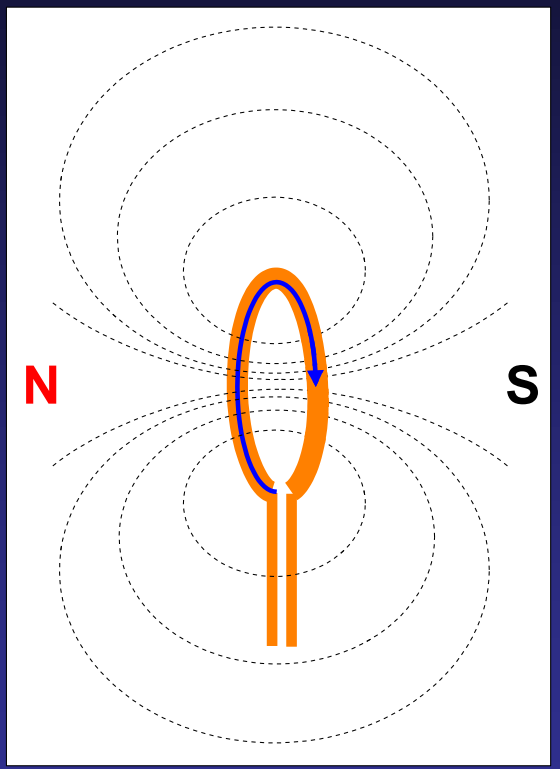
From the same website above:

" When ferromagnetic materials are used in applications like an iron-core solenoid, the relative permeability gives you an idea of the kind of multiplication of the applied magnetic field that can be achieved by having the ferromagnetic core present. So for an ordinary iron core you might expect a magnification of about 200 compared to the magnetic field produced by the solenoid current with just an air core. This statement has exceptions and limits, since you do reach a saturation magnetization of the iron core quickly, as illustrated in the discussion of hysteresis. "

- Before we review the effects, lets review air cores versus iron cores.

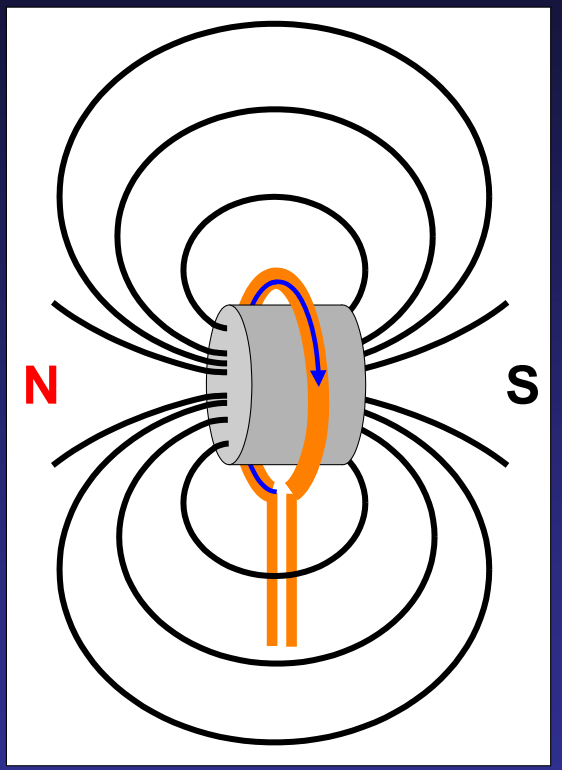
Magloop with an Air Core

- If we apply an AC signal to a wire loop with an air core, then for a given maximum current,
  - The magnetic field strength is relatively low.
  - With each half cycle of the AC signal, the wire loop's magnetic field builds up, cuts across the wire loop and causes a CEMF that opposes the change in current flow in the loop.
  - The inductance is just the inductance of the wire loop and the magnitude of inductance determines how much CEMF is generated that slows down the change in current flow thus slowing down the build up of the loop's magnetic field each time the current level is increasing.
  - The EM energy radiated equals the energy from a signal generator that is not returned to the generator from the wire loop during periods when the magnetic field is collapsing before switching polarity. (assuming no resistance losses)
  - The energy radiated away comes from the signal generator.



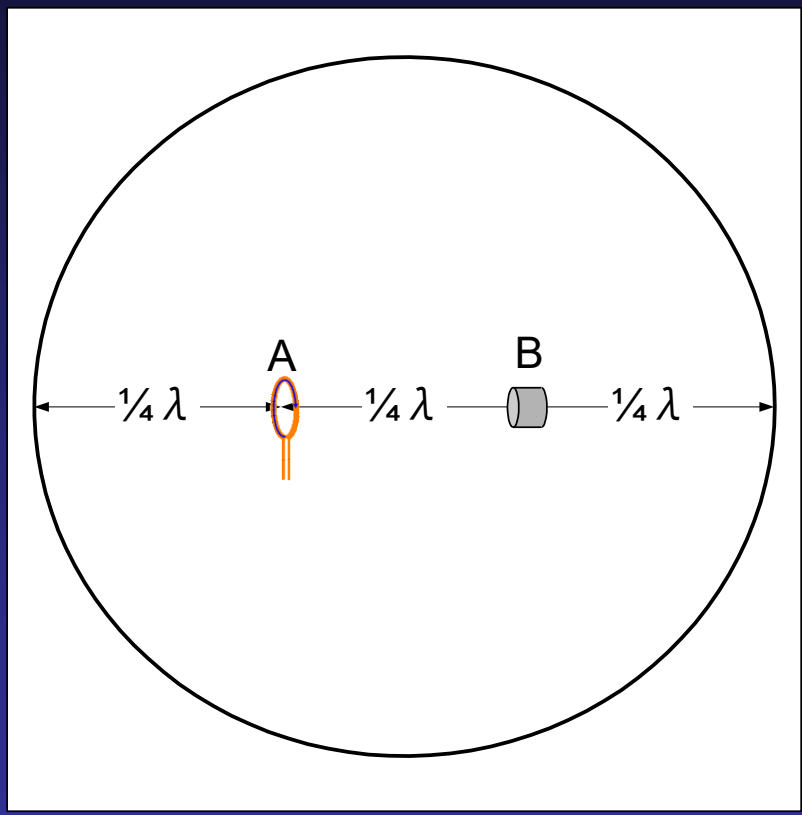
Magloop with an Iron Core

- If we apply an AC signal to a wire loop with an iron core, then for a given maximum current,
  - The inductance is now magnified by the relative permeability of the iron core.
  - A much stronger magnetic field is generated when the magnetic domains of the iron core turn to align with the magnetic field from the wire loop.
  - This generates a much larger CEMF in the wire loop which greatly reduces the rate that current flow can change.
  - A much larger signal must be applied to achieve the same current flow in the same time period of each AC cycle.
  - Again, the EM energy radiated equals the energy from a signal generator that is not returned during periods of each cycle when the magnetic field is collapsing before switching polarity. (assuming no resistance losses)
  - A proportionally greater amount of energy is radiated away and the signal generator provides that extra energy. (Conservation of energy)



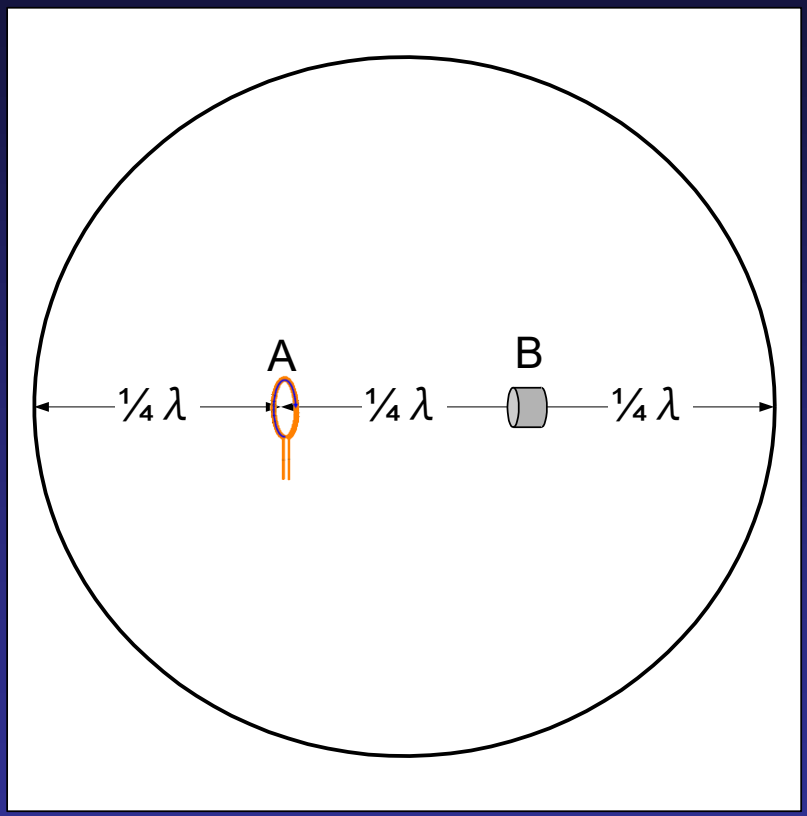
An Iron Core at λ/4 distance

- With an Iron Core at λ/4 distance, the magloop antenna doesn't have a greater inductance from an iron core inside it nor greater CEMF opposing the build up of current because the iron core is not able to immediately respond to changes in current in the magloop antenna.
- The iron core will not respond until a λ/4 time delay.
- Each signal cycle's change in polarity causes alternating EM radiation from A that converges on B, at which time the iron core will begin to respond and its magnetic domains will turn to align with the external magnetic field that originated from A.
- When the magnetic domains of the iron core change orientation, that generates a magnetic field change that propagates back to the magloop antenna at A.
- By the time this signal arrives at A, rather than opposing the change in current in the magloop antenna, it generates a current flow in the same direction the signal generator is causing in the magloop antenna already.
- The induced current is even greater than a "shorted" condition's maximum current set by resistance within the source, transmission line and antenna.



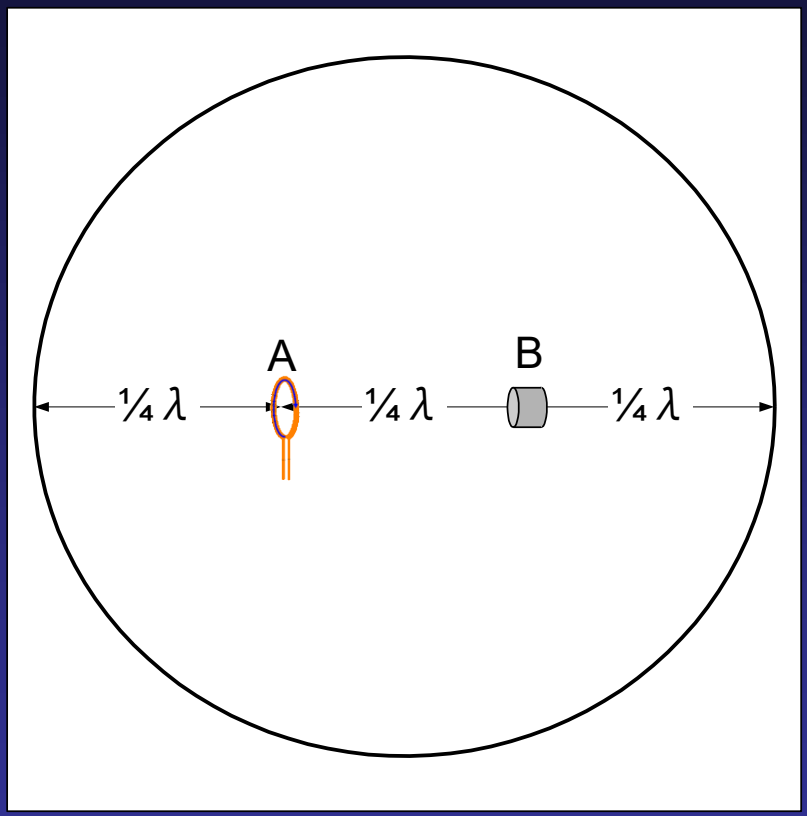
An Iron Core at λ/4 distance *continued*

- In fact, if after generating an initial pulse, the signal generator is disconnected from the magloop antenna at A and a load only is left attached, then when the magnetic field from the iron core arrives, it should induce a current flow through the load.
- The current flow around the magloop and through the load will cause another magnetic field of opposite polarity to radiate outwards from the magloop at A.
- This will propagate over and converge on B, swap the iron core's direction of magnetization and the process will repeat so an oscillation begins.
- The iron core now becomes the signal source and the maximum signal amplitude possible is determined by the maximum magnetic field density that the iron core can generate before the iron core becomes saturated, as represented by a hysteresis curve for the iron core's magnetic properties.
- Other ferromagnetic materials may work also and the effect begins as soon as the initial signal received by the core material is strong enough to overcome the coercivity of the material.



An Iron Core at λ/4 distance *continued*

- The effect depends on the core material having a relative permeability high enough and a BH_{max} (Maximum Energy Product) high enough to radiate more electromagnetic energy back to the magloop antenna than was transmitted.
- The energy received at A must be higher than the energy losses due to:
  - imperfect antenna efficiency, (antenna heating).
  - imperfect reflections off cavity inner walls, (heating of the cavity walls).
  - imperfect focusing of the reflected signals at each foci, (possible phase smearing).
  - losses in the core material
  - **UPDATE:** See further considerations on slide 73



- **NOTE: Energy is conserved.**

  The energy appears to come from the core material itself but there are processes that allow this to occur.

Where does the energy come from?

- According to classical electrodynamics, all electrically charged particles, like quarks of protons and neutrons, as well as orbital electrons, are radiating away energy from precessional and precessional plus orbital motion. All electrically charged particles are radiating away energy all the time.
- However, all charged particles absorb just as much energy from all other radiating particles. The absorbed energy applies electromagnetic forces that naturally move all similar type particles into harmonious precessional motions with all other particles. This results in a vast sea of electromagnetic standing waves among all matter.
- This gives rise to a hidden yet strong tendency towards harmony and equilibrium among all matter in the universe due to these unseen standing waves and spin interactions among all matter. This tendency overcomes, to a great extent, the tendency towards chaos and heat death of the universe. This tendency can also be exploited to perform work.
- This is the interaction among all matter that Ernst Mach alluded to as necessary to cause matter's characteristic of inertia. Einstein later called this Mach's Principle. Einstein studied Mach's ideas while developing his theory of General Relativity.

Specifically where does the energy come from?

- Energy lost to a load causes the particles of the core material to lose the energy of angular momentum by the same amount as the energy transferred to a load.
- The charged particles of the core material begin to spin and precess slower. (Something a quantum physicist may not be prepared to accept.)
- However, as soon as there is the slightest change in angular momentum, there will be phase lag in the precessional rotation between the particles' axes of precession and the sea of standing waves.
- As soon as there is a phase difference, the received signals from the sea of standing waves will apply electromagnetic forces that force the magnetic core material's charged particles back up to speed again.
- This is similar to how a wrist exercise "power ball" can be precessed by applying force with the wrist to increase the ball's spin rate. https://www.youtube.com/watch?v=xE7zFEV1dKk
- It is also similar to how a planet can have external forces on it that increase its spin rate.

Practical Design Criteria for a Prototype

- The antenna should have high efficiency
- The ellipsoidal cavity's inner wall should have high reflectivity.
- An impedance matching network should match the impedance of a load to the impedance of the antenna and should be able to handle the power output without saturating.

High Efficiency Magloop Antenna

- There are books, websites and forums dedicated to magloop antenna designs.
- Antenna efficiency, also called radiation efficiency, per wiki: "… is the ratio between its radiation resistance and its total resistance …". It represents how much of the antenna's input power actually gets radiated as opposed to dissipated by things like resistance in the antenna or resistance of the ground in the vicinity of the antenna. In this application, the cavity inner wall is the ground and will have minimal losses. But resistive losses in the magloop antenna metal surface or in connectors are a big concern.
- Both online and downloadable magloop antenna calculators can be found that predict the antenna efficiency for a given design.
- A high Q design is often desired by ham radio enthusiasts because it increases selectivity and reduces bandwidth, both desirable for ham radio receivers and transmitters. But a high Q design causes the electric field component to increase without increasing the magnetic field component. For this application, a strong magnetic field is the primary concern. If a high Q helps that in some way that is great but if it doesn't increase the radiated or received magnetic field energy it doesn't matter much.
- The size, shape and reflectivity of the cavity inner wall will increase Q anyway.
- A tuned capacitor is a major component of ham designs that strive for a high Q, but if you get the antenna impedance you want at the desired frequency without any capacitor then maybe you can do without the capacitor.

The Ellipsoidal Cavity Construction

- Polished aluminum or copper have good reflectivity in the RF range
- Places that manufacture spun metal parts are capable of making the ellipsoidal cavity.
- This is what we are talking about: https://en.wikipedia.org/wiki/Metal_spinning
- Examples: http://www.centurymetalspinning.com/

  http://www.helandermetal.com/metal-hemispheres-metal-cones.html
- The frequency determines wavelength (λ) and this determines the size.
- If the ellipsoidal cavity is 3λ/4 across and the operating wavelength is 70cm then the cavity will have an inner surface 70*3/4 = 52.5cm across.
- The inner surface needs to be polished mirror smooth and possibly have a silver or gold coating for the lowest skin resistance in the RF range.
- A high dielectric protective coating may be desirable to prevent oxidation so as to maintain low skin resistance. It needs to be a high dielectric coating so no current flow through it can cause resistive losses. Polyurethane might be good enough.

Impedance Matching Network

- The impedance matching part of this proposed design has not been explored yet.
- It may be possible to pulse the unit into operation through a low efficiency impedance matching network.
- Then couple its output through high frequency power diodes to a more typical low frequency utility transformer that can handle a lot of power at more typical AC power frequencies.

Power Control

- When I explained this design to my nephew, who is a pretty smart dude, he commented that it seemed like it would immediately go into a runaway condition with an uncontrollably high output level, and he is right.
- If the overall losses are low enough to make it work then the positive feedback from the magloop to the core would possibly make it output too much if, for example, a short was placed across the magloop antenna output. There are several problems actually:
- How to control the output level?
- How to modulate the output for a 60Hz output?
- How to make it fail safe, i.e. if something breaks in some control circuit, it should make it shut down rather than output too much.
- Making it fail safe is most important.

Power Control continued

- A possible solution is to saturate the core with permanent magnets designed not to absorb or reflect the EM radiation from the magloop antenna. The magnets must have sufficient coercivity that the magnetization of the permanent magnets can't get flipped by the EM radiation from the magloop antenna.
- Then use a control winding with a DC current applied to reverse and so neutralize the magnetic fields of the permanent magnets. If the control winding or its drive circuitry fail, then the core becomes saturated which should prevent it from responding to positive feedback from the magloop antenna.
- This would be somewhat similar a saturable reactor with one big difference. What would normally be an AC power input winding would now be an RF input from a magloop antenna at least λ/4 away so as to develop positive feedback between the core and the magloop antenna.
- The next problem is modulating the output level for a 60HZ output.

After further review …

- I was previously discounting the need for a tuned capacitor in the magloop antenna but after further thought;
- If the core was initially pinged with sufficient energy from a magloop antenna so as to start positive feedback between the core and the antenna, there may be other frequencies that the whole system decides to oscillate at besides the intended frequency.
- To keep the whole system oscillating at the desired frequency, a good magloop antenna design is needed probably with a tuning capacitor included.
- The magloop antenna itself should not have parasitic capacitances or inductances that would cause it to resonant at unintended frequencies.
- If the whole system oscillates at frequencies higher than intended, it makes it much harder to control and harder to rectify the output from the antenna without the rectifying circuit possibly overheating.
- Other strange and hard to control conditions may develop as well, related to slowing the spins of the cores' charged particles to slower than other matter in the area.

After further review … *continued*

- Else, continue to dispense with a capacitor as part of the magloop antenna and instead warp the perfect shape of the ellipsoidal cavity so that at higher frequencies too much phase smearing would occur and so those frequencies could not support enough positive feedback to maintain oscillations.

After even further review, *see the dilemma realized and discussed on the next slide.*

Frequency Limits of the Magnetic Core

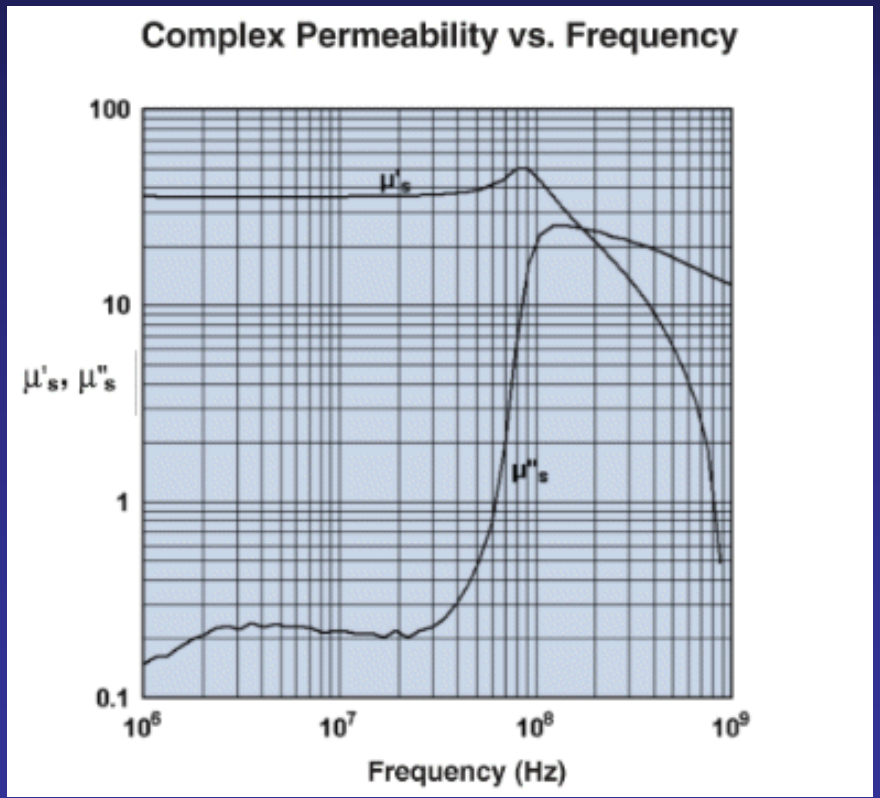
i.e. Resonant Cavity Size Limits

- As the intended frequency increases, a magnetic core's material has a decrease in permeability, develops phase lag in response to external magnetic field changes and develops higher resistive impedance which causes heat loss.
- Higher temperatures cause more permeability loss so the permeability continues to drop off even faster.
- Relevant links:

http://www.fair-rite.com/newfair/materials67.htm

http://www.ieee.li/pdf/viewgraphs/ferrites.pdf

http://www.matsceng.ohio-state.edu/ims/LR_Ferrites.pdf



Fair-Rite Material # 67

Frequency Limits of the Magnetic Core

i.e. Resonant Cavity Size Limits Continued

- A particular magnetic material's characteristics at higher frequencies determines the minimum size limit of the ellipsoidal cavity.
- For example, if for Fair-rite material #67, we use a target frequency of 22MHz for minimal loses, then 1 wavelength would be:

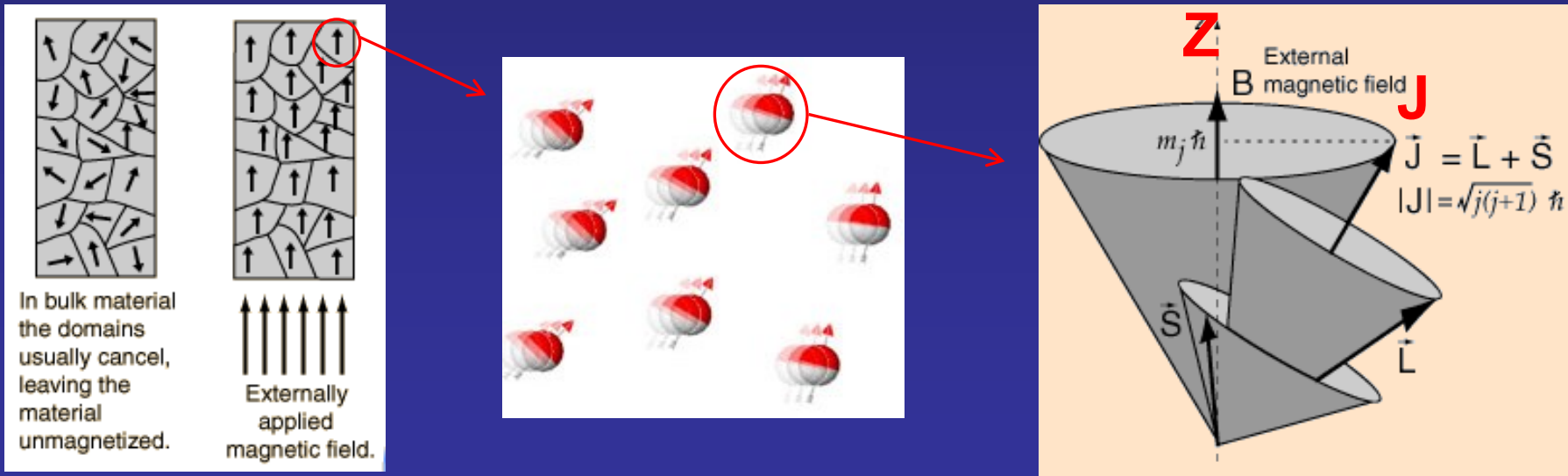
wavelength (λ) = c/ λ , where c = $3*10^8$ m/s (velocity of light) so
($3*10^8$ m/s) / ($2.2*10^7$ Hz) = 13.64 meters

- So the smallest possible ellipsoid cavity size of $3\lambda/4$ across would be a width of 10.23 meters across.
- The following slides explain why magnetic ferrite performance decreases and what the alternatives are.

An Alternate Approach

to get around the frequency (and size) limits

- As explained on page 11 of this review of ferrite materials: www.matsceng.ohio-state.edu/ims/LR_Ferrites.pdf , *as the frequency increases, it approaches the ferromagnetic resonant frequency.*
- In magnetic materials, it is the combined direction of the uncompensated electrons' *orbital spin*, *orbital precession* , *electron spin and electron spin axis precession* that change orientation and cause the material's magnetic field orientation to change.
- As the frequency increases, that an externally applied magnetic field is changing direction, the changing external magnetic field couples less to the frequency that the Z axis re-orients to alignment with it and couples more to the continuously precessing J axis.



An Alternate Approach

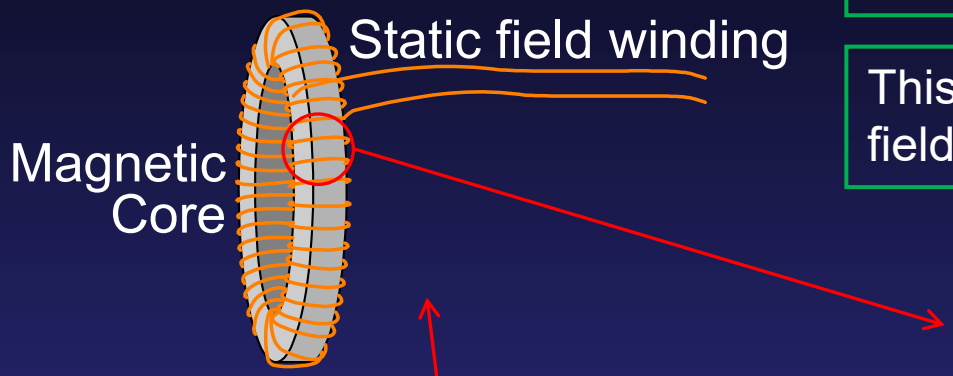
continued

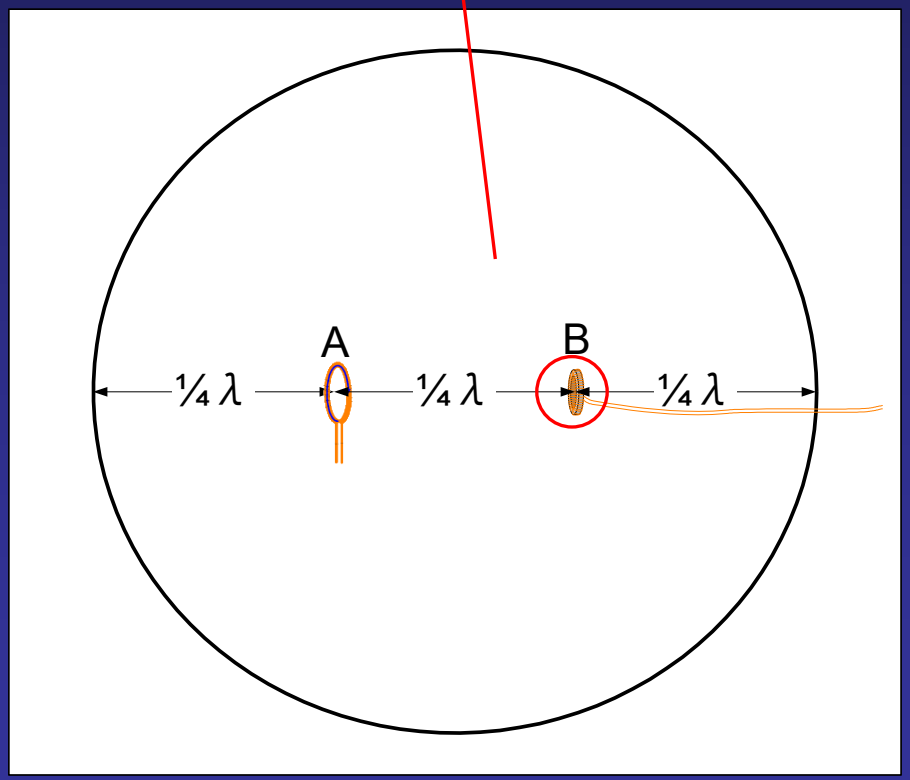
- The frequency the J axis wants to precess depends on the strength of an external static magnetic field pulling in line with the axis of precession.
- This is similar to how a tilted gyroscope would precess at different rates if the gravitational field strength were changed that pulls along its axis of precession.
- There is a different class of ferrites that are designed for use at microwave frequencies with these characteristics in mind.
- Reference: https://web.archive.org/web/20140912125537/http://www.temex-ceramics.com/site/fichiers/TEM01_Ferrite.pdf
- For our particular application, we need a toroid shaped core so we can wrap a DC winding around it.
- The current through this winding should be adjustable so as to adjust the toroid's static magnetic field strength and this in turn will set the ferromagnetic resonant frequency.
- We want to test the device's response as we adjust the magnetic material's resonant frequency relative the ellipsoidal cavity's resonant frequency and the magloop antenna's resonant frequency.

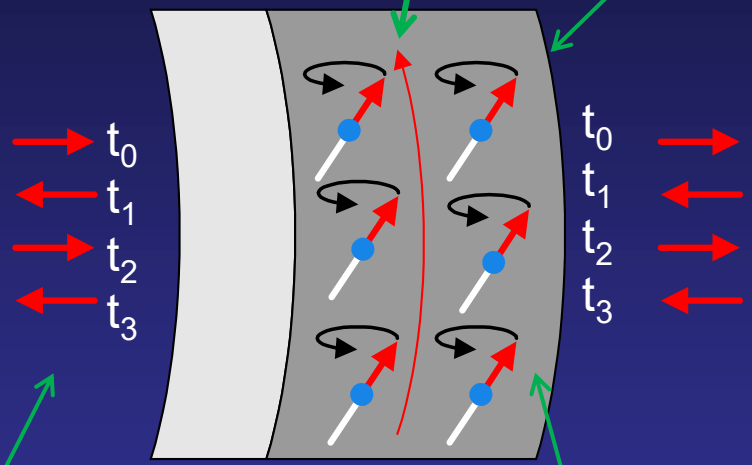
The Prototype Test Setup

Precessing spins synchronize with incoming waves from the magloop antenna and radiate larger waves back to the magloop antenna.

This static field strength is set by the field coil current level.







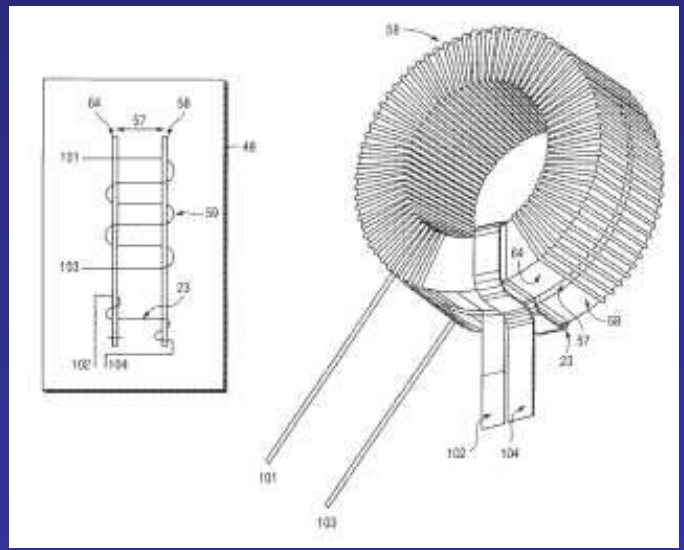
These magnetic waves propagate to the right side of the toroid from the left interior walls.

These magnetic waves propagate to the left side of the toroid from the right interior walls.

Design of the DC winding

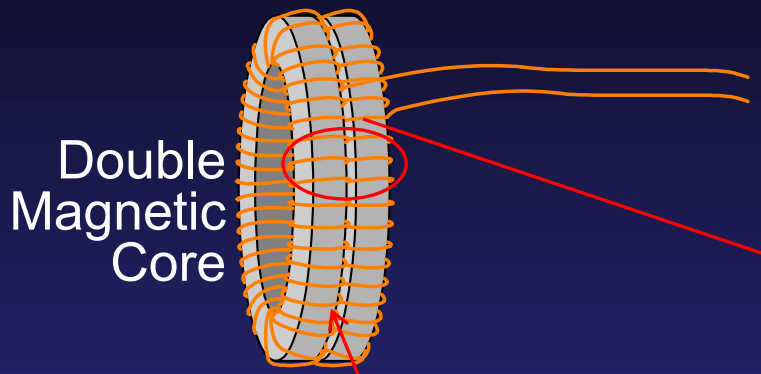
- At HF and VHF frequencies, the target magnetic core material needs a DC current winding around the core to control its saturation point so as to control the RF output level. It functions similar a saturable reactor control winding.
- At UHF and SHF frequencies, the target magnetic core material also needs a DC current winding around the core but this time it is used to control the ferromagnetic resonance frequency.
- At both frequency bands, we don't want RF coupling into the control winding and we don't want the inter-coil capacitance to short out the RF signal to the core. This is the same dilemma solved by US patent 5770982:

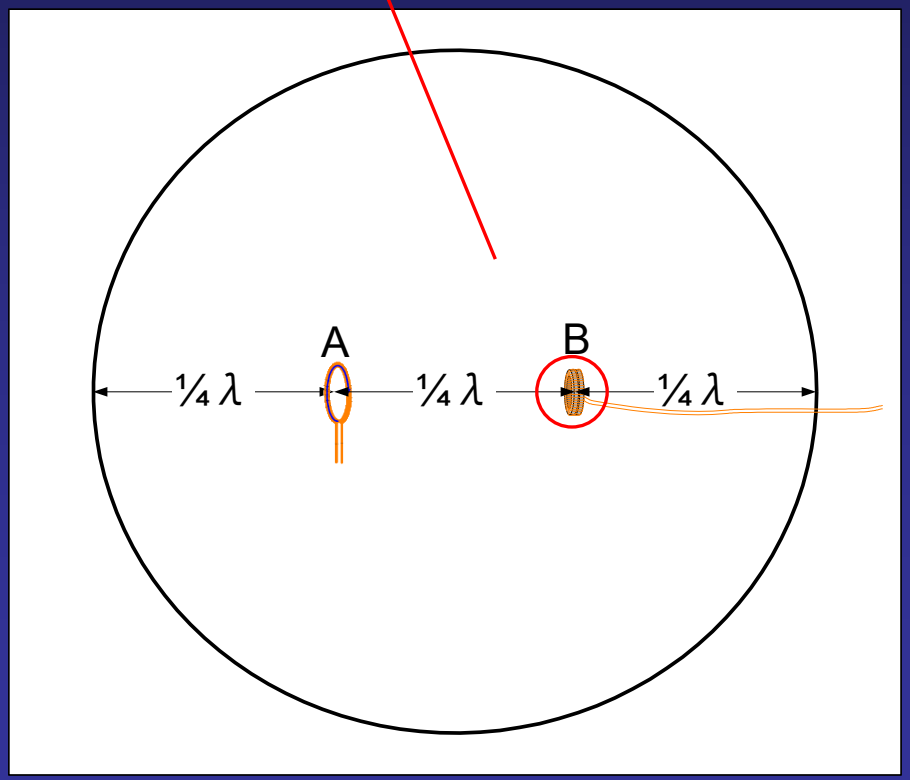
- In this patented design, the problem is solved by winding the RF input in a figure 8 so that the RF induced EMF in each core is equal and opposite so cancels for the control winding.
- Reciprocally, the inter-winding capacitance effects are equal and opposite so they don't appear as a short to the RF winding.
- On our design, since we can't figure 8 the RF input from the magloop antenna, we will do it to the control winding instead.

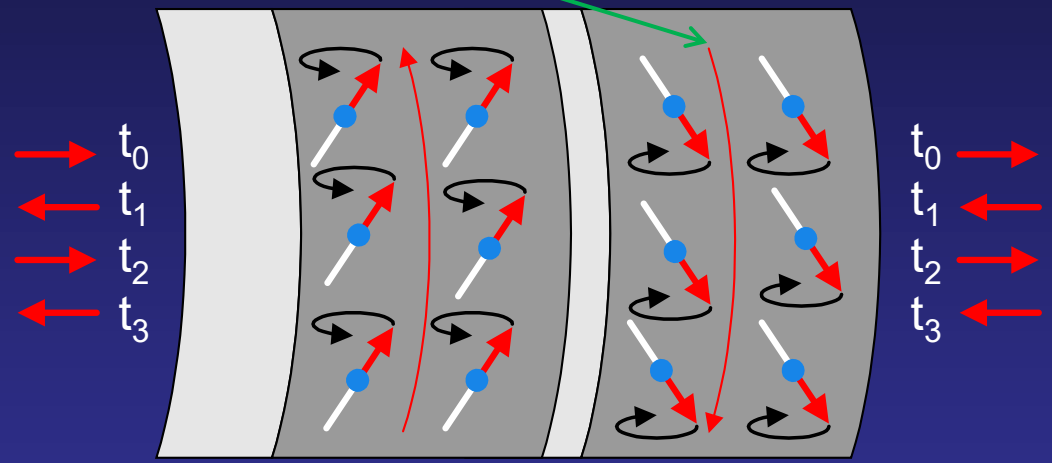


Design of the DC winding *continued*

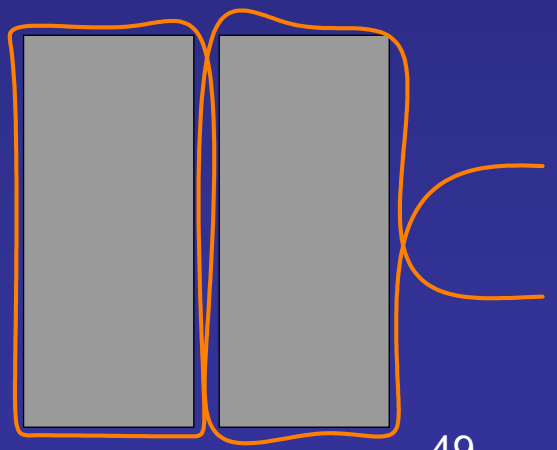
The static magnetic fields in the cores are in opposite directions, but the spins should still be able to precess in sync in the left and right directions as stimulated by the signal from the magloop antenna. Notice all “Norths” will be pointing to the right then to the left at the same time in response to the incoming RF magnetic field orientation changes.







Static field winding cross section view



More Design Dilemmas

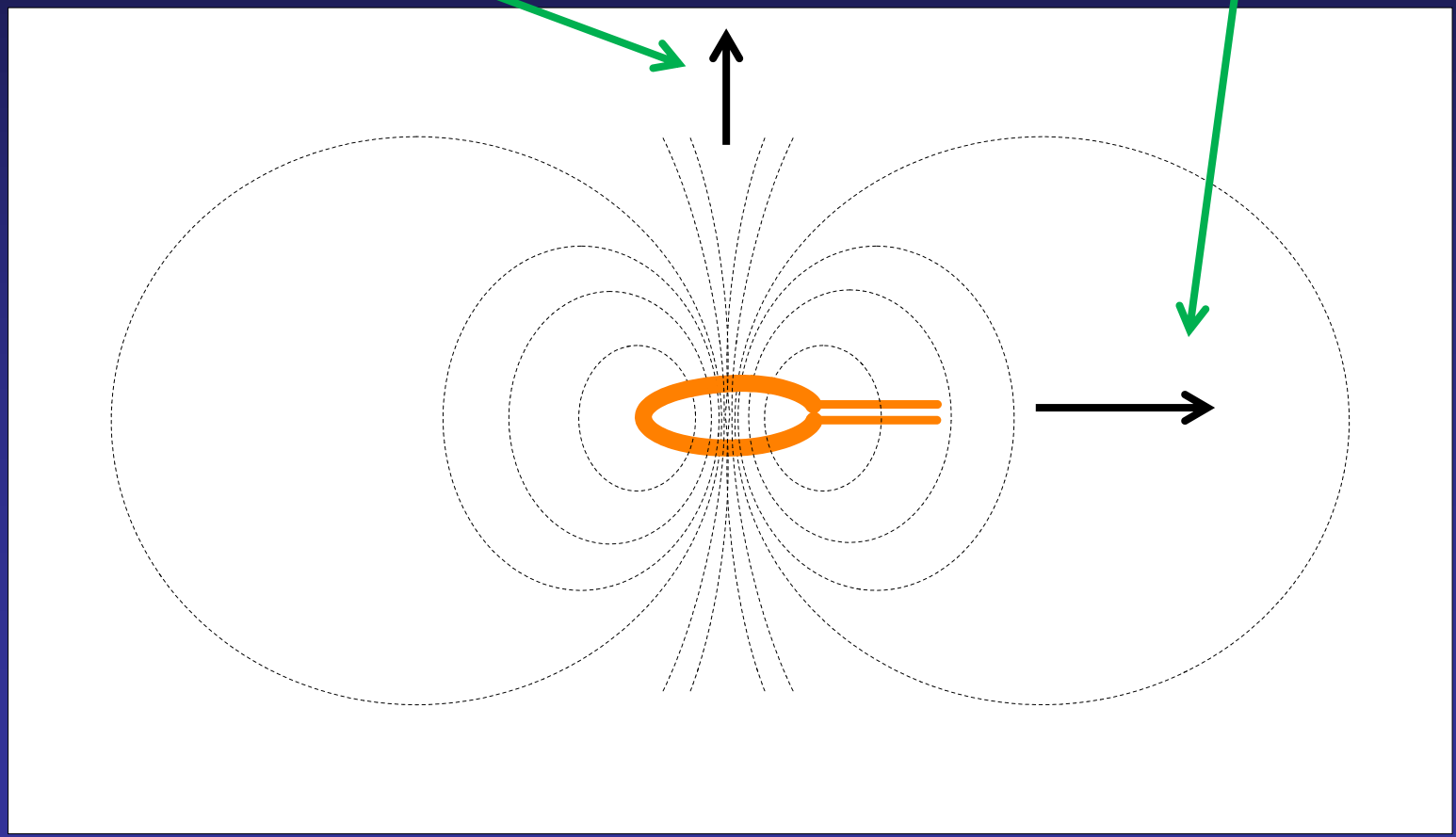
that could be solutions to other designs

- Even though the inter-winding effects cancel by doing the figure 8 around dual cores, the coil as a whole, looks like a larger single turn shorted loop to the incoming RF. The effective loop is in a plane parallel with the cores.
- Maybe a shorted loop is not a problem because a short reflects back to the magloop antenna as an open.
- It is only a problem if it shorts the radiated output from the precessing spins in the 2 cores,
- but **regardless** of the figure 8 winding pattern, the signals radiated from the cores should not get shorted as long as they are synchronized.
- but **regardless of whether** the spins are precessing and counter precessing **or not** they don't induce current in the figure 8 winding pattern.
- **But!** the radiated toggling magnetic waves will not induce current in the cavity walls either so will pass through without reflecting off the walls.
- This makes a great way to transmit information through thick walled Faraday cages or mountains, as long as you have a circuit that can receive them, i.e. a magnetic material tuned to resonance at the frequency of the received magnetic waves. The magnetic material should be designed with very low damping of the precessing spins so as to resonant well.

Two modes of radiated magnetic waves

Magnetic waves in this direction do not induce current flow in conductors but can still push and pull on magnetic dipoles in magnetic materials.

TEM (Transverse Electro-Magnetic) radiation in this direction will induce current flow in conductors

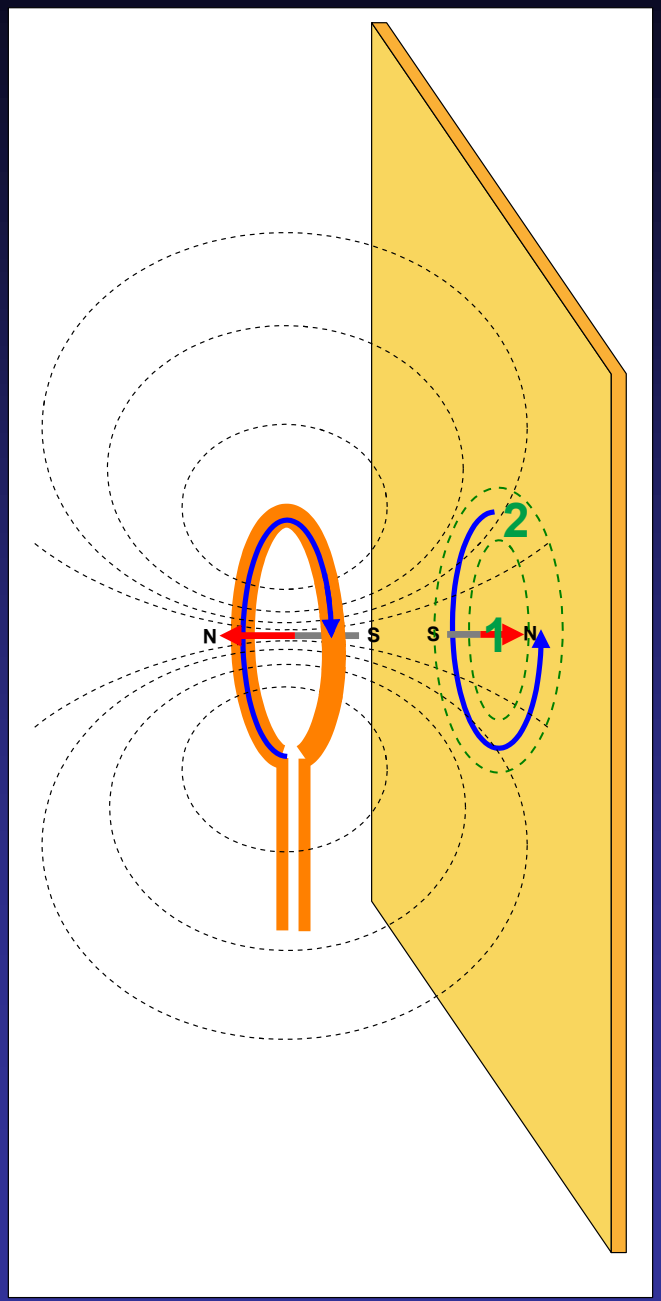


Two modes of radiated magnetic waves
continued

1. To induce current in a conductor, the magnetic component of EM waves needs to be at an angle to the direction of propagation.
2. TEM waves have the magnetic component at right angles to the direction of propagation.
3. There can be, and usually are, directions from a signal source in which the magnetic component of the EM waves is somewhere between a right angle and exactly aligned with or against the direction of propagation.
4. In these cases, only that vector portion that is at right angles is considered part of the TEM radiation.
5. To push and pull on the magnetic dipoles in a magnetic material, it doesn't matter if the magnetic field component of an EM wave is at right angles or is alternating directly with or directly against the direction of propagation.
6. Either way, it will push and pull on the magnetic dipoles of a magnetic material used to receive the signal.
7. Magnetic waves that have the magnetic field component aligned with or against the direction of propagation can pass through a Faraday cage because no current flow is induced in the conductive cage so the signal cannot be reflected off the cage's conductive surface.

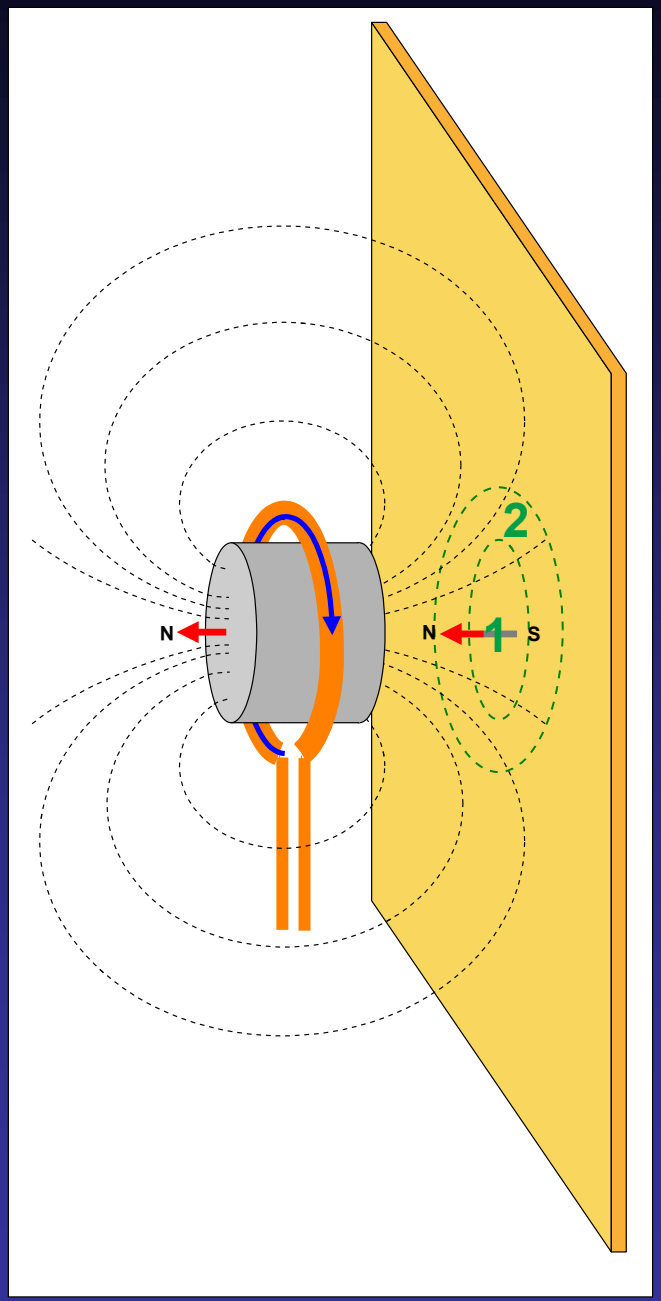
Magnetic waves from a ferrite core versus magnetic waves from a magloop antenna

- When current increases in one direction or the other in a magloop antenna, an increase in magnetic flux density propagates out from the antenna.
- With the magloop antenna oriented parallel to the conductive surface, the surface directly to the right of the magloop antenna (Area 1) experiences a minimum of magnetic flux moving out to the sides of the direction of propagation and so induces a minimum of current flow in the conductive surface.
- Slightly more out to the sides of the direction of propagation (Area 2), there is slightly more magnetic flux moving out to the sides of the direction of propagation and so to that extent it induces current flow in the conductive surface.
- Similarly, the further out the magnetic flux is from the direction of propagation, the more it cuts through the conductive surface in a motion that is at right angles to the direction of propagation and so this induces more current flow in the conductive surface.



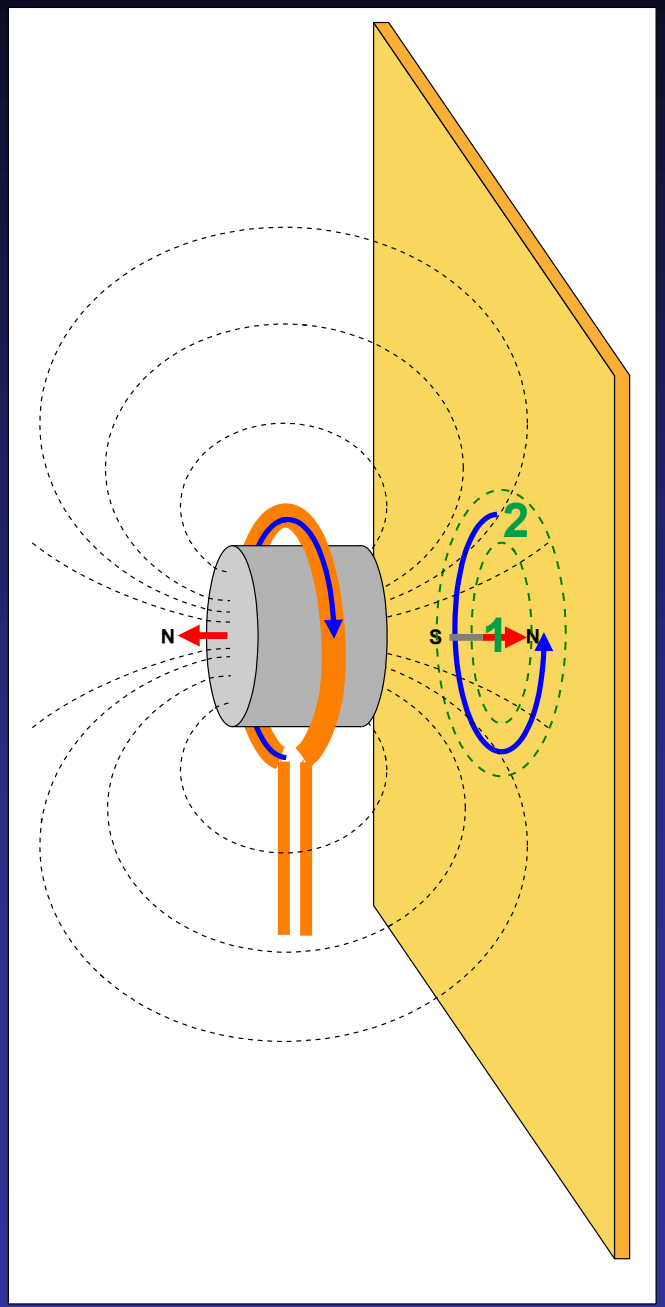
Magnetic waves from a ferrite core versus magnetic waves from a magloop antenna
continued

- Within a ferrite core, when the individual magnetic domains rotate to become more aligned with an external magnetic field, all their individual contributions to the total magnetic flux stay the same magnitudes but sum together more and more.
- As each individual domain's magnetic field rotates to become aligned, the area of the conductive surface to the immediate right will experience each domain's magnetic field sweeping across from various angles around the centerline of the core from every position within the core.
- 50% sweep to the right from a direction more toward the centerline and 50% sweep to the right from a direction more towards the outer circumference of the core.
- The net result is that in the area of the conductive surface immediately to the right of the ferrite core there are as many individual magnetic fields inducing clockwise current flow as there are inducing counter-clockwise current flow.



Magnetic waves from a ferrite core versus magnetic waves from a magloop antenna
continued

- Directly to the right of the ferrite core and also further out to the sides of the conductive plate the total magnetic flux from all the individual magnetic domains will increase as the individual domain's directions become more aligned.
- This increase in magnetic flux may have an effect equal to the lines of magnetic flux expanding out from the center line and so may be equivalent to magnetic flux sweeping across the surface from the centerline outward and so would still induce current flow as shown.
- This all needs to be checked with experimentation to see if reality matches the proposed ways of visualizing what is happening.

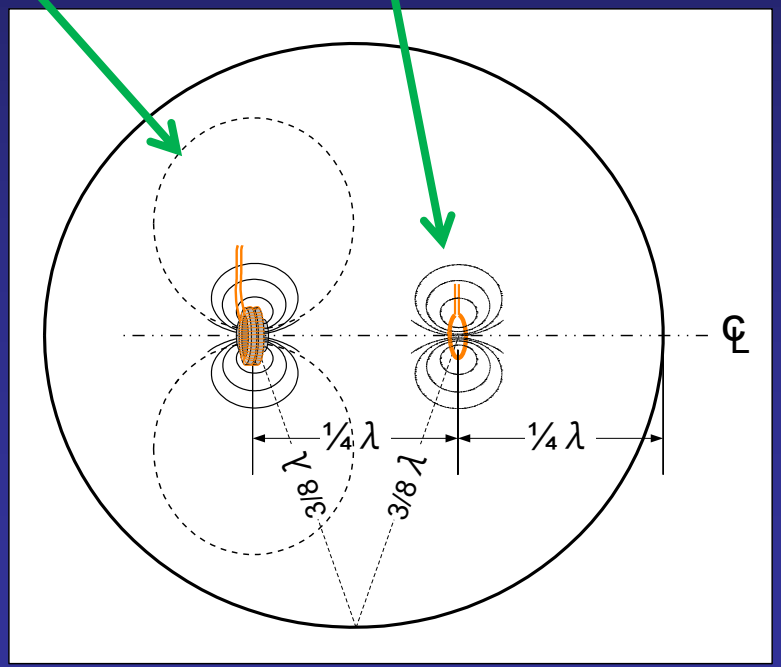


Antenna for Magnetic waves versus TEM waves.

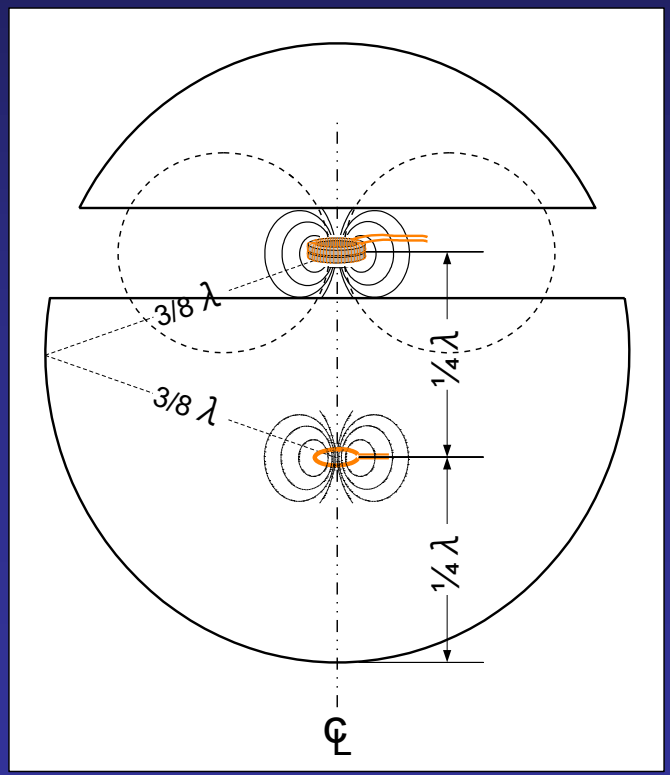
Magnetic waves in this direction pass through cavity wall (Faraday Cage) and stimulate the resonant frequency of the core's precessing and counter-precessing electrons.

The DC field winding current sets the resonant precession frequency to match the cavity resonant frequency, sized for incoming signal.

Magloop antenna output



TEM radiation in this direction will stimulate the resonant frequency of the cores' precessing and counter-precessing electrons also, but requires a hole in the cavity wall (Faraday cage).



Design criteria for a prototype

- The ellipsoidal resonant cavity size is determined by the chosen frequency.
- A frequency of 1282.5MHz is chosen because it is within the 23cm amateur band at a location where an amateur radio novice class operator is allowed to transmit with up to 5W of RF power. Reference: https://www.ntia.doc.gov/files/ntia/publications/january_2016_spectrum_wall_chart.pdf
- This makes the cavity size manageable enough for a DIY person to experiment in their home and it keeps down the cost of the cavity versus larger sizes.

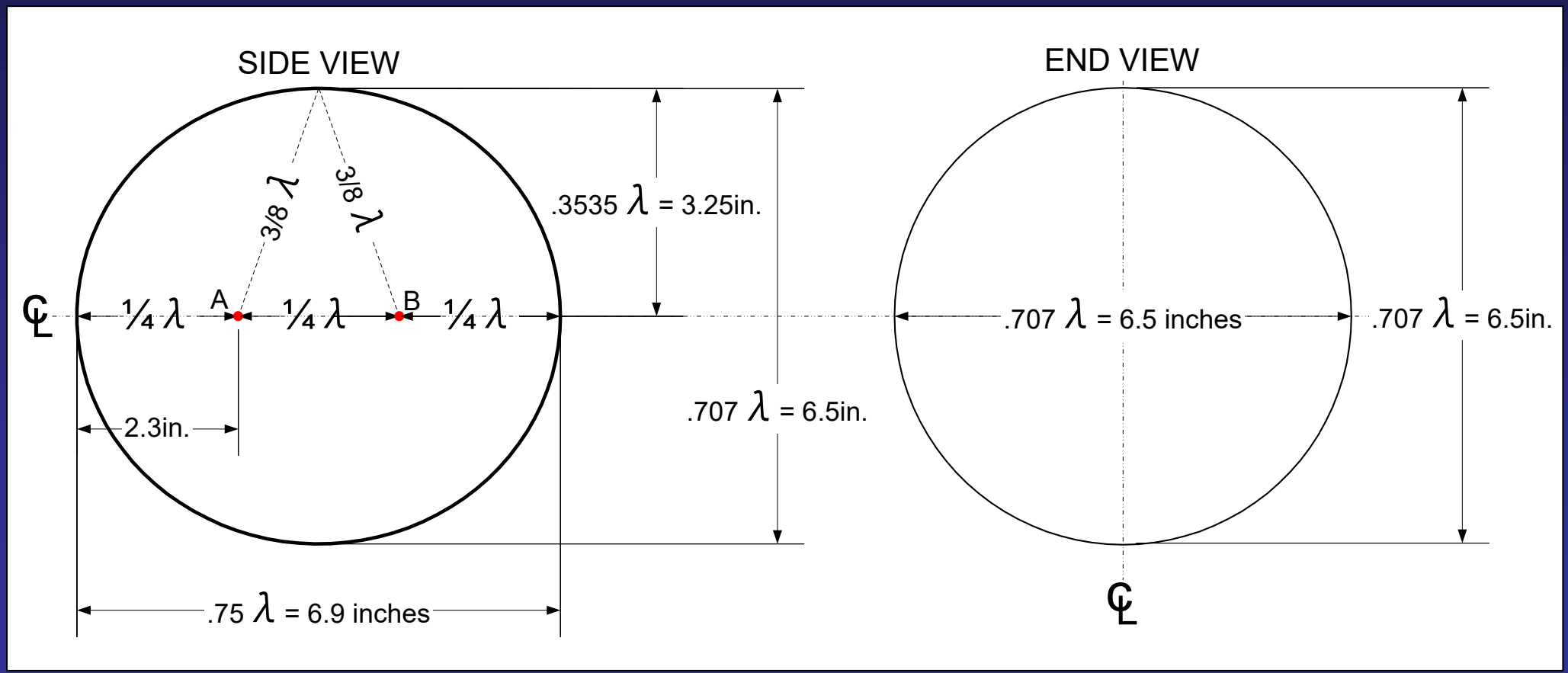
Specifications for this target size: http://www.1728.org/freqwave.htm

- λ = c/f and c = 299,792,458 meters and f = 1282.5MHz so
- 1 λ = 23.376cm = 9.20 in. = 0.767 ft.
- 3/4 * λ = 17.532cm = 6.902 in. = 0.575 ft.
- .707 λ = 16.527cm = 6.507 in. = 0.542 ft.
- 1/4 λ = 5.844cm = 2.3 in. = .192 ft.
- 1/8 λ = 2.922cm = 1.15 in. = .096 ft.
- With a magloop antenna circumference of 1/8 λ then
- Magloop antenna diameter = 1/8 λ /pi = 0.93cm = 0.366 in. = .0305 ft.

Design criteria for a prototype continued

Ellipsoidal resonant cavity inside dimensions:

- The below dimensions should support resonant oscillations at 1282.5MHz.
- However, it may be hard to find ferrites that can be un-baised and work at that frequency or even biased with a static field to promote a high permeability response at that frequency.
- So the below dimensions will be tweaked to promote higher frequencies also.



Design criteria for a prototype continued

Ellipsoidal resonant cavity inside dimensions for higher frequencies:

- For a new higher frequency f_2 with a wavelength λ_2 and per the equations on slide 20, if we set m = 1.5 and
- If the distance from the wall to the nearest foci must equal $\lambda_1/4$ and must also equal (m+ 1/4) λ_2 then $\lambda_1/4 = (1.5 + 1/4)\ \lambda_2$ then $\lambda_1/4 = (1.75)\ \lambda_2$ so:

$\lambda_1 = 4*(1.75)\ \lambda_2$ therefore

$\lambda_1 = 7\ \lambda_2$ and $\lambda_2 = \lambda_1 / 7$

If the distance between foci A and foci B must be $\lambda_1/4$ and also must be

(n+ 1/4) λ_2 and if $\lambda_2 = \lambda_1 / 7$ then (n+ 1/4) ($\lambda_1 / 7$) = $\lambda_1/4$ therefore

(n+ 1/4) $\lambda_1 = 1.75\ \lambda_1$ therefore (n + 1/4) = 1.75 so n = 1.5

The distance from a foci to the wall center point is: (m + n/2 + 3/8)

so if m =1.5 and n =1.5 then (1.5 + 3/4 + 3/8) = (12/8 + 6/8 + 3/8) = 21/8 = 2.625

For the cavity shape to stay the same then 2.625 λ_2 must equal 3/8 λ_1

When $\lambda_2 = \lambda_1 / 7$ then 2.625 / 7 = .375 so the same cavity shape should work.

Design criteria for a prototype continued

Ellipsoidal resonant cavity inside dimensions for higher frequencies:

- So if $\lambda_2 = \lambda_1 / 7$ then $f_2 = 7f_1$
- Since f_1 = 1.2825GHZ then f_2 = 8.9775GHZ
- New target frequency: 8.9775GHZ for testing magnetite and hematite rings as the target material.
- As it turns out, the same cavity size and shape will work for any higher frequency f_2 where f_2 is ***x*** times larger than f_1 as long as ***x*** is 1, 3, 5, 7, ….

- The magloop antenna will need to reflect these higher frequencies also, else designed to be tuned to specific higher harmonic frequencies.

Design criteria for a prototype continued

Ferrite toroid core design:

- The ferrite core needs to have a high permeability at 1282.5MHz.
- This requires microwave ferrite which will likely need to be biased with a static magnetic field so as to set a precession frequency that will cause the precessing electron spins to **reflect** rather than absorb RF at 1282.5MHz.
- There are companies that sell microwave ferrites that may work except they are not usually sold in a toroid shape, not specified for reflecting RF with a high permeability response and they can be expensive. Reference:
- https://web.archive.org/web/20140223021045/https://www.temex-ceramics.com/site
- https://web.archive.org/web/20180420155557/https:/www.countis.com
- https://web.archive.org/web/20141220165512/https:/www.trans-techinc.com/
- https://web.archive.org/web/20180410015235/https:/pceramics.com/
- https://web.archive.org/web/20180330022711/https:/magneticsgroup.com/
- https://web.archive.org/web/20161114012323/https:/www.aft-microwave.com/en/products/ferrites-and-dielectrics.html

Design criteria for a prototype continued

The Ellipsoidal Cavity

- I must choose between a custom fabricated product or an off the shelf product like one of these:
- https://web.archive.org/web/20200229043253/http://www.necopperworks.com/copperballs.html
- http://www.wagnercompanies.com/spheres_and_hemispheres.aspx
- https://www.kingmetals.com/Catalog/CatalogListing.aspx?CatalogId=C39&CatalogDetailId=86&ViewAll=true

Two 6.5 inch hemispheres with a .4 inch gap between them would be approximately the same as the ellipsoid of slide 58, however the 6.5 inch size is not available off-the-shelf.

UPDATE:

It is might be better to have a custom form fabricated

to the exact dimensions required per slide 37.

Update: 03/04/2021: or if experimenting in the MHz range, try the design included in the magnetic permeability presentation using newengland copperworks copper sphere, water filled and use magnetic materials coated or impregnated with very heavy elements. However, some frequencies involved might have a ¼ wavelength as small as the thickness of a sheet of paper between the material and a reflecting coil around the material.

Design criteria for a prototype continued

The Ellipsoidal Cavity

- I'm having a hard time finding someone who will make or who already sells the correct size.
- If instead I use 2 hemispheres then these are possible options:

- For 70cm band:

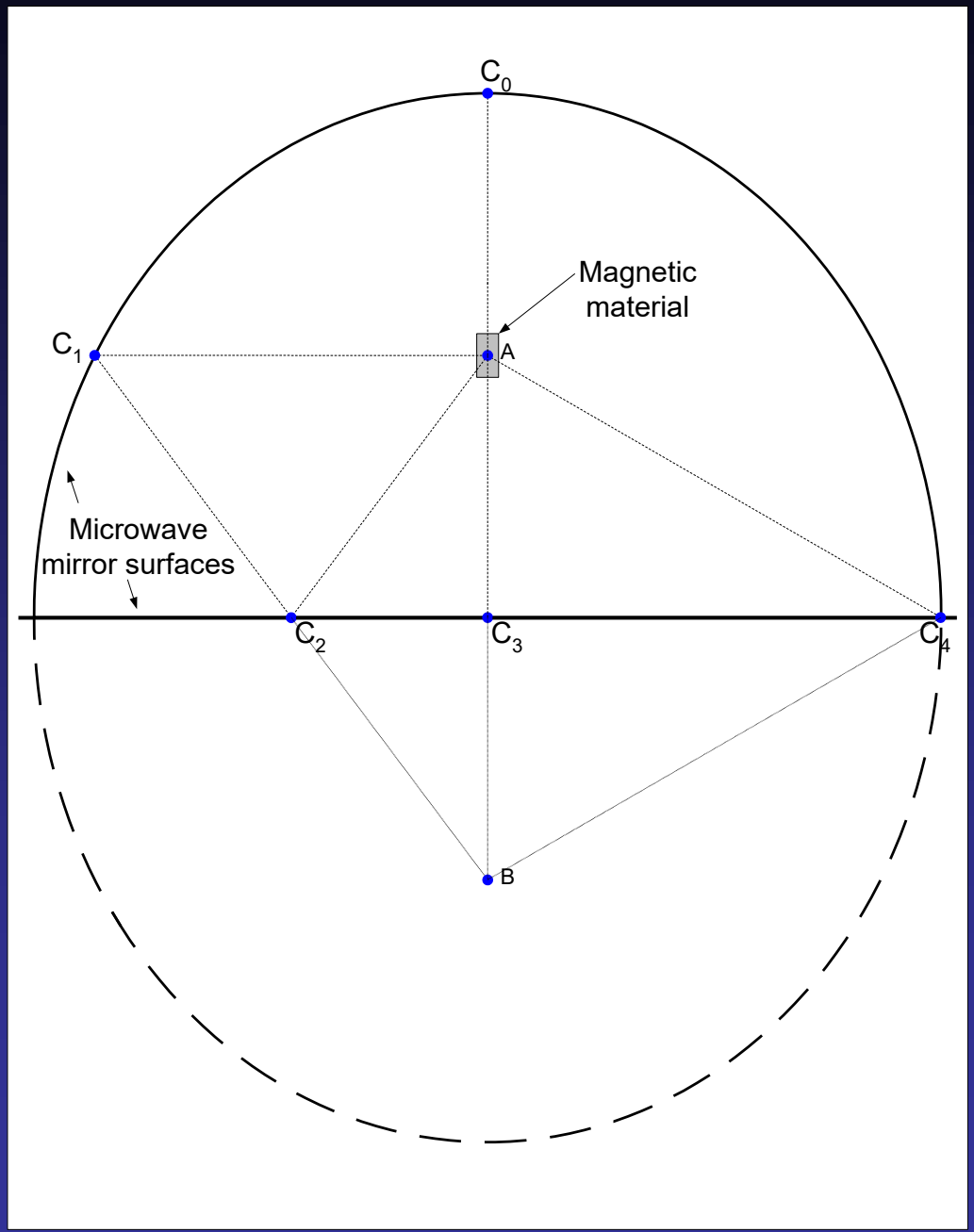
https://www.amazon.com/exec/obidos/ASIN/B00ADP9C92/mebelis-20/

Update: 03/04/2021: or if experimenting in the MHz range, try the design included in the magnetic permeability presentation using newengland copperworks copper sphere, water filled and use magnetic materials coated or impregnated with very heavy elements. However, some frequencies involved might have a ¼ wavelength as small as the thickness of a sheet of paper between the material and a reflecting coil around the material.

UPDATE:
It is much better to have a custom form fabricated to the exact dimensions required per slide 37.

Resonant cavities revisited:

- A half ellipsoid is easier to work with in a lab environment.
- A magnetic loop antenna at microwave frequencies is not practical so an antenna at foci B can be morphed into a flat RF mirror at the mid point and the total path length between foci would be the same as for a complete ellipsoid.
- The magnetic material can get its initial stimulation another way, to be discussed in the following slides.



A semi-ellipsoid resonant cavity

Referring to the diagram below, to get the desired effects from a magnetic material at position A within a semi-ellipsoid on a flat plate reflector, these dimensional requirements must be met:

m and n are half wavelength increments: 0, 1/2, 1, 1.5, etc.

$\overline{C_0A} = (m+1/4) * \lambda$

$\overline{AC_3} = (n+1/4) * \lambda$

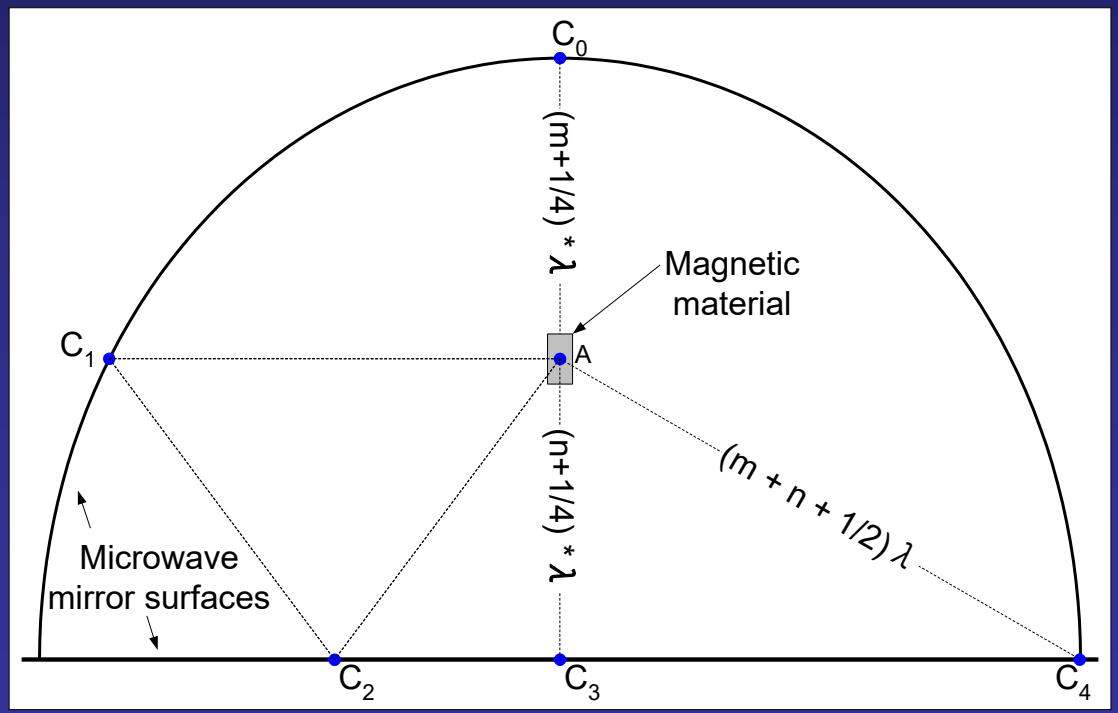
$\overline{AC_4} = (m + n + 1/2) * \lambda,$

From this slide and on there are errors. See corrections starting on slide 90

When these conditions are met then:

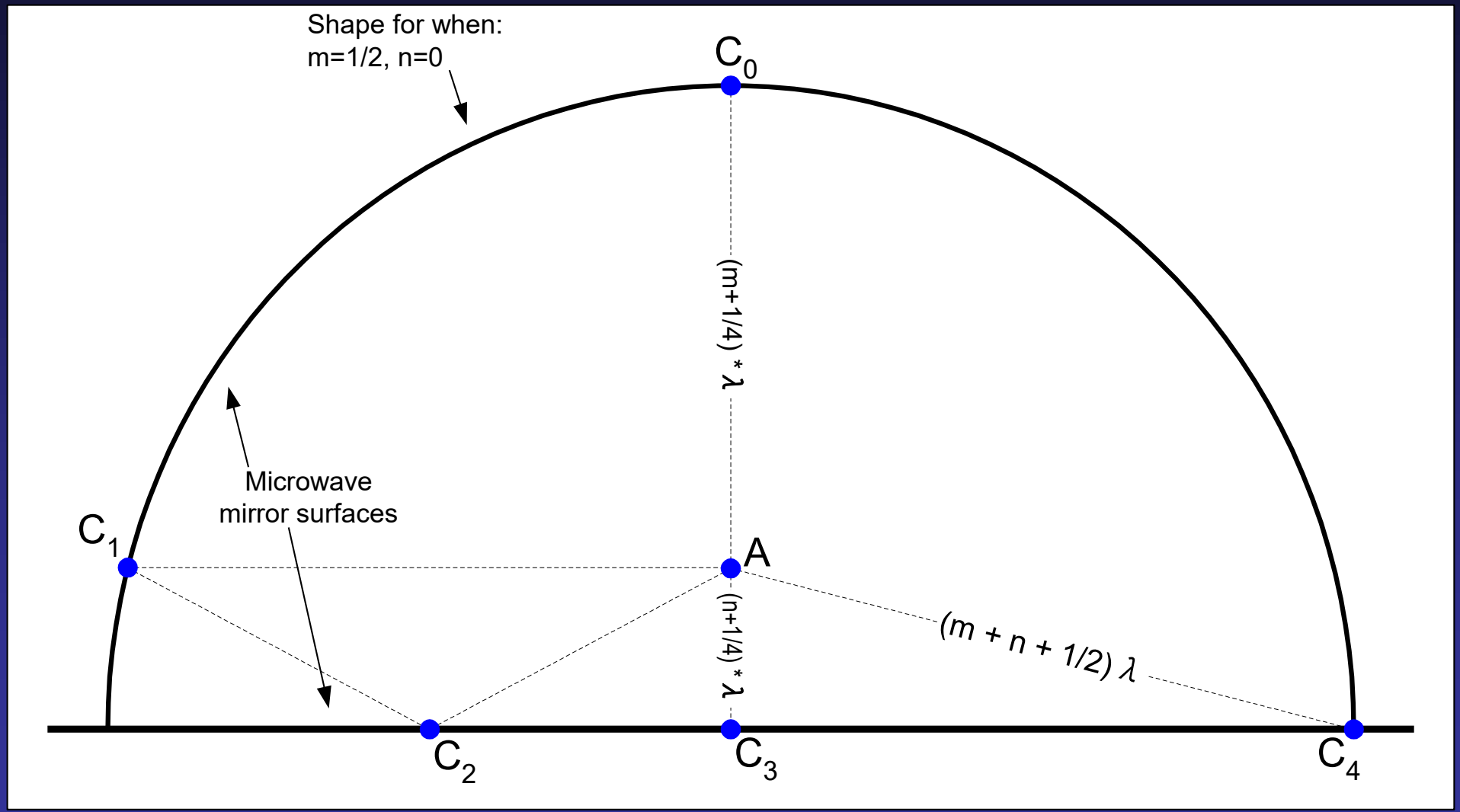
$\overline{AC_1} + \overline{C_1C_2} + \overline{C_2A} = 2 * (\overline{AC_4}) = 2\lambda * (m + n + 1/2)$

- When the reflections bounce directly back to the foci A from the top or bottom they have a single 180 degree phase shift from the reflecting surface and another 180 degree phase shift from the round trip delay of λ/2.
- When reflecting off 2 surfaces the reflection needs to have an additional λ/2 round trip delay.



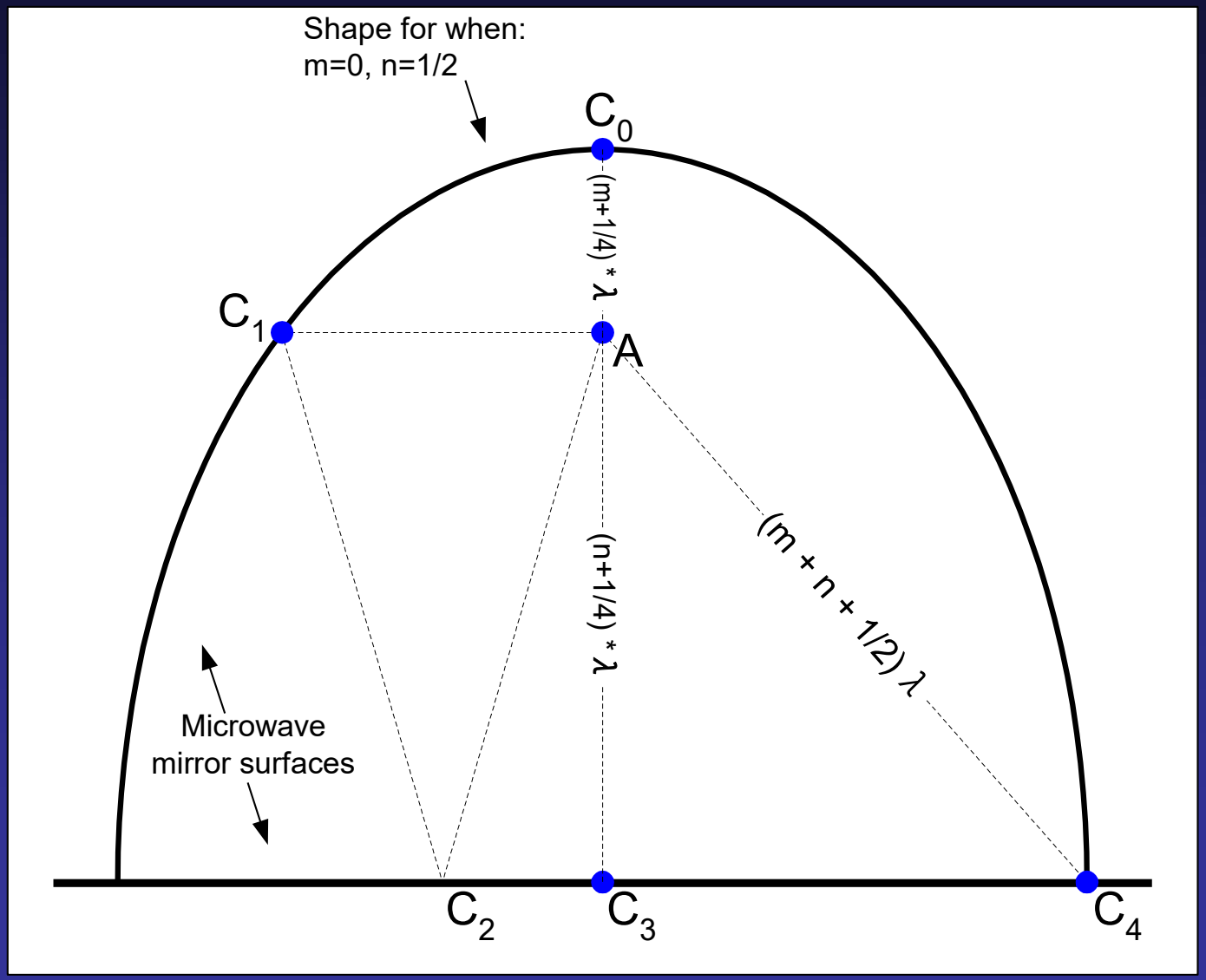
A semi-ellipsoid resonant cavity

- This is a semi-ellipsoid with m=1/2 and n=0:



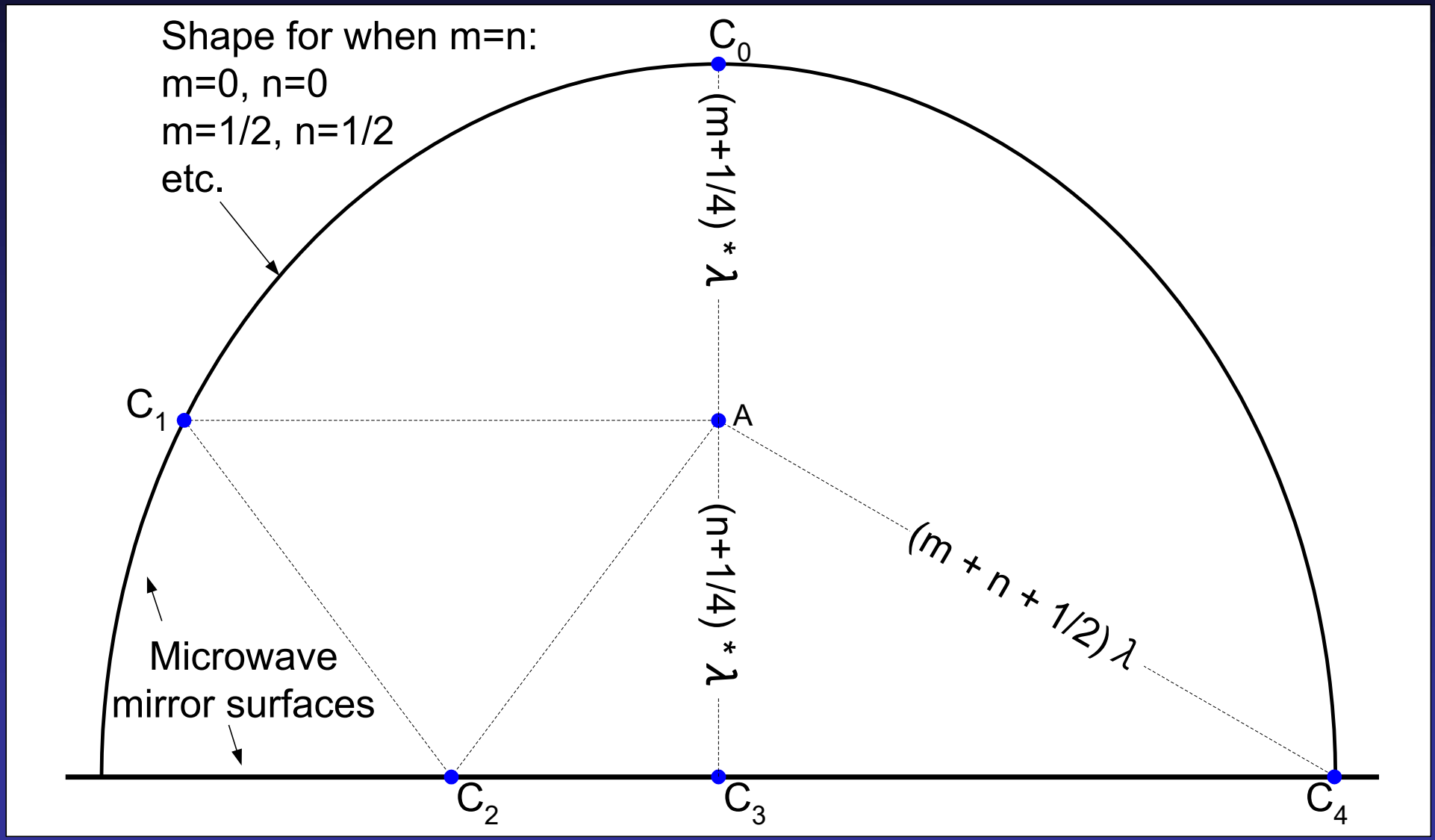
A semi-ellipsoid resonant cavity

- This is a semi-ellipsoid with m=0 and n=1/2:



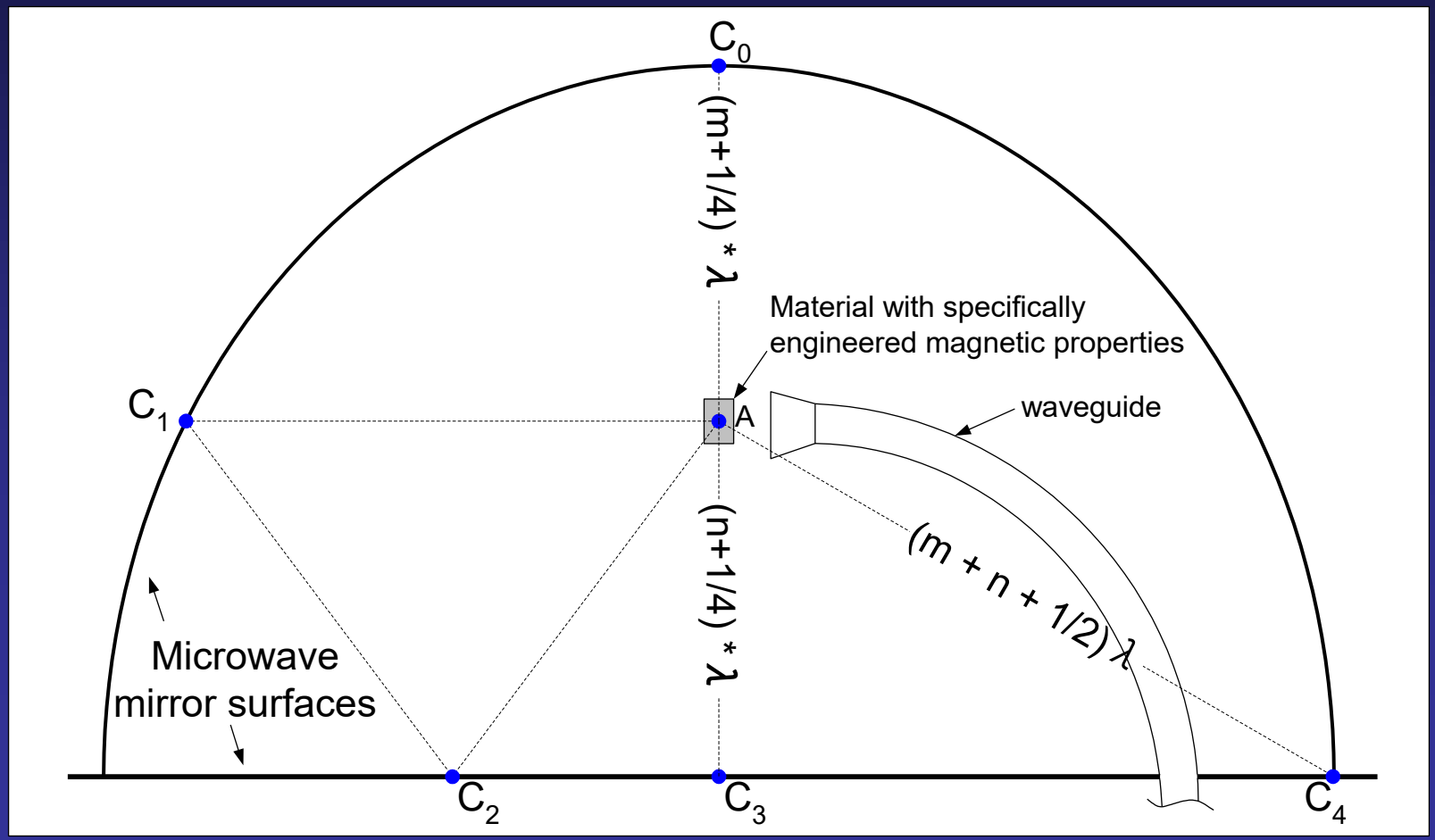
A semi-ellipsoid resonant cavity

This is a semi-ellipsoid with m=n: m=0 and n=0, m=1/2 and n=1/2, etc..



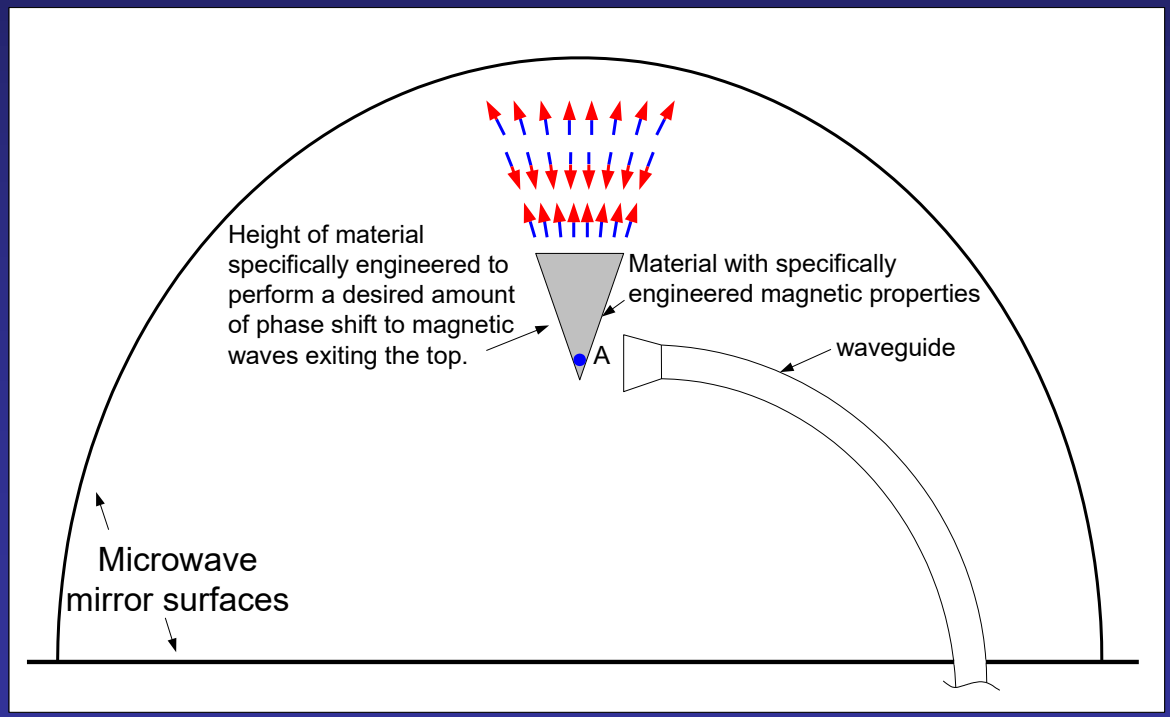
A semi-ellipsoid resonant cavity

- The magnetic material can get its initial stimulation using microwaves through a circular waveguide.
- Power can be extracted from the magnetic material using the same circular waveguide.



A semi-ellipsoid resonant cavity

- As discussed earlier, this type of resonant cavity can be used to generate magnetic waves up and down, i.e. in the direction usually considered the “null” direction for radiation of transverse electromagnetic waves.
- We have seen some applications that used a wedge shaped target material.
- This may have been done to add a magnetic “delay line” that utilizes spinwaves within the magnetic material to perform a 180 degree phase shift to the magnetic waves before exiting through the top of the cavity.
- Alternatively, the top of the wedge might be used to sample external magnetic waves and phase shift them before they converge at the focal point.



A semi-ellipsoid resonant cavity

- Referring to examples linked to at bottom, the vertically oriented conical guide might be some type of material to direct magnetic waves downward while allowing transverse electromagnetic waves to pass through to the ellipsoid walls.
- It is this author's contention that no special atomic element is required.
- If the cavity is large enough then self sustained resonance should be possible with "Earthly" magnetic materials; however, materials exhibiting the most desired effects have been purposely kept off the commercial market available to DIY experimenters.
- High relative permeability magnetic materials that work at UHF and microwave frequencies are sold for military applications and it is hard to get their vendors to release specifications.

https://www.google.com/search?q=lazar+reactor&tbm=isch

https://duckduckgo.com/?q=lazar+reactor&t=ffsb&iax=1&ia=images

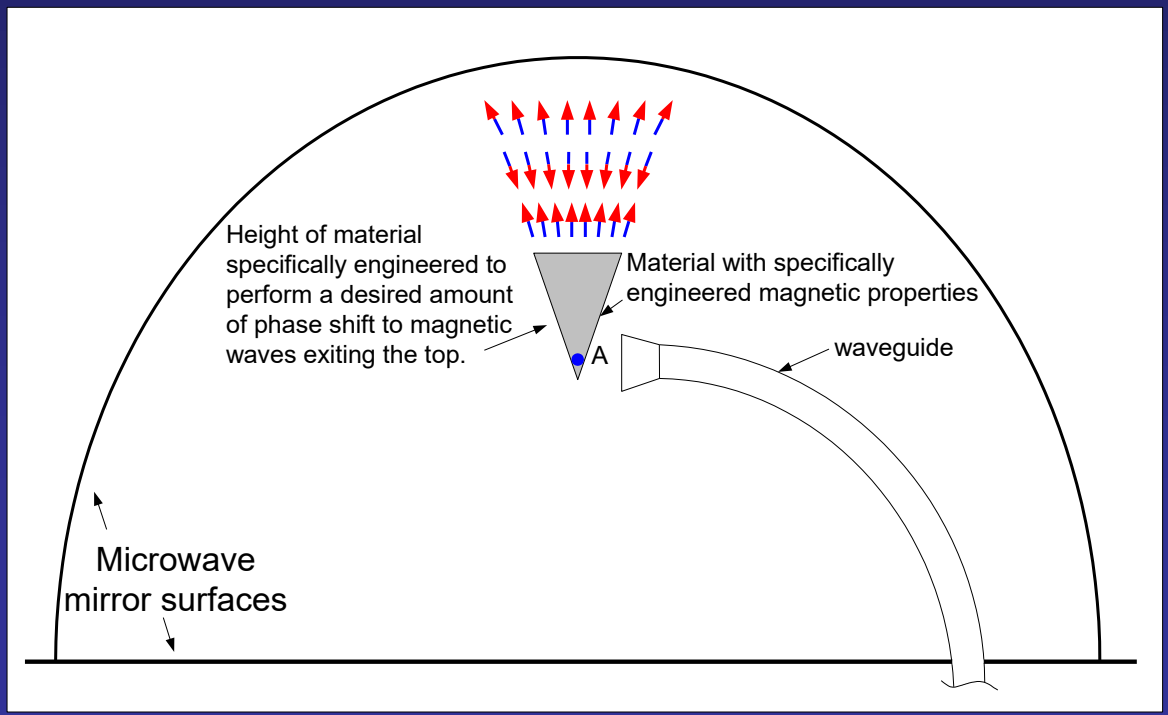
DIY experimenter recommendations:

- If you want to make your own magnetic materials, manganese based magnets might work, examples, Mn-Al-C, Bismanol or Silmanol.
- Before they were taken off the market, manganese based magnets showed anomalous amplification properties in patents US4290070A and GB2075755A.
- Mn-Al-C magnets can have high saturation magnetization and low coercivity which may be desirable characteristics for this application.
- Examples of Mn-Al-C based magnets:
  - US4051706A
  - US4404046
  - US4342608
  - US4443276
  - US4023991
  - US4133703
  - US3976519
  - US3661567
  - US4042429
  - US3730784
  - US3116181
  - US3194654
  - US5769971
  - US4623404
  - US3591369
  - US20120090740

After thoughts:

- Referring to the diagram below and referring to the description of a spinwave (magnon) laser at the Vasant Corporation website, the RF signal from the circular waveguide may stimulate the material in the real permeability (u') direction to magnetize the material back and forth in a horizontal plane so as to maintain emissions from coherent precessional motions of electrons in the vertical direction, i.e. the material's imaginary permeability direction (u").
- A typical laser uses 2 opposing mirrors whereas this form of magnon laser uses the reflecting surfaces of the semi-ellipsoid.

http://www.vasantcorporation.com/about-spinwave-lasers.php



Suggested design changes:

Fixing the precessing/counter-precessing design problem:

- On slide 49 is proposed one design that can cause electron spins to precess and counter-precess as a way to make magnetic waves that can propagate through free space and apply magnetic forces on other electrons' magnetic dipoles.
- Although not specifically stated previously in this presentation, this special form of magnetic waves is possibly what causes the force we call gravity.
- This is described in detail in the 3 part youtube video about where gravity comes from:

https://www.youtube.com/watch?v=lB5qG5wHJ_s

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

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

- But there is a design problem with the design of slide 70.
- To make precessing and counter-precessing electrons requires their axes of precession (of real permeability) to be pointing in opposite directions.
- But EM waves at GHz frequencies from a waveguide would tend to magnetize a "normal" magnetic material with all uncompensated electrons oriented a similar direction rather than 50% of them oriented the opposite direction .

Suggested design changes *continued:*

Fixing the precessing/counterprecessing design *continued*:

- In the design that Bob Lazar was told or concluded was a matter-antimatter reactor, it also includes an inverted truncated conical (conical frustum) resonant cavity fed from the side by a waveguide .
- This was omitted from the diagram on slide 70.
- But maybe this shape and material of the conical frustum is important in magnetizing different portions of the wedge shaped material in opposite directions so as to allow for precessing and counter-precessing electrons.
- And/or possibly the wedge shape is constructed of layers of magnetic materials that somehow get magnetized in opposite orientations in response to an externally applied toggling magnetic field.
- This author can't figure this all out right now so I'll set it on the back burner and continue this presentation with other design thoughts and suggestions while they are on my mind.

Suggested design changes *continued:*

2 ways to defy gravity:

- To understand the following text, it is necessary to pay close attention to all of the 3 part youtube video of slide 74.
- Method 1 - Unsynchronized magnetic waves:

  In a correctly designed ellipsoid or semi-ellipsoid resonant with a correctly designed magnetic material at one focal point, it should be possible to create sustained RF resonance and to extract some RF energy from the device.

  To the extent that some energy is extracted, the matter of the magnetic material should lose energy and to the extend this happens, the magnetic waves from all the compensated electron spins of the material should slow down in their precessional motions relative to all external matter.

  This causes them to get out of sync with external matter and to the extent this happens the gravitational pull of external matter will become less.

- Method 2 - Synchronized and out of phase magnetic waves.

  Same as above initially but with the addition of some method to detect the phase difference that develops relative external matter.

  Then control and maintain the desired phase shift to cause a push rather than a pull.

Suggested design changes *continued:*

Available magnetic materials:

- There are COTS (Commercial Off The Shelf) magnetic materials and then there are magnetic materials that, because to their high performance characteristics, are kept off the open market due to concerns for things like national security.
- Within the COTS category:
    - There has been much research into magnetic thin films demonstrating there ability to work with high levels of real permeability in the GHz range.
    - This author has found no samples of bulk magnetic materials able to work well with the real permeability at a useful level in the GHz.

- Options for using COTS materials in a resonant cavity of a manageable size:
    - Use only thin films, either a single small loop or a flat piece at various orientations.
    - Use a thicker bulkier material but make the cavity resonant only to the electron precession frequency of the imaginary permeability rather than making the resonant cavity large enough for the lower frequency limits that the real permeability direction can toggle back and forth.

Suggested design changes *continued:*

Resolving design issues:

- The largest portion of this presentation is about interfacing to the RF energy radiated from the toggling of the direction of magnetization for *u*' the real axis of magnetic permeability of a magnetic material.
- But this requires too large of a resonant cavity for COTS magnetic materials in order for it to theoretically succeed.
- This also may require complicated "fail safe" design considerations to prevent a run away condition from ever occurring.

These problems might be avoided with the following design changes:

- Extract RF energy radiated from electron precessions of the magnetic materials' axis of imaginary permeability, *u*".
- Size the resonant cavity for the higher frequency electron precession frequency instead of the frequency at which the axis of real permeability toggles back and forth.
- Then toggle the axis of real permeability at a lower frequency relative to the cavity size such that it could never develop a run away resonant condition.

Suggested design changes *continued:*

Radiating rather than absorbing energy:

- When extracting RF energy at the electron precession frequency, it is important to insure the magnetic material radiates rather than absorbs RF energy at this frequency.
- To radiate RF energy, the electron spins must start in a higher energy state and drop to a lower energy state.
- In this case, the difference in energy states is radiated away as RF energy.
- Study the information at these links: "spin superradiance" and "spin wave lasers" to understand this process better.
- If designed incorrectly the magnetic material absorbs more energy than it radiates and so the magnetic material gets hot and this will permanently damage the magnetic material.
- If designed correctly, the magnetic material radiates more energy than it absorbs and this causes the material to get cold and to manifest gravity modification effects.
- It may or may not be a problem if the strength of the toggle signal is enough to force spin flips rather than just setting the initial metastable state condition.
- It might be better if either an external stimulus at the electron precession frequency can stimulate the spin flips or if the ringing that remains in the cavity from the previous coherent burst can stimulate the spin flips.

Suggested design changes *continued:*

Regulating output power:

- Rather than running the “toggle” frequency continuously, it can be pulsed On and Off at a low frequency with a variable duty cycle.
- For example, pulse a KHz or MHz toggle frequency On and OFF at around 5Hz to 10Hz and with a duty cycle from 0% to 50%, and even here some fail safe mechanisms should be built into the control circuitry so it doesn’t fail with the toggling signal continuously On.
- With each toggle, the goal is to extract some of the RF energy bursts as the electrons precess and drop from “aligned against” to “aligned with” the magnetic field of the KHz or MHz signal.
- If you have ever been in an MRI machine, this is not the same but slightly similar to how it works in pulses.
- With an MRI machine, the RF energy extracted is a portion of the RF energy absorbed by the protons when they are radiated with and made to precess at a specific resonant precession frequency as determined by a strong static magnetic field.
- With a correctly designed spin wave laser, the toggle frequency signal is not absorbed but only acts to establish the “static” magnetic field in one direction and then the opposite direction, toggling back and forth. It sets the conditions so that the electrons are ready to drop to a lower energy spin state.
- The spin wave laser can be pulsed on rather than run continuously.

Suggested design changes *continued:*

Regulating output power *continued*:

- When extracting RF energy at the electron precession frequency, if this is done successfully, this should cause the electrons of the magnetic material to lose angular momentum very slightly.
- To the extent that they do, they will have less electric charge as well.
- This can cause a voltage difference in potential between the magnetic material and external circuits.
- The antenna and coils closer to the magnetic material may develop voltage potential differences as well which will cause current flow to the extent that there are differences in charge potentials.
- If this potential difference occurs extremely rapidly due to some design flaw there is the possibility of damage to external circuits and test equipment in the area.
- If changes in angular momentum “leaks” out of the resonant cavity it can affect other matter in the area.
- There can be possible RADAR and communications interference and the government is very good at quickly locating sources of interference.
- It is best to think your circuitry and system design through very well.

Suggested design changes *continued:*

How to inject the toggle frequency:

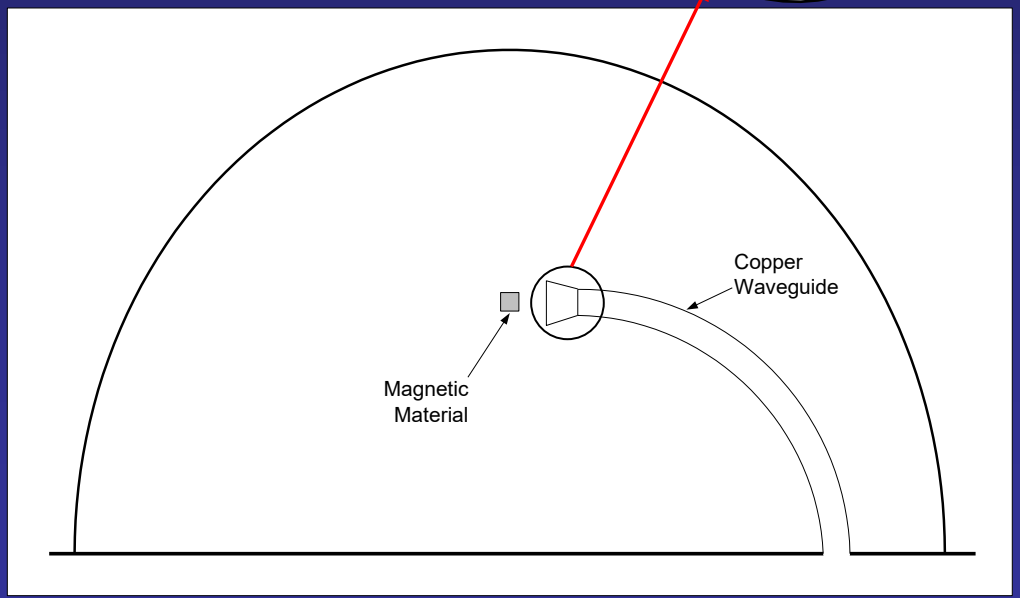
- Slide 69 is proposing the use of a magnetic material in which the toggle frequency is in the GHz frequency range with the electron precession frequency in the GHz or THz range.
- There are magnetic thin films available that can do this, but to experiment with thicker magnetic materials, the toggle frequency must be lower and so also the toggle frequency wavelength becomes much longer than the resonant cavity dimensions.
- In this case the resonant cavity can only support resonance of the electron precession frequency, not the magnetic material's lower toggle frequency.
- To send in a toggle signal, the waveguide can be morphed into a hollow copper coil and possibly a 2nd coil will be needed on the opposite side.
- At the electron precession frequency, the inter-winding capacitance should be high enough to act as a short circuit between adjacent turns and/or layers of the copper coil such that the hollow coil continues to perform as a waveguide for GHz range frequencies.
- This method will not cause magnetic waves from both precessing and counter-precessing uncompensated electron spins of a target magnetic material but it could cause magnetic waves from both precessing and counter-precessing compensated electron spins of the magnetic material to the extent that the magnetic material's matter loses the energy of the angular momentum of all the particles that make up the material.

Suggested design changes *continued:*

How to inject the toggle frequency *continued*:

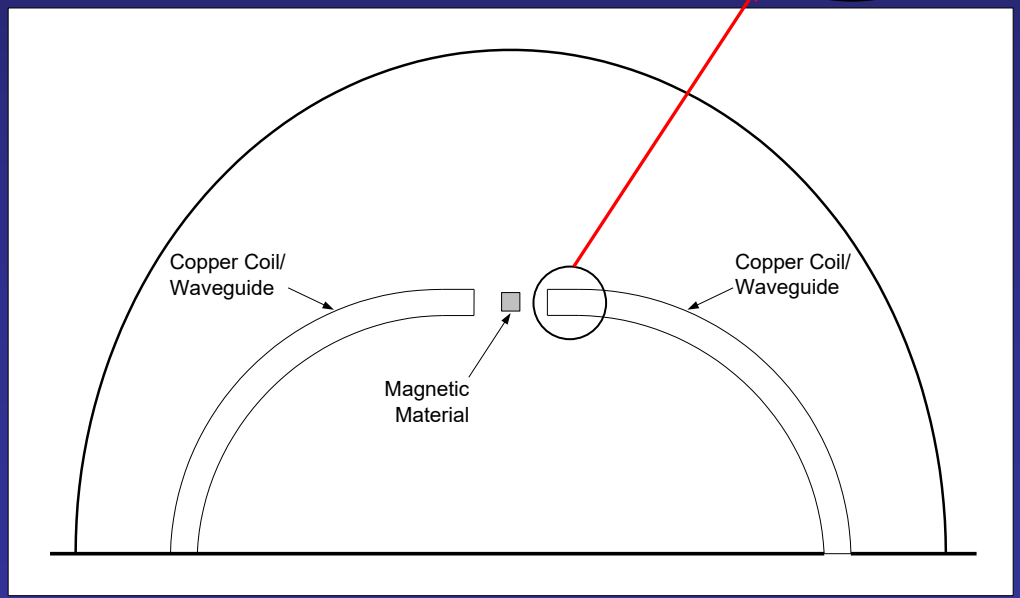
For microwave magnetic materials:

- Waveguide tubing is solid copper.
- Both GHz toggle frequency and higher electron precession frequency pass through waveguide.



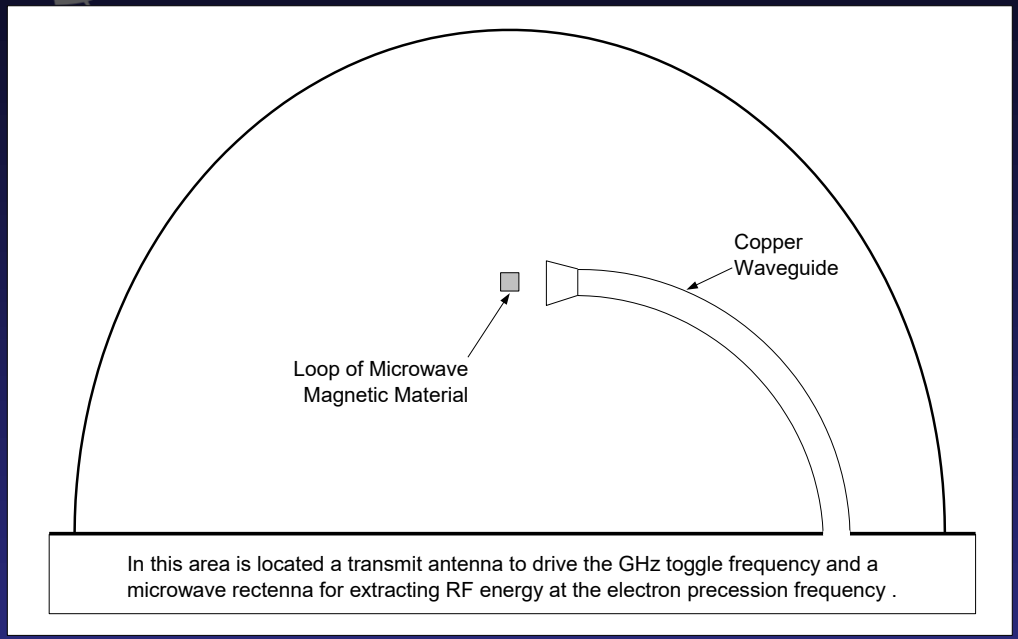
For slower magnetic materials:

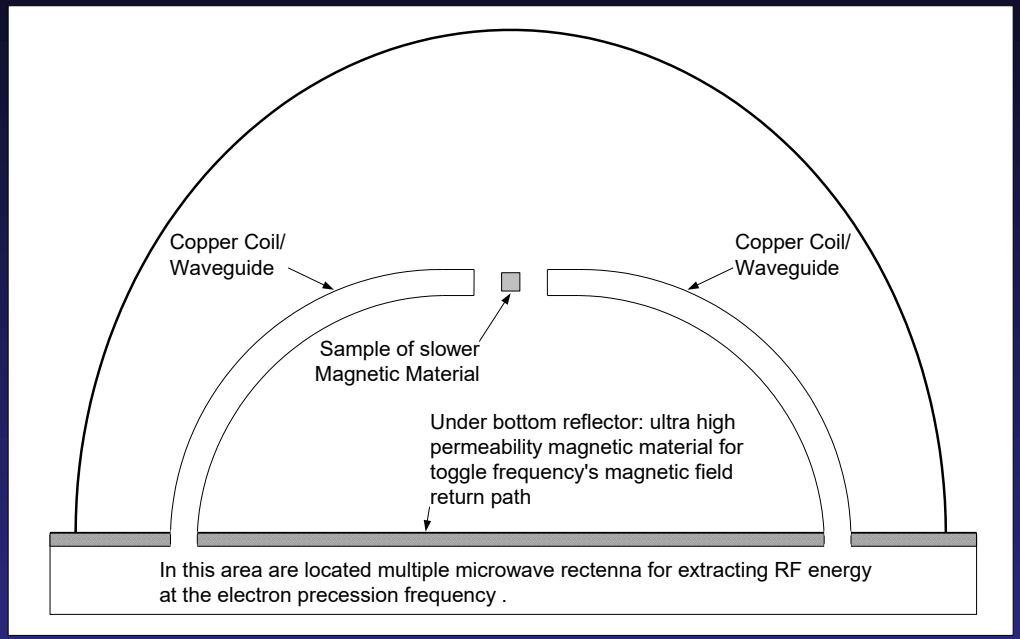
- Waveguide tubing each is made of 2 layers of flat insulated copper coil.
- Toggle frequency signal connects to the copper coils.
- Toggle frequency set to resonant frequency of the coils' inductance and inter-winding capacitance.
- Copper coils act as waveguides to the electron precession frequency.



Suggested design changes *continued:*

What's under the bottom reflector plate?





- When using microwave magnetic material, a microwave transmit antenna drives the GHz toggling magnetic field, another higher precession frequency antenna can stimulate spin flips and also a rectenna is used that is tuned to the higher electron precession frequency to extract RF energy.
- When using slower magnetic material, multiple rectenna are used and tuned to the electron precession frequency to extract RF energy.
- When using slower magnetic material, there is an ultra high permeability magnetic material used for a better magnetic field path between the 2 coils.
- The toggle frequency coils can be driven from off board circuitry.

Suggested design changes *continued:*

Soft versus Hard magnetic material

- In this presentation's originally proposed idea, energy would be extracted at the toggle frequency and this proposed idea should work with soft magnetic materials or with slightly hard magnetic materials that have high magnetization and only moderate coercivity.
- But to extract RF energy at the electron precession frequency with the device working as a spin wave laser then a purely soft magnetic material may not work.
- It becomes a necessity for the magnetic material to be at least a little hard so that the electron spins can be put into a metastable state and then transition to a lower spin state in a coherent manner.
- If the magnetic material is too hard this might require all of the reflected RF energy and then some to overcome the material's coercivity so as to magnetize the material back and forth at the toggle frequency.
- Then again, that shouldn't matter if the strength of the toggle signal just sets the conditions and then a separate stimulus at the electron precession frequency is used to stimulate macroscopic tunneling of the spins to relax to the "aligned with" direction.

Suggested design changes *continued:*

Magnetic material's efficiency:

- Assuming a particular magnetic material has already been designed to minimize hysterisis loss and Eddy current loss, there are additional design goals possible that are related to increasing the magnetic materials efficiency at coupling its radiated RF energy to free space.
- With a magloop antenna, for example, coupling to both the permeability and permittivity coefficients of free space matters. More capacitive surface area on a magloop antenna enables it to couple more energy to the permittivity of free space at the same time the loop inductance couples to the permeability of free space.
- Similarly, with a magnetic material, not only its magnetic permeability characteristics but also its permittivity characteristics may be important when it comes to how much RF energy it can sent out and away from itself rather than having more of it stay in the near field.

Suggested design changes *continued:*

Magnetic material's efficiency *continued*:

- In other words, it is important to match the impedance of free space.

  Reference: https://en.wikipedia.org/wiki/Impedance_of_free_space
- There are formulas for antenna efficiency, like used in this online calculator:

  https://www.66pacific.com/calculators/small-transmitting-loop-antenna-calculator.aspx
- Similar considerations may be needed regarding a magnetic material's ability to radiate the maximum amount of RF energy and this may be determined by a magnetic material's magnetoelectric and magnetodielectric characteristics.

  References: https://en.wikipedia.org/wiki/Magnetoelectric_effect

  https://en.wiktionary.org/wiki/magnetodielectric

Suggested design changes *continued:*

Magnetic material's efficiency *continued*:

Two examples:

- If two capacitive plates separated by a dielectric are charged with a voltage and then quickly separated more or quickly brought closer together to some degree then the voltage on the plates will jump up or down and this radiates an E field component through the permittivity characteristic of free space.
- Similarly if a magnetic material is designed such that electric charges are held within the material and reversing the material's direction of magnetization causes some dielectric portion of the material to change in thickness between these charges then this could radiate an E field component along with the magnetic field component.

- Water as a dielectric is made of H_2O molecules and these constitute electric dipoles. When used as a dielectric between 2 plates these electric dipoles rotate between electric charges and hold charge by their rotational positions such that water has a dielectric constant of about 80.
- Similarly, within a magnetic material, if a dielectric material included or consisted of molecules that were electric dipoles and if reversing a material's direction of magnetization could force these electric dipoles to rotate to some degree then this would radiate an E field component along with the radiated changes in magnetic field orientation.

Suggested design changes *continued:*

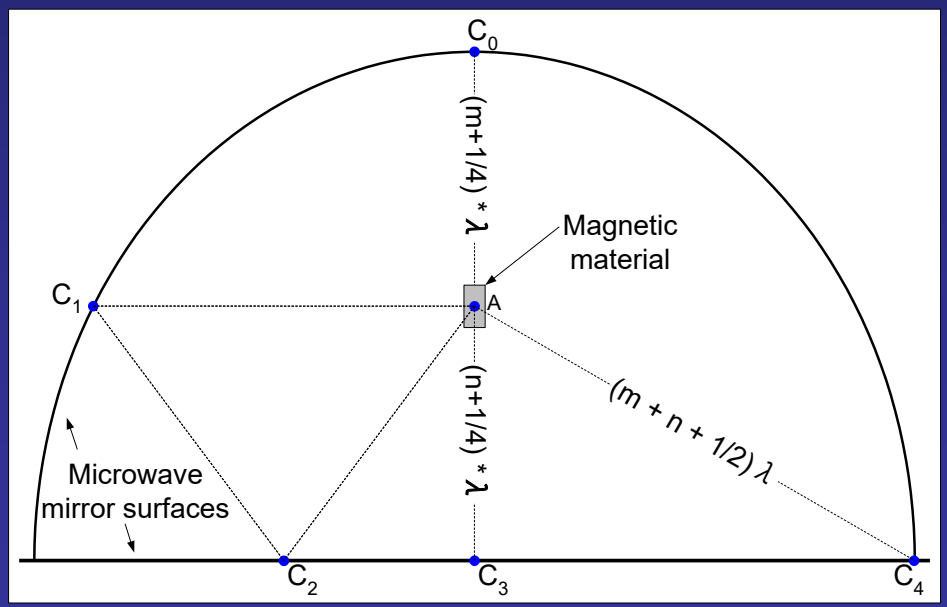
When designing and constructing a semi-ellipsoid cavity:

- It must support resonance at the electron precession frequency regardless of whether or not it can support resonance of the toggle frequency.
- If the electron precession frequency can go as high as the THz range then the tolerance of the semi-ellipsoid shape must be tight.
- For example, if the electron precession wavelength is 1mm then all reflections from a target magnetic material, off the cavity walls and back to the magnetic material must stay in phase to within +/-10% of 1mm as they all converge back on the magnetic material.
- If the semi-ellipsoid shape is too far out of tolerance then some areas of reflections with be close to 180 degrees out of phase with the reflections from other areas and so as they all converge back on the magnetic material they will cancel each other out due to the phase differences.

A semi-ellipsoid resonant cavity

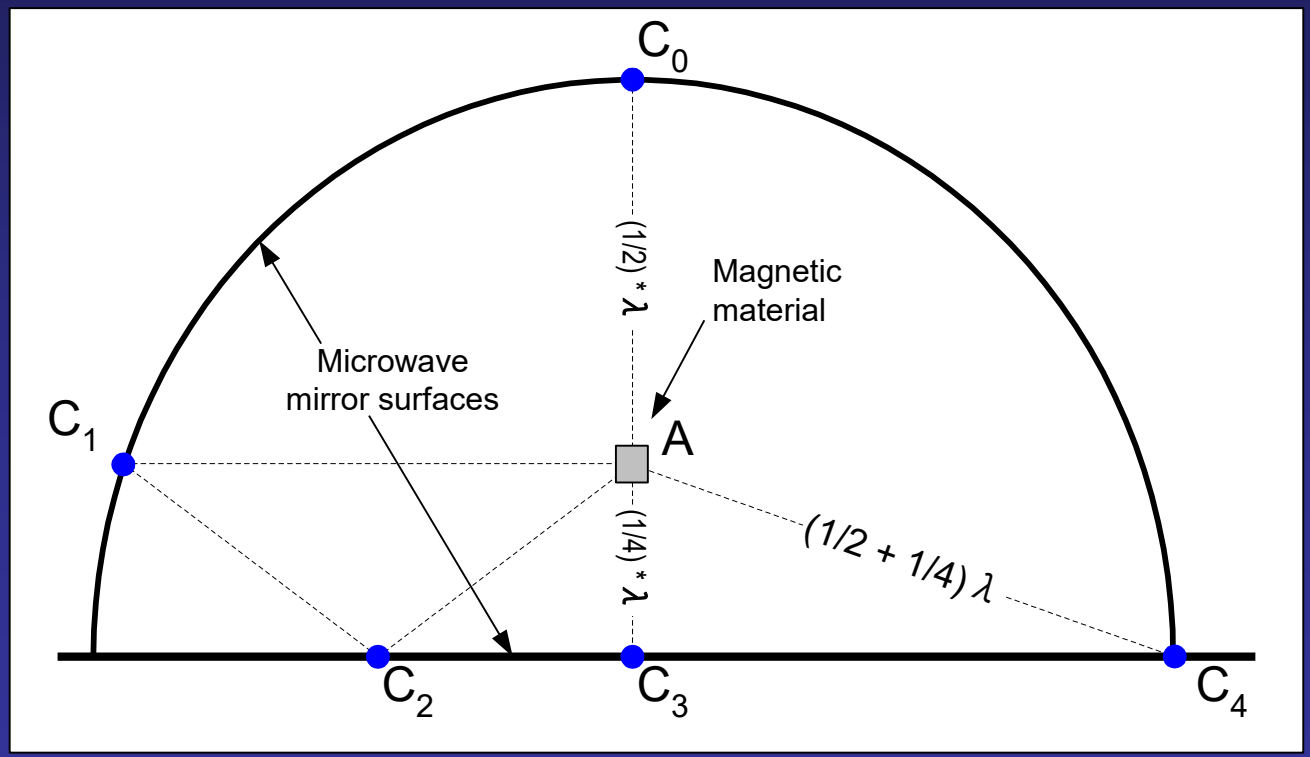
Referring to the diagram from slide 65,

- When the reflections bounce directly back to the foci A from the top or bottom they have a single 180 degree phase shift from the reflecting surface and another 180 degree phase shift from the round trip delay of λ/2.
- When reflecting off 2 surfaces the reflection needs to have an additional λ/2 round trip delay.
- Except! Each bounce off a surface reverses the current flow direction in the reflective surface but the magnetic field component is still oriented the same direction, so the number of bounces doesn't matter!
- After factoring in the different propagation delays, the reflected returns after just a single reflection end up being 180 out of phase with returns off 2 surfaces and so they cancel each other out.



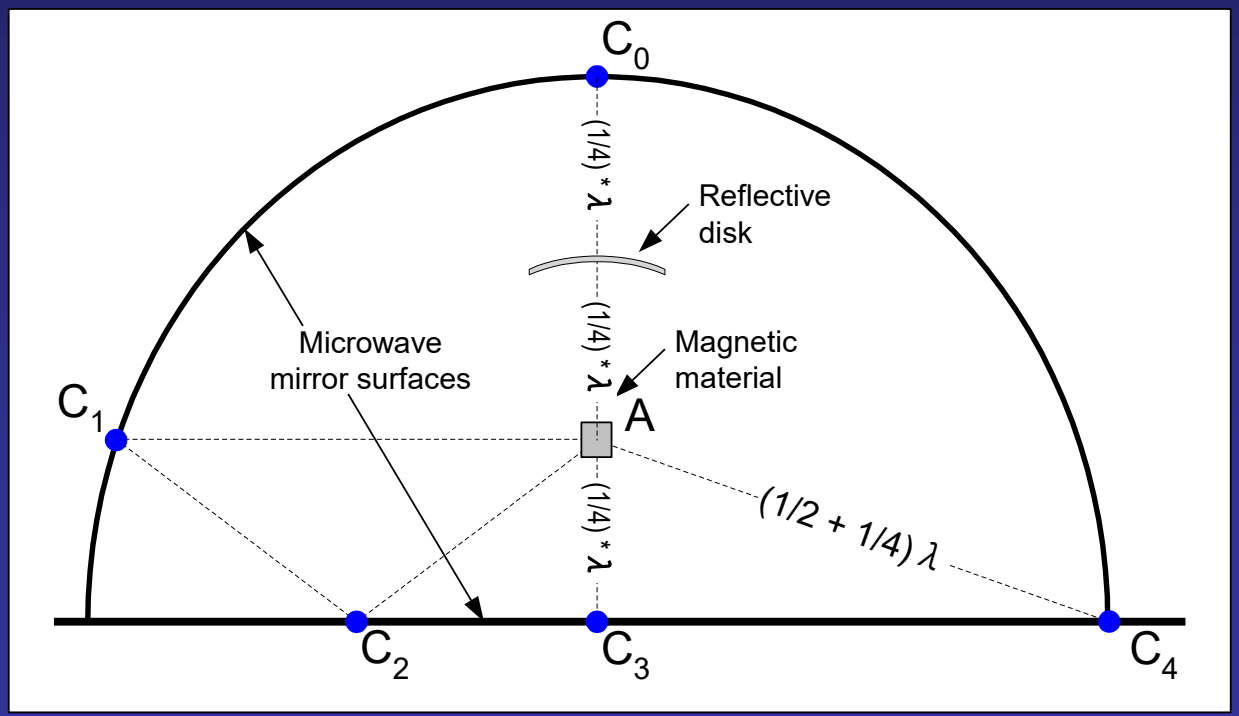
A semi-ellipsoid resonant cavity

- However, the single reflections off the top and bottom can cancel each other out by making one of them delayed by a λ/4 delay while the other reflection is delayed by λ/2.
- After a round trip delay for each, the reflection directly off the top will be 180 degrees out of phase with the reflection directly off the bottom.



A semi-ellipsoid resonant cavity

- In this design, 2 bounce reflections and 1 bounce reflections directly off the bottom will arrive back in phase but 1 bounce off the top will be out of phase.
- A reflective object can be placed λ/4 above the magnetic material to block 1 bounce reflection off the top of the semi-ellipsoid surface.
- The reflection off the reflective disk will have the required phase shift.



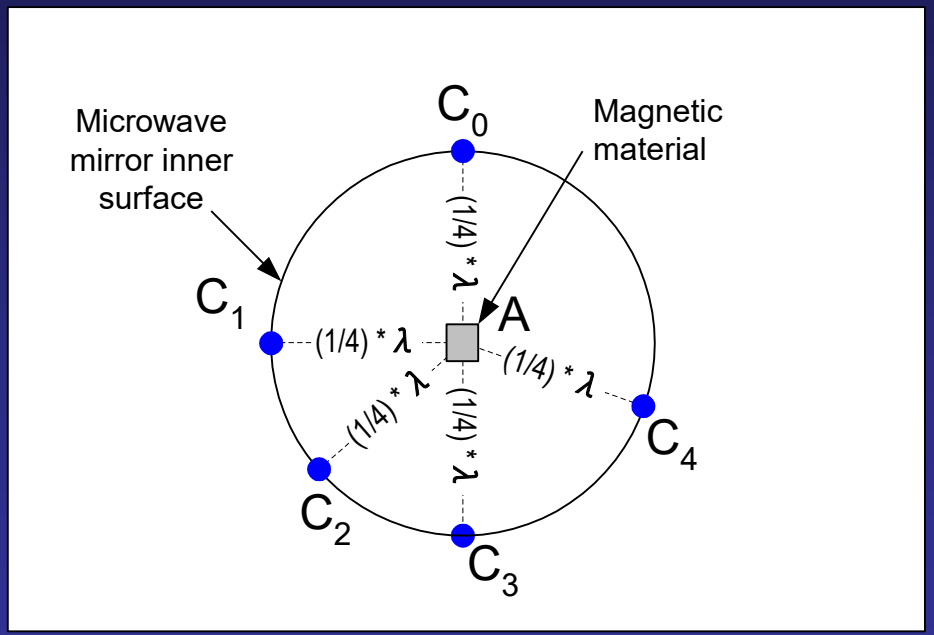
A semi-ellipsoid resonant cavity

Things that still hurt my head:

- The toggle magnetic field needs to be oriented vertically to get the best resonant feedback from the inner surface of the semi-ellipsoid but the electron precessions need to be in the a vertical plane as well to create gravity waves.
- Something would need to skew or rotate the planes of electron precessions into a vertical orientation before they exit the top or bottom as gravity waves.
- Readers must study this author's Youtube videos about gravity to understand the context of the above statement.
- Otherwise, perhaps…. simply by extracting power from a working device all the precessions of all the paired electrons within the magnetic material would slow down such that at some point they become 180 out of phase with external gravity waves and then at that point further power extraction could be controlled so as to maintain the 180 degree phase shift.
- This would require some means of measuring and comparing the phase of internal and external gravity waves.
- The Bob Lazar design includes an inverted truncated conical (conical frustum) resonant cavity fed from the side by a waveguide. It seems this would contain all microwave resonance so only a toggle frequency could reflect off the semi-ellipsoid cavity. But then the toggle signal would be blocked from reaching the magnetic material by the conical frustum unless the conical frustum was some non-conductive material, like a ferrite reflector material maybe.

A semi-ellipsoid resonant cavity

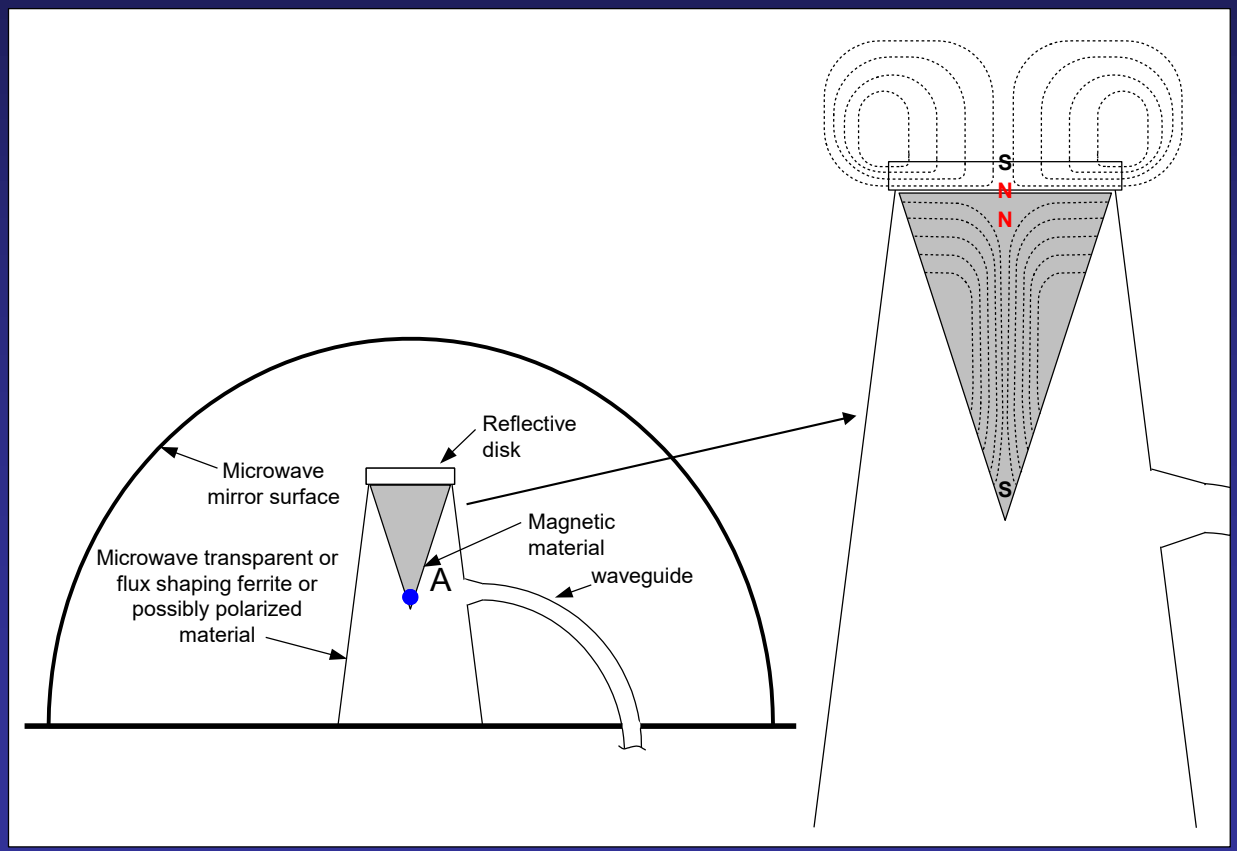
- Its seems to me that a spherical resonant cavity with the magnetic material at the center would remove the 2 bounce dilemma but there must be enough advantages to a semi-elliptical cavity that it was used in the design that Bob Lazar was researching.
- There may be other advantages besides just being able to lay flat on a lab table and having an easily removable top cover.



- Update: 03/04/2021: If experimenting in the MHz range, try the design included in the magnetic permeability presentation using newengland copperworks copper sphere, water filled and use magnetic materials coated or impregnated with very heavy elements. However, some frequencies involved might have a ¼ wavelength as small as the thickness of a sheet of paper between the material and a reflecting coil around the material.

A semi-ellipsoid resonant cavity

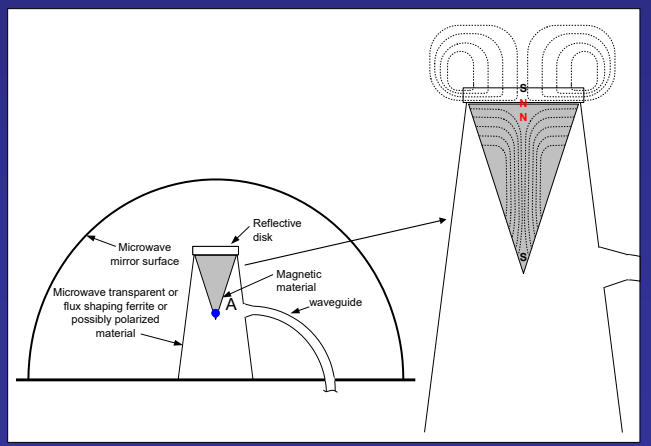
- I realized that with a conductive disk above a wedge shaped magnetic material, the wedge shaped magnetic material would have flux in the horizontal plane in its upper part and this made me realize that electron precession at the bottom portion would be in a horizontal plane but would split into precessing and counter-precessing uncompensated electrons towards the 2 upper corners of the wedge. So the wedge shape of the magnetic material could create the needed precessing and counter-precessing electrons.



A semi-ellipsoid resonant cavity

Things about the previous slide that hurt my head:

- The flux directions shown only exist 2 times per toggle frequency waveform when the magnetic field in the wedge is expanding.
- When the expansion stops the cover disk stops having current or an opposing magnetic field to push flat the flux in the wedge.
- When the magnetic field in the wedge contracts then the cover disk has a reverse current flow and reverse magnetic field that aligns with and pulls on the shrinking field from the wedge.
- During this time there would not be horizontal flux in the wedge.
- I have to consider if and just how far back I got totaling off track.
- Additionally, the focal point always has electron precessions in the horizontal plane but resonance is not reinforced by the semi-ellipsoid reflections except for precessing electrons in a vertical plane.
- Something would need to rotate the polarization (of the higher frequencies only) a total of 90 degrees between the focal point and the semi-ellipsoid and with low losses.
- Maybe the cone is vertically polarized and electron precession frequencies stay inside the cone.

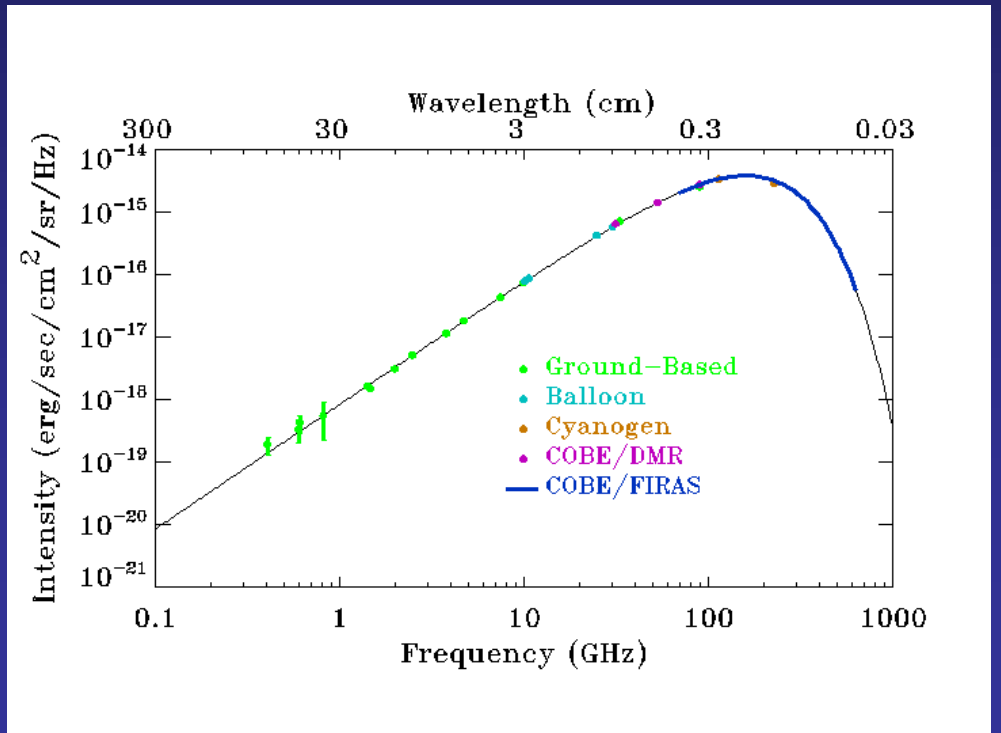


Last thoughts:

- Maybe a disk of diamagnetic material would do better at forcing the flux in the wedge into the horizontal plane during more parts of the toggle frequency waveform.
- Maybe Bob Lazar's wedge was as dense as element 115 because laser cooling was used to merge layer by layer using Bose-Einstein condensation such that the end material had multiple atomic lattices interwoven with each other.
- I believe John Hutchison has demonstrated intermixing of atomic lattices also.
- At millimeter wavelengths the semi-ellipsoid and portions of the bottom plate could possibly reflect a decent amount of correctly polarized RF back to the focal point.
- The bottom plate area may need to include an antenna to initiate oscillations at the toggle frequency. I have not yet figured out how the thing could be self-starting when the semi-ellipsoid cover is placed on it and at the same time use a wedge magnetic material with any amount of hysteresis.

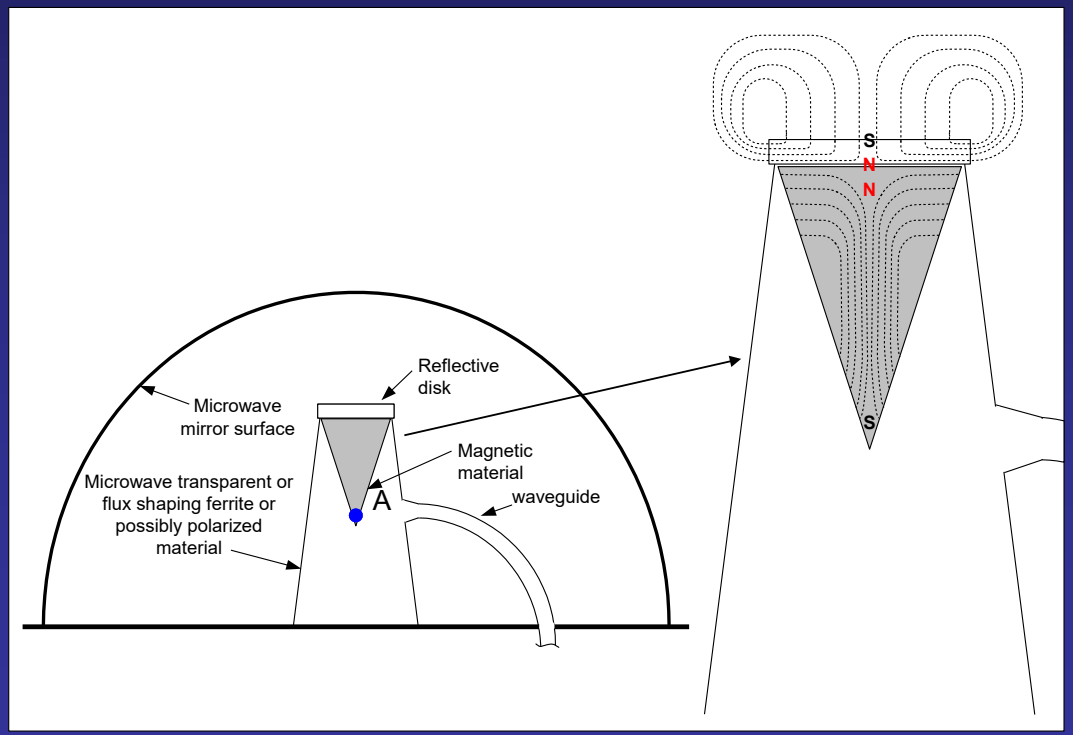
New thoughts as of Jan 8th 2019:

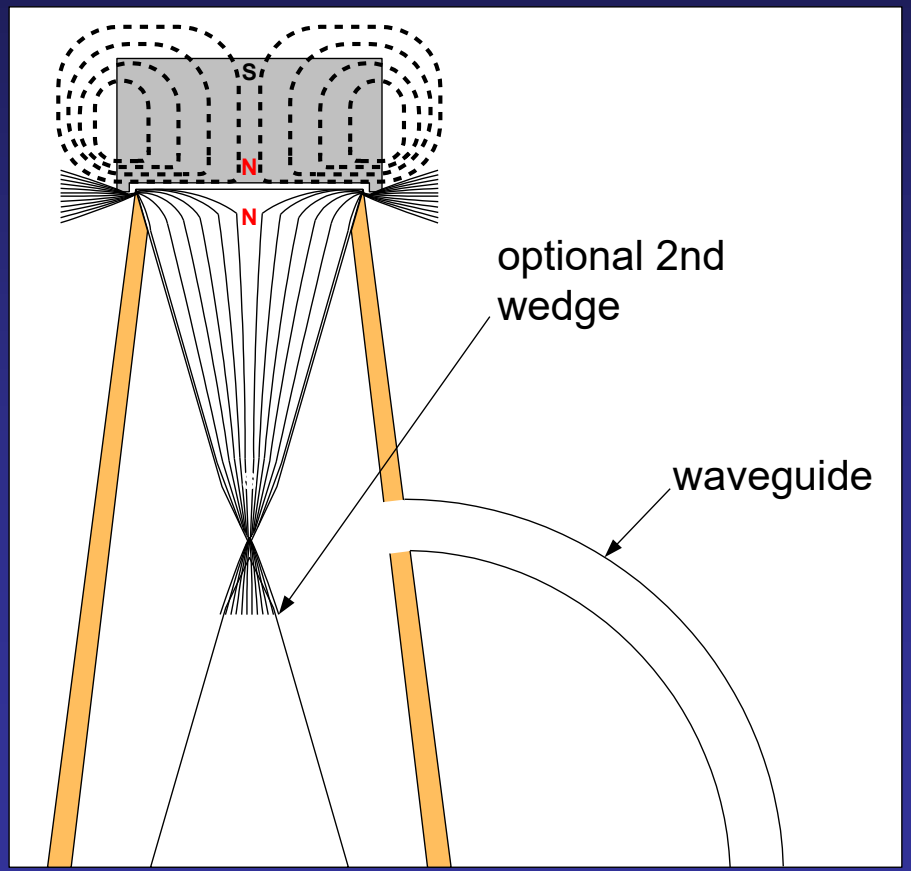
- If gravity is caused by precessing and counter-precessing orbital electrons then it would help to determine the most common precession frequency for all atoms of planet Earth.
- In as much as there is a finite distance that separates paired orbital electrons, their Larmor frequency emissions from precession and counter-precession during orbital motions might not be 100% compensating between them.
- A very small portion of emissions could still radiate and might still be detectable. It might be misinterpreted as what we call Cosmic Microwave Background Radiation left over from the Big Bang.
- There is the possibility it is being generated in real time throughout the universe.
- So then to get an idea of the frequencies involved and which are most common you could look at a graph of these emissions, like this ->
- It looks like the most common frequencies are around 150GHz.



New thoughts as of Jan 8th 2019:

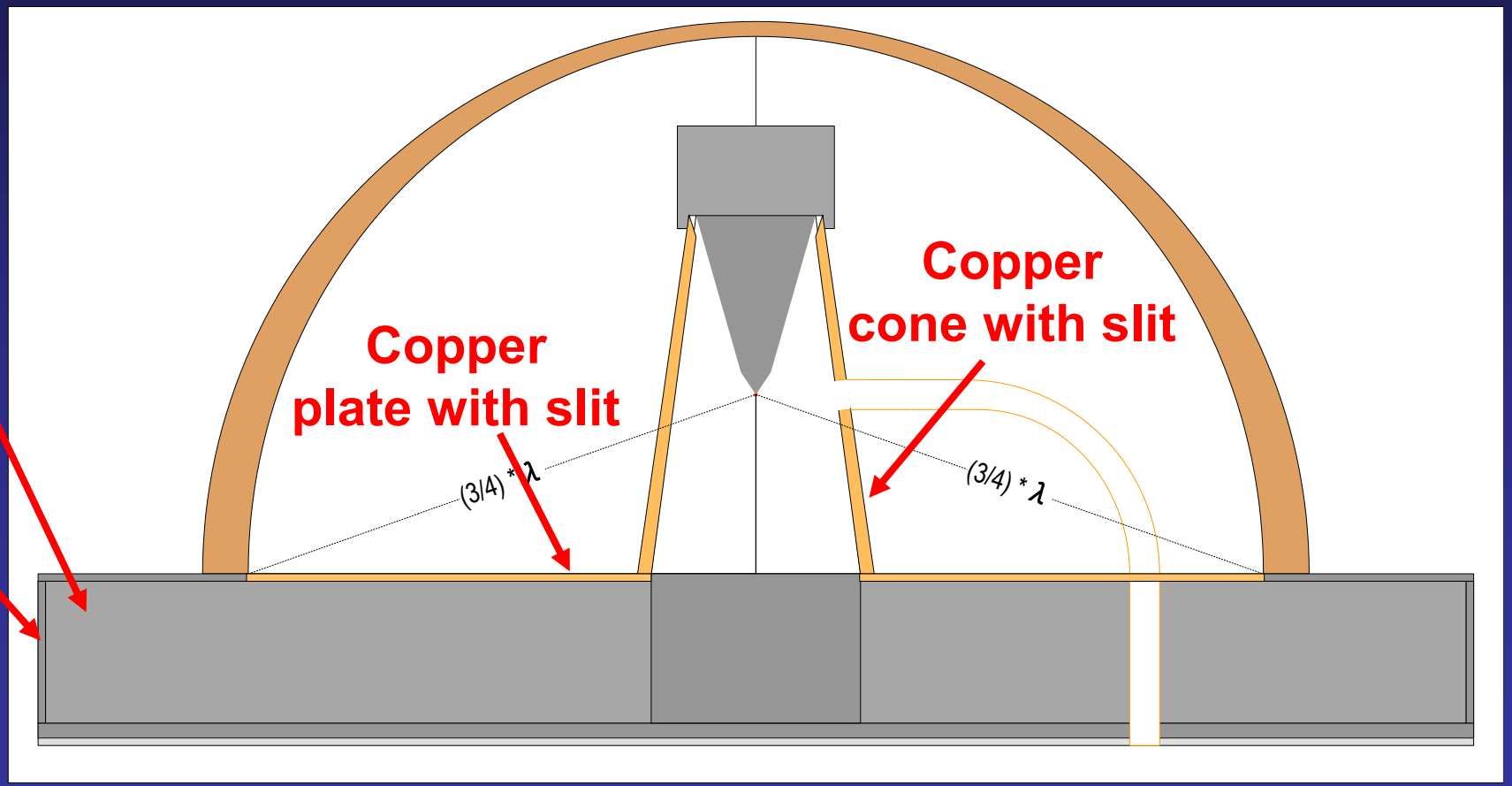
- On slide 95 I had proposed a spin superradiance device design in which a wedge of magnetic material had flux more or less evenly distributed along its left and right sides.
- But to get precession frequencies to go as high as 150GHz it might be necessary to have areas of higher flux density like the diagram below on the right.
- The stand that holds the wedge would be made of thick copper with a slit down the side so as to act as a flux compressor.



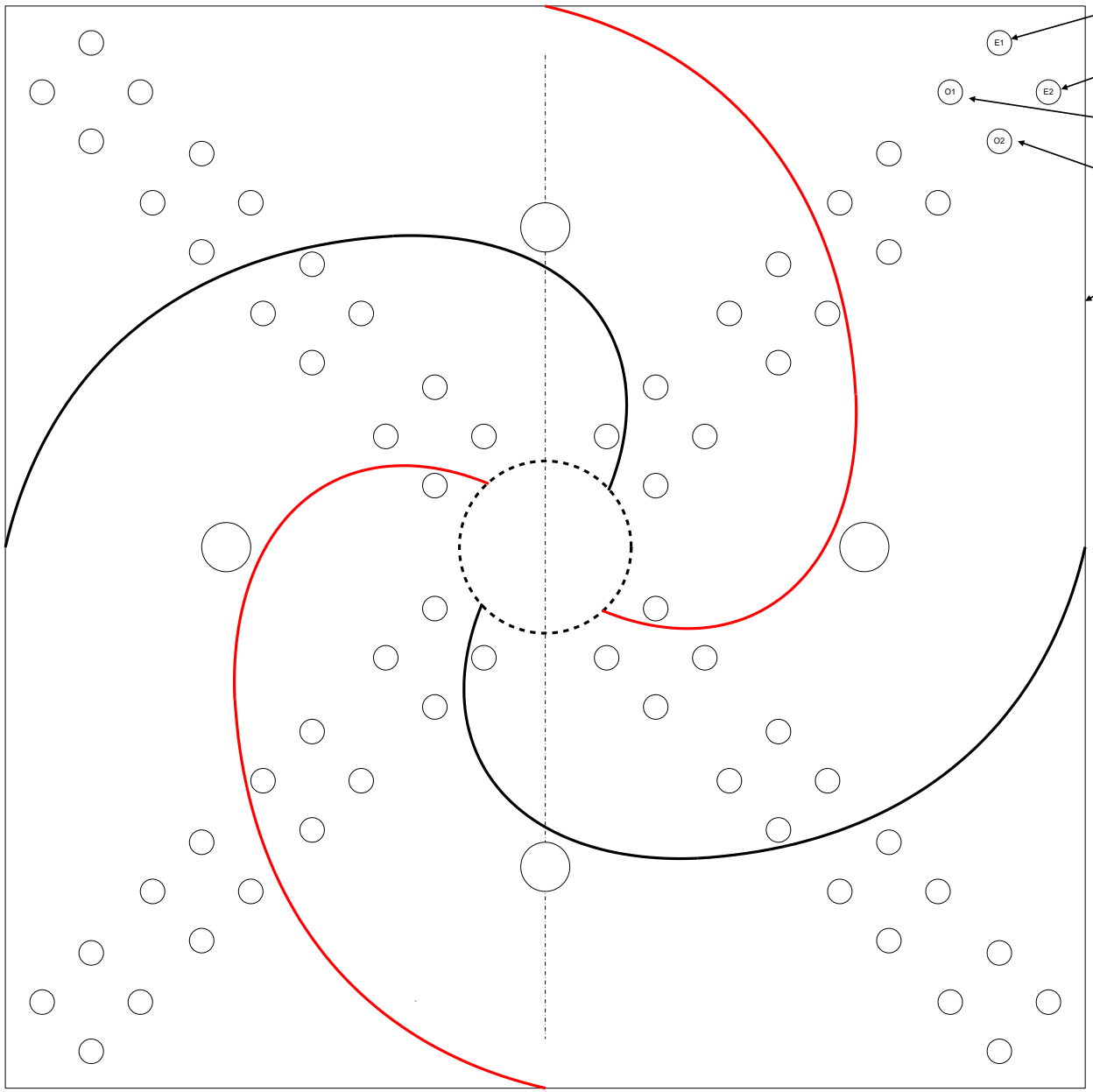


New thoughts as of Jan 8th 2019:

- The source of the magnetic flux to get compressed could be an AC electromagnet built into the base.
- It can be designed as a high Q PCB inductive-capacitive resonator with power taps towards its 4 corners.
- The LC resonator can be built up of stacks of multilayer printed circuit boards.



New thoughts as of Jan 8th 2019:



Power connects to even layers of 1st and odd PCBs in stack

Power connects to even layers of next flipped and every other PCB

Return connects to odd layers of 1st and odd PCBs in stack

Return connects to odd layers of next flipped and every other PCB

Odd and even layers (Blk/Red) are solid copper layers with spiral gaps etched in them.

	.0030 for post pressed pregreg 1080
	.0007 for 1/2oz copper
	.0030 for post pressed pregreg 1080
	.0007 for 1/2oz copper
total:	.0074 inch thick

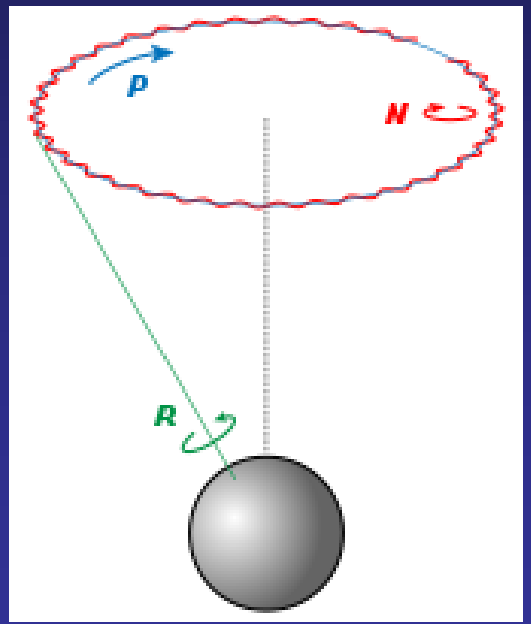
New thoughts as of Aug 23, 2020:

- Over the last few months I have been reviewing technical data provided by Bob Lazar in Youtube videos.
- I've been trying to see more correlations between his assertions and my own theories about gravity and inertia.
- Here: https://youtu.be/CBnxI5uhAaQ?t=633 Bob calls "Gravity B" the form of gravity that we are all use to, that holds us down to planet Earth for example.
- Bob says the nuclear strong force is the same as what he calls "Gravity A"
- Although he doesn't explicitly say it, it is my contention that the long range emission/radiation and reception of Gravity A waves between quarks of all protons and neutrons in the universe causes all of them to have inertia.
- In my understanding of things Gravity B is a unique form of electromagnetic waves in the gigahertz and possibly terahertz range that comes from the motions of orbital electrons.
- In my understanding of things Gravity A is a unique form of electromagnetic waves from the motions of quarks in the nucleus of atoms. In my understanding of things, this would have to be in the frequency range of gamma rays.
- So my struggle is to understand Bob's contention that something about very heavy elements allows the Gravity A wave to be accessible and amplified.

How to access Bob's Gravity A waves

(thinking out loud but certainly not sure yet)

- There is a known interaction between spin flips of orbital electrons and spin flips of nuclei particles that allows a nuclei particle to get its spin orientation flipped by flipping the spin of the orbital electron.
- What would be the classical electro-dynamic explanation of this interaction?
- Throwing out ideas: As orbital electrons precess they may also have a nutation: https://en.wikipedia.org/wiki/Nutation
- The electromagnetic waves from these nutations might be the same frequencies and synchronized with the electromagnetic waves from precessing quarks of the nuclei particles, all in the gamma ray range.
- A neutron might be just a proton with an electron in a very close orbit such that the close electron would precess at extremely high frequencies.
- After all, a lonely neutron decays into a proton, electron and a gamma ray.
- I'm still lost as to how gamma ray frequency EM waves from the nucleus become more accessible in very heavy elements unless it is done via a lower frequency interaction with electrons. Like different size gears locked in sync.



From wikipedia.org

How to access Bob's Gravity A waves

(thinking out loud but certainly not sure yet, continued)

- Two early "Free Energy" devices were reported to each use a heavy element in order to get anomalous electrical power output.
- The Alfred Hubbard device was claimed to use a small amount of radium
- **https://fuel-efficient-vehicles.org/energy-news/?page_id=1164**

- The Lester Hendershot device was claimed to use a small amount of pitchblende.
- https://www.nytimes.com/1928/02/27/archives/fuelless-motor-is-a-generator-new-hendershot-device-has-enough.html
- The use of pitchblende in the Hendershot device was told to me in a slow mail packet of information decades ago and I'm not sure any internet site mentions this.
- People have assumed that something about the radioactivity was involved but per Bob Lazar's comments about heavy elements, it could be that the thing that matters is not the radioactive aspect but simply the fact that they are very heavy elements and this somehow allows access to Bob Lazar's Gravity A electromagnetic waves from the nuclei of these heavy elements.

How to access Bob's Gravity A waves

(thinking out loud but certainly not sure yet, continued)

- The following thoughts are based on the unproven theory that there are no gluons holding quarks together to form protons and neutrons.
- Instead, it is the precession and other motions of quarks that cause them to radiate and receive gamma ray frequency electromagnetic energy and it is this exchange that binds them.
- If uncompensated electron spin allows access to the magnetic and electromagnetic fields of orbital electrons then:
- Maybe the "Gravity A" signal (a.k.a. the gamma ray frequency electromagnetic waves) exchanged between quarks can become accessible when there are uncompensated quark spins.
- The big question then becomes: Are there any stable isotopes that have uncompensated quark spins or would it only be something that radioactive materials could have?
- Without knowing nuclear physics better, I would just assume that it is uncompensated quarks that make an element radioactive but maybe not.
- I need to study what causes an element's nucleus to be radioactive to see if there can be uncompensated quarks without being radioactive.
- Still, there is a big problem that gamma ray frequencies can't be amplified with microwave equipment like Bob Lazar made it sound.
- It would have to be done indirectly through some lower frequency processes that interact with the higher frequency processes.

How to access Bob's Gravity A waves

(new thoughts after a day)

- I'm still assuming all nuclei interactions are electromagnetic in nature.
- The idea of uncompensated quark spins is valid but likely not the key to accessing and amplifying gravity A waves.
- Uncompensated quark spins are possibly related to more disharmony in nuclei and radioactivity.
- Too many inventors have been able to modify gravity without using radioactive isotopes.
- It may be more important to use very heavy elements.
- Some nuclei particles and some of the orbital electrons in very heavy elements will have precession and other motions that radiate and absorb electromagnetic energy at significantly different frequencies compared to lighter elements.
- Is this what makes the signals from the nucleus accessible?
- At one point Bob says that once accessed, the gravity A wave is phase shifted to become the gravity B wave.
- If he had at least said frequency shifted instead of phase shifted it would be believable.
- It sounds like misinformation that was fed to Bob so he could feed it to others.
- Bottom line, I have to take a lot of Bob's words with a lot of grains of salt.
- I'm assuming that very heavy elements need uncompensated electron spins and/or possibly uncompensated proton spins to work. Too many unknowns.

New thoughts as of May 9th, 2022:

- I'm still assuming all nuclei interactions are really electromagnetic in nature.
- When I concluded that *"Too many inventors have been able to modify gravity without using radioactive isotopes.",* maybe they did use radioactive materials or else stumbled across magnetic materials with trace amounts included.
- Both Alford Hubbard and Lester Hendershot were reported to have used radioactive material in their devices to get them to work. Neither had the means to incorporate it into the bulk of the magnetic materials they used. However, both had readily available means to paint or coat their magnetic materials with a variety of radioactive products available in their time. People could buy radium paint and there was even radium in distilled water for drinking that was sold with claims it would make you look more radiant!
- Present day DIY experimenters should not need to incorporate radioactive materials into the bulk of their magnetic materials. Simply coating the magnetic materials could possibly work if in fact radioactive materials is an important key to success.
- Electromagnetic interactions at the frequencies of precessing orbital electrons might be too weak to be the key to anomalous electrical power output. The key might be electromagnetic interactions with the nuclei of certain elements, possibly from some kind of interaction between the orbital electrons and the nuclei. The frequencies involved might be in the THz range and if so then the thickness of insulation around the wires and/or around the magnetic material (or its coatings) might be key to having a ½ wavelength phase shift in "Lenz's Law" CEMF.

New thoughts as of May 9th, 2022 *continued*:

- The shape of the LC tank resonator on slide 101 is not optimum. There is an alternate design that doubles the series capacitance and so lowers the resonant frequency. This makes it easier to use COTS magnetic materials for the magnetic shielding shown on slide 100 with lower heat losses while directing most of the magnetic field into the top of the wedge shaped material.
- The magnetic device invented by Ed Leedskalnin allowed him to move massive blocks to make Coral Castle. This device appears to modify gravity by a similar means to that proposed here and in the other Vasant Corporation presentation: https://www.vasantcorporation.com/downloads/magnetic-permeability-05-03-2017.pdf
- See more about Ed Leedskalnin's device here: https://duckduckgo.com/?q=Ed+Leedskalnin%27s+magnetic+device&ia=web
- It is my contention that the frequency, phase, polarization, etc. of the electron precessionss are more important rather than the magnetic current created by DC electrical current flow as Leedskalnin discusses. The strength of the DC current sets the strength of the magnetic field (magnetic current) but this affects the frequency of electron precessions and that is one of the important parameters. References: https://en.wikipedia.org/wiki/Edward_Leedskalnin
- https://www.academia.edu/4899906
- Edward Leedskalnin is an example of a lot of independent researchers who stumble across something that they get working despite their explanations not being 100% accurate.
- Maybe I'm like that too.

New thoughts as of May 11th, 2022:

- If all forces end up just being electromagnetic in nature, and
- If in fact all electrons precess and both radiate and absorb electromagnetic energy among all other electrons so as to create a sea of standing waves, and
- If gravity originates from the attraction of diverging magnetic fields that toggle orientation at the frequencies of precession, then either,
- An electron's inertial resistance to acceleration must be explainable from electromagnetic forces from phase changes when positions change and the forces at the frequencies of precession must be strong enough to explain the amount of inertia experienced when trying to accelerate an electron, or
- There must be some intrinsic quality or an additional process occurring to explain an electron's magnitude of inertia. Since I don't like intrinsic qualities with no process to explain them,
- What if electrons both precess and also have continuous nutation at much higher frequencies, and
- At those higher frequencies of nutation the increased amount of exchanged electromagnetic energy is enough to explain an electron's inertia.
- If in fact all electrons have both precession and nutation all the time then they possibly always have interaction with quarks of nucleons at the frequencies of nutation. They would contribute to and be part of the much higher frequency sea of standing waves responsible for all matter's characteristic of inertia.

New thoughts as of June 24th, 2022:

Modifying inertia, assuming quark interactions are involved

- Continuation of thoughts started on slide 102 and related to the idea previously put forth about uncompensated quark spins and the theory of inertia based on quark interactions.
- If quark spins not being fully compensated is a valid way to visualize what makes an isotope radioactive then they might not behave exactly similar uncompensated electron spins.
- Uncompensated electrons can, at the macroscopic level, all point a similar direction so as to make a static magnetic field.
- On the other hand, because of how triplets of quarks are forced to interact electromagnetically with each other, they might not have the option to ever have their axes of precession point in a static direction.
- Their precession axes might be forced to always be changing direction at some high frequency even as their magnetic dipoles are precessing around their precession axes at a much higher frequency, like in the range of gamma rays.
- So with radioactive isotopes, that frequency at which the quarks' precession axes are continuously changing might be the frequency that becomes accessible from outside the nuclei.
- By interfacing to that frequency, it might be possible to manipulate the much higher frequency of precession so as to shift its phase relative to all other radiated and absorbed electromagnetic emissions from all other matter in the universe.
- This could create an isolated rest frame in a flying vehicle that could change position very quickly relative to external matter.

New thoughts as of June 25th, 2022:

Gravity A wave versus Gravity B wave

- On slide 106, I had objected to something Bob Lazar said here: https://youtu.be/zdUeavlbYGM?t=1779
- But now I think I understand. If quarks are precessing at the frequencies of gamma rays and if quarks have their axes of precession continuously changing, then that frequency of change will possibly be the same frequency that orbital electrons are precessing.
- So then the phase of the changing quark precession axes orientations is shifted until it pushes rather than pulls of the toggling magnetic fields from orbital electrons.
- You might object, saying that if quark precession axes orientations are continuously change then really the axes of that change would be the precession axes and what I'm calling the precession axis would really be an axis of nutation.
- But usually, nutations are just a small variation in the much larger precessional motion.
- Ref.: https://en.wikipedia.org/wiki/Nutation
- So I'm guessing that with quarks, if any of my Hail Mary conjectures are even close, their precessions are too large to be like a nutation.
- If people want to call them nutations then they are possibly very large nutations.
- On slide 106, when I said "*uncompensated quark spins…..not the key to accessing and amplifying gravity A waves.*", I might have been wrong.
- As previously conjectured, if uncompensated quark spins lead to the level of disharmony in a nucleus that causes an isotope to be radioactive and also allows access to Bob Lazar's Gravity A waves and if a compartmentalized portion of the military knows it, then it makes sense that radioactivity is one of the first things checked for at crashed UFOs.

New thoughts as of June 25th, 2022:

Still more questions than answers ….

- If the precession axes of quarks are themselves precessing, that sounds very similar to just the precession of the plane that triplets of quarks lie in.
- But that seems synonymous with the precession of a nucleon.
- But the precession of nucleons is usually in the MHz range and not at the frequency of precessing orbital electrons.
- Maybe it is not the same as the precession of a nucleon itself. or
- Maybe in very heavy elements ….. never mind…. visualizations are too abstract and vague to put into words yet.
- If there are quarks and if they can be explained using classical electrodynamics,
- The reason to assume an extreme quark precession frequency is that it is necessary to explain quark spacing which determines nucleon size and necessary to explain the mass equivalent electromagnetic energy of nucleons.
- If precession frequency is extreme, then the apparent magnetic field must be extreme to apply the torque on quark spins so as to cause an extreme precession frequency.
- If the apparent magnetic field is extreme then source charge must be extreme or relative motion must be extreme.
- If there is nothing but quarks in a nucleon then what generates an extreme magnetic field so as to induce extreme precession frequency?
- Are quarks moving relative to quarks at extreme velocity causing the apparent magnetic field between them?

New thoughts as of June 25th, 2022:

Still more questions than answers ….

- Decades ago, I saw a physics documentary that showed an animation of quarks within nucleons precessing and orbiting around their common triplet center so someone must have had a kind of classical idea of quarks way back then.
- If unpaired quarks cause isotopes to be unstable i.e. radioactive and if these uncompensated quarks have uncompensated magnetic fields and if they have precession and precession of their precession as discussed on slide 111, then spin resonance techniques should be able to detect their frequencies if they are anywhere within the MHZ to GHz range.
- Per Bob Lazar, these frequencies should be accessible from very heavy elements.
- If a Spin Super-radiance resonant cavity is used to reflect these frequencies back into radioactive nuclei after a total of ½ wavelength delay, then it may be possible to extract electromagnetic energy from the nuclei.
- Instead of the super-radiance being associated with resonance of uncompensated electrons, it would be from uncompensated quark spins.
- These frequencies involved might manifest during spin flips of the uncompensated quarks similar to how spin super-radiant emissions momentarily appear within a resonant cavity from uncompensated electron spins that flip spin states.
- Based on the results of many private inventors and researchers, only a small quantity of material is needed to get results if it is the correct material.
- When these private inventors and researchers are using magnetic materials and they have only a small amount of radioactive impurities, they get anomalous electrical energy out. Maybe even something as stable as bismuth manganese bismuthide would work. I don't know.

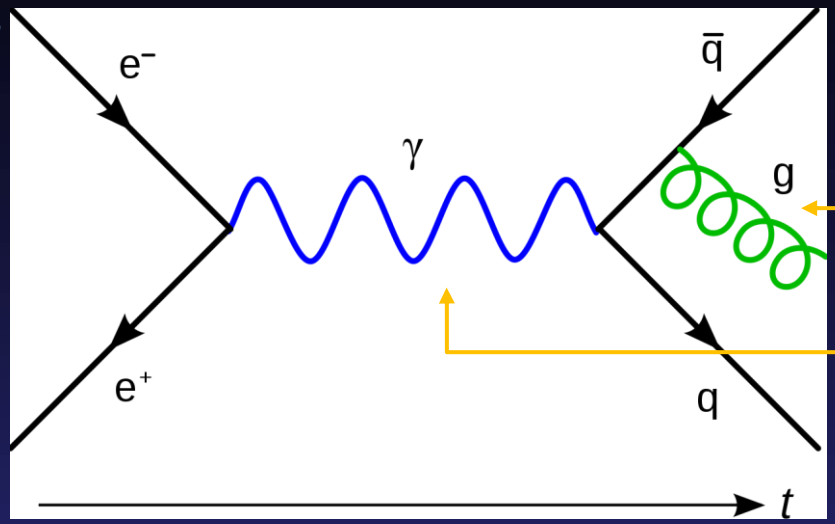
New thoughts as of June 26th, 2022:

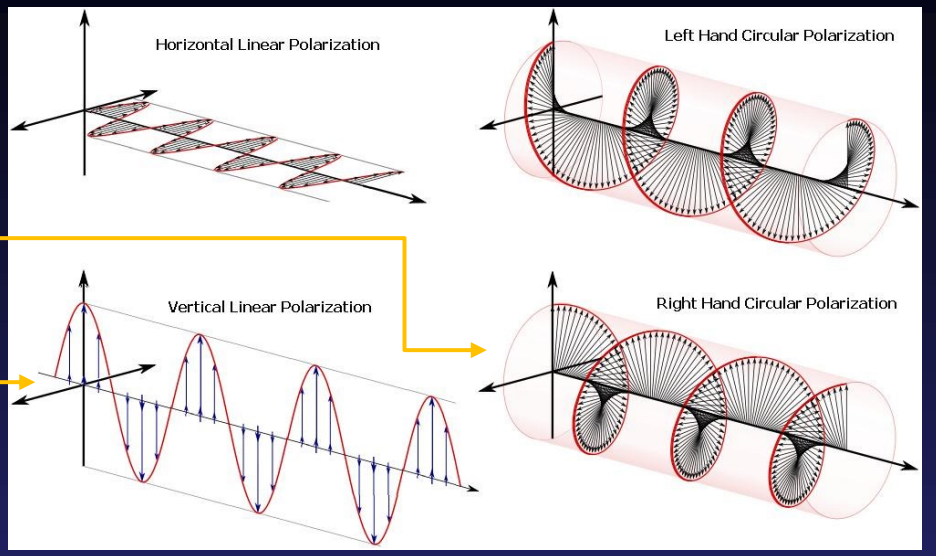
Still more questions than answers ….

- If quark precession frequencies are too high to access directly and
- If the plane that quark triplets are in can precess at an accessible frequency, then
- This might be just the precession of a nucleon (a proton or a neutron)
- To access a proton precession, I just need unpaired protons i.e. isotopes with an odd number of protons.
- So, are radioactive isotopes really needed?
- Maybe they just need to be very heavy isotopes for some reason?
- Is it feasible to design a spin super-radiance resonant cavity for uncompensated proton spins instead of for uncompensated electron spins?
- Since private inventors had successes with devices with relatively small gaps between magnetic materials and surfaces that could reflect RF, it seems that precession frequencies would need to be very high, but the precession frequencies of protons still seem relatively low even at around 250MHz.
- Is there still something else making some other accessible intermediate frequencies that are not nucleon precession but not the precession frequencies of quarks either?
- Does the precession frequency of quarks become much lower in very heavy elements, as evidenced by the increased size of nucleons in very heavy elements?

Ref: https://www.space.com/amp/mystery-of-proton-neutron-behavior-in-nucleus.html
https://www.livescience.com/64844-quarks-emc-effect-nucleus.html

Polarization of Gluons





- Did Feynman draw photons linearly polarized to represent electromagnetic waves because it is the most typical type of polarization for electromagnetic waves even though the math might show that exchanges between charged particles are circularly polarized?
- Did Feynman draw gluons as circularly polarized because something about the math indicated something analogous to circular polarization in the exchanges between quarks?
- Does “color” represent the precessional phase of the precessing spin axis of a quark relative to adjacent quarks and phase of radiated gluons relative the receiving quark?
- OR
- Does “color” possibly represent the left or right handedness of gluons?
- The later option can’t be true because there are 3 colors but only 2 handedness options.
- If “color” relates to quark precessional phases, then in a nucleon, are they each 120 degrees shifted from each other?
- Ref.s: https://en.wikipedia.org/wiki/Feynman_diagram https://en.wikipedia.org/wiki/Circular_polarization

Quark Precessional Orientations

- Within a proton, what orientations would 3 quarks need to each precess so as to explain the magnetic dipole of a proton spin?
- The fundamental problem with trying to move forward with figuring this out is: *"A proton isn't just three quarks and gluons, but a sea of dense particles and antiparticles inside"*
- So????, is that really true or is it an indication that physicists currently have a completely wrong understanding of nucleons.
- My opinion as an independent observer of all this theory, is that consistent external attributes of a proton don't come from a sea of dense particles.
- Physicists have gone down the quark/gluon road but have to say there is a sea of dense particles and antiparticles inside to keep that road going, but maybe going nowhere really???
- Things must be simpler so are there really even quarks?
- Quarks only account for 1-to-2% of the mass of a nucleon.
- What is "mass"? If I start with the conjecture that somehow nucleons are only electromagnetic in nature and possibly are exchanging gamma ray or cosmic ray frequency waves within a nucleon, then a nucleon mass should be equivalent to all the electromagnetic energy inside in the form of waves and whirlpools of electromagnetic energy.
- In collider experiments, various new particles (whirlpools of electromagnetic energy) are created by the collisions.

Do quarks really exist?

- If the “all-electromagnetic” conjecture is correct, then the electromagnetic exchange of energy inside and between nucleons must always force nucleons back to the same set of characteristics, the same amount of angular momentum, the same charge, always exactly opposite the charge of electrons.

- If an electron loses any angular momentum, then it gets slightly out of phase with the sea of electromagnetic standing waves and so then absorbs electromagnetic energy that pushes it back up to speed, kind of like a human wrist getting a Gyro Wrist Ball back up to speed.
- So if a nucleon loses any angular momentum, similar interaction with the sea of standing waves must force it (or its internal parts) back up to speed also.
- But does this interaction occur at a completely different set of frequencies from an electron’s interactions with the sea?
- If at the atomic level, motion through space causes motion through time, then are we talking about different frequencies in both space and time?
- How would that be measured macroscopically?
- Losing a slight amount of angular momentum causes a phase shift it time such that a particle become slightly more like antimatter (matter going the opposite direction in time).

Atomic Electromagnetic Interactions

- Intuitively, it seems that orbital electrons and the internal parts of nucleons must have some common frequencies of interaction.
- Some of the electromagnetic energy radiated from electron orbital and precessional motions must be resonating with internal motions within nucleons and keeping the internal parts “up to speed”.
- Or are nucleons’ internal parts kept up to speed only by much higher frequency components of the sea of standing waves?
- Can magnetic resonance measuring techniques reveal unique resonant frequencies from within nucleons of very heavy radioactive isotopes?
- Per Bob Lazar, it would seem the answer is YES.
- Per the operation of Bob Lazar’s “antimatter reactor”, it seems successfully measuring those frequencies and reflecting them back to the nucleons after a delay can extract enough energy to cause the nucleons to lose a little angular momentum thus becoming more like antimatter in their direction of spin motion through time.
- It should be possible to pass electromagnetic energy through a resistive reflector, reflecting it back to nucleons to extract energy from nucleons.
- But at what frequency? Is it detectable in heavy radioactive isotopes?

Giant Nuclear Resonances

and possible mechanisms allowing them to occur in the GHz-THz range

- For years I had concluded that when anomalous electrical power was produced within spin super-radiant devices of various inventors, the spins involved were uncompensated electron spins. However, after more research, it appears the spins involved are uncompensated spins from within the nuclei through some known or unknown form of "**Giant Resonance**", possibly, resonance from stimulating the internal structure of nucleons. I've seen this happen where the experimenters had coated magnetic materials with heavy radioactive isotopes. I'm not sure if it can happen anyway in non-radioactive materials. Possibly, in certain heavy or radioactive isotopes, this resonance is occurring within the GHz to THz range. Not coincidentally, this correlates with what Bob Lazar said many years ago that the nuclear strong force had a wave nature and was accessible in very heavy elements. This should not be construed to be an endorsement of all the other things Bob Lazar said about space aliens which I still believe was just part of a disinformation campaign by U.S. Naval Intelligence and the CIA.
- https://en.wikipedia.org/wiki/EMC_effect
- https://vixra.org/pdf/1806.0406v1.pdf **study this one!!!**
- **https://iopscience.iop.org/article/10.1088/1742-6596/1643/1/012126/pdf**
- **https://en.wikipedia.org/wiki/Giant_resonance**
- **https://arxiv.org/pdf/1812.09070.pdf**
- **https://www.pks.mpg.de/~ccm08/Abstract/Brink.pdf**

Giant Nuclear Resonances *continued*

and possible mechanisms allowing them to occur in the GHz-THz range

- This phenomena might still be difficult to detect because the emissions from nucleons' internal structure could be locked in sync with emissions from precessing orbital electrons and/or are part of the sea of standing waves among all matter.
- It may be necessary to use a very well electromagnetically isolated resonant cavity and then
- Frequencies could become visible just when nucleons flip between UP and DOWN spin.
- New Update: I so far cannot confirm any resonance is from nuclei, only from uncompensated electrons and yet the anomalous electrical power appears only with addition of very heavy isotopes.
- Are there Counter EMFs radiated from motions of nucleons' internal structure in response from EMFs from orbital electrons' precessions?
- Are these counter EMFs unique in that they are propagating in a different direction in time relative to their direction of propagation in space compared to counter EMFs from other electrons?
- I would think if this were true, the CEMFs would have to originate from motions of anti particles but the nucleon quarks aren't anti- so maybe I'm on the wrong track.

Giant Nuclear Resonances *continued*

and possible mechanisms allowing them to occur in the GHz-THz range

- If a radioactive material is slowly but constantly decaying, then it might be creating short lived particles that include anti-quarks which could radiate CEMFs in reverse time?
- A road less traveled…
- If a negative direction in time is defined as that direction in which entropy decreases and if interactions of rotating electric or magnetic dipoles causes them to move to more ordered states, then they must be moving in a negative direction in time.
- If this way of thinking works, then the energy released from matter moving to more ordered states is like the energy released when matter interacts with matter moving in a negative direction in time (antimatter).
- Inventers report that there “free energy” devices get colder in proportion to energy drawn from them.
- One inventor reported he accidentally shorted his device and the wires got ice cold.

How to access Nuclear Resonances

Using the Bose Einstein Condensate or time crystal concept

- Years ago, Bob Lazar mentioned that what he called an antimatter reactor was pulsed on at a relatively low frequency. I think he said 7Hz but I don't remember exactly now.
- I couldn't figure out how to keep resonances going between 7Hz pulses.
- I think inside the resonant cavity, it does the time crystal thing.
- https://en.wikipedia.org/wiki/Time_crystal
- If I understand time crystals correctly, they are similar to Bose Einstein Condensates. If I understand both correctly, in a quantum description, the wave functions of many particles can combine and slow down. So, I'm wondering if resonances within nuclei usually at gamma ray frequencies can slow all the way down to GHz frequencies and so become accessible if the conditions for a time crystal are met.
- Resonances can continue if the resonances are isolated from the outside world.
- If this is all done in a spin super-radiance cavity, resonances should continue but be unmanifested until the spins swap spin states Up to Down or vice versa at which time, the resonance manifest as a quick high intensity pulse that is now at GHz frequencies instead of gamma ray frequencies.
- Maybe it all slows down in both time and space so it gets slower and bigger???
- Can this work if the nuclei are isolated but not super cooled?

Can a free energy device be self cooling?

- In order to get gamma ray frequency quark interactions to slow way down to GHz frequency interactions, the nuclei may need to be cooled into a Bose Einstein Condensate, kind of like this: https://physicsworld.com/a/laser-cooled-bose-einstein-condensate-is-a-first/
- Except, is it possible to doing maser cooling instead of laser cooling?
- If yes, then within a spin-super-radiance cavity, can GHz frequency electron spins of a microwave magnetic target material be used to create reflections off cavity walls that then cool the nuclei when reflected back at the optimum phases?
- Regarding these reflections, is it maser cooling or is it a rotating reference frame that makes nucleons greatly enlarge? Do both occur together?
- If the magnetic material is coated or doped with the optimum nuclei of interest, can GHz frequency interactions with the quarks of these nuclei then release energy from the nuclei?
- Would cooling occur anyway as soon as energy gets extracted from quark interactions.
- Would the quarks spins and precessions slow down and so then absorb energy from the sea of standing waves to get back up to speed?

Is the GHz frequency from nucleons a difference frequency?

- If orbital electrons also have a nutation at gamma ray frequencies and if this is usually exchanged with gamma ray emissions from quark motions, then,
- If magnetic resonance techniques are used on uncompensated orbital electrons so as to make their nutations shift frequency, then,
- Would GHz frequency emissions become accessible as a difference frequency between emissions from orbital electron nutations at gamma ray frequencies and quark motions at slightly different gamma ray frequencies?

Two suggestions for successful “free energy” device experimenters:

- If you have been successful in making a “free energy” device that outputs electrical power and experiences a partial weight loss proportionate to the electrical power drawn from the device, then please try the following:

1. Use some heat lamps as an electrical load and point them at the sky for a day or two and see if it has any effect on the weather. This suggestion is based on an experiment to this effect reported many years ago.
2. This is just a hunch; If there is ever radioactive fall out in the atmosphere, see if radiating it with heat lamps powered by a “free energy” device causes any measurable decrease in the half life of the radioactivity. This is based on a demonstration by Yull Brown before his untimely death, of immersing a radioactive sample in what appeared to be a modified form of water. There should be a way to reduce radioactivity, but I’m not sure this is a way or not.

Nucleon Internal Electrodynamics

- Regarding question posed on slide 115, scientists concede something like quark precession in as much as “gluon helicity” is described as caused by how quarks spin. Read more here: https://en.wikipedia.org/wiki/Proton_spin_crisis

https://en.wikipedia.org/wiki/Nucleon_spin_structure https://arxiv.org/pdf/0907.3431.pdf

https://arxiv-export1.library.cornell.edu/pdf/2009.01291

- Also, the “shell model” of nuclei internal structure appears to be the most accurate model once the attributes of combined orbital and spin angular momentum are considered.
- References: https://www.youtube.com/watch?v=Rd0CJje59bE

  https://www.youtube.com/watch?v=Lxr4YKtGsPE

  https://www.youtube.com/watch?v=8vMwzkOi0v4
- Just as quantum physics describes electrons “as if” they are precessing, so also quarks should be precessing.
- Quarks experience classical radiation and absorption of electromagnetic energy at their frequencies of motion.
- Part of this electromagnetic exchange may be with orbital electrons’ motions if at the same frequencies, like from electron nutation.
- Part of this electromagnetic exchange becomes part of the universal sea of standing waves.

Nucleon External Electrodynamics

- Since the “shell model” of nucleon internal structure appears to be the most accurate model once the attributes of combined orbital and spin angular momentum are considered, http://hyperphysics.phy-astr.gsu.edu/hbase/Nuclear/shell.html
- This implies that many other phenomena associated with spins and orbits can possibly occur within nuclei.
- The “shells” have various orbital shapes rather than just spherical.
- A nucleon dropping from a higher orbital to a lower orbital should emit a photon.
- A nucleon absorbing a photon of the correct wavelength should jump to a higher orbital.
- Does this allow nuclear lasing in a resonant cavity and at what frequencies?
- Many other manipulations of nucleons are possible for those gifted in the art.
- It is still my contention that QCD phenomena between nucleons is really electrodynamic phenomena but at gamma ray frequencies and with a portion of the electromagnetic energy being absorbed from or radiated to the universal sea of standing waves and contributing to the inertial force.
- Gamma rays are detected when a particular event causes the electromagnetic interactions to break lock with the sea of standing waves.

Shell Model of Nuclei vs concept Nuclear Strong Forces

- There is strong evidence the Shell Model correctly describes an atomic nucleus.
- This describes nucleons in various orbitals with both spin and orbital motions.
- Supposedly, the idea of electromagnetic interaction with electron orbital and spin angular momentum cannot be extended to nucleons.
- It is my contention this is not correct. There can still be electromagnetic interactions but whereas uncompensated electrons can have specific frequencies of magnetic resonance and uncompensated electrons can have static magnetic fields that sum to make a macroscopically magnetic material, with nucleons, because of their internal structure a "static" magnetic field may still be at some frequencies which quarks spin and precess around each other.
- The orbital shapes and motions of nucleons per the "Shell Model", which is most likely correct, is at odds with the concept of gluon exchange that has been assumed to attract all nucleons more or less equally towards each other.
- I am still assuming the nuclear strong force is somehow electromagnetic in nature and probably at gamma ray frequencies.
- So nucleons within each nucleon orbital should be at integer wavelengths similar to how electron orbitals are at integer wavelengths.
- So gamma rays would be exchanged between nucleons and possibly with nutations of the precessions of orbital electrons with another portion of all emissions becoming part of the sea of standing wave among all matter.

Shell Model of Nuclei vs concept Nuclear Strong Forces
continued

- Although there is strong evidence for the shell model for protons in the nucleus on for neutrons in their own shells in the nucleus, this concept is at odds with the idea that gluons between protons and neutrons are keeping protons close to each other even as the protons' positive charges would try to push them apart.
- In fact, even if for less than a billionth of a seconds, we now know it is possible to have a nucleus with 2 protons but no neutrons. Reference: https://web.archive.org/web/20081014143925/http://www.aip.org/pnu/2008/split/865-2.html
- Although this is very unstable, it seems some kind of exchange between the 2 protons is able to keep them close together for a very short period of time.
- Are gluons possibly just an exchange of gamma ray electromagnetic energy keeping the protons located at fractions of a wavelength apart where their exchange of energy is slightly stable?
- Like ¼ wavelength or ½ wavelength apart for example?

Radioactive materials in “Free Energy” devices

- In some of my research files and videos I talked about the possibility that if radioactive materials decay releasing charged particles of antimatter then there was the possibility that electromagnetic radiation reflecting off induced motions of charge particles of antimatter might not only reflect the electromagnetic energy in space but also in a different direction in time since mathematically, antimatter is going backwards in time.
- But after more thought, most radioactive materials don’t release antimatter during decay and the few that do, that antimatter annihilates rather quickly with normal matter and so is not present to reflect EM energy.
- If some radioactive materials do allow so called “free energy” devices to work, it is more likely that the thing making an element radioactive is already causing it to move slightly in a negative direction in time.
- It might be the disharmony between electromagnetic interactions between nucleons might involve cyclical motions in time that are slightly more out of phase with normal matter and access to these interactions might be gained from uncompensated nuclear spins.
- I’m not sure about all this stuff. Just throwing out ideas.
- Regardless, the Alford M. Hubbard device and the Lester Henderson device were both reported to contain radioactive materials, radium in the first and pitch blende in the second.

Previous revisions:

June 19, 2018: *Fixed typos and to add suggested design changes starting on slide 74*

July 10, 2018: *Updated outdated hyperlinked text*

Dec 9, 2018: *Found and revised design flaws that started on slide 65 and added suggested corrections and more design insights starting at slide 90.*

Jan 8, 2019: *Added new thoughts and design ideas starting on slide 98.*

Aug 23-27, 2020: *Added new thoughts starting on slide 102*

Mar 4, 2021: *Updated old hyperlinks, some of which had since been re-assigned to malicious websites. Added updated untested design suggestions on various slides.*

May 9 -11, 2022 *Starting at slide 107, added untested design suggestions. Thickness of insulation might be important. Magnetic materials' coatings vs. incorporated in bulk. Reversal of a few previous conclusions.*

May 13, 2022 *Found the pdf print version of this file used original hyperlinks on slides 46 and 61 and these were redirecting to malicious websites. Replaced with original safe data from archive.org so that the .pps and .pdf versions of this file link to safer data.*

June 24-26, 22: *Added slides 110-114 regarding inertia, quarks and accessing Bob Lazar's gravity A waves*

July 5, 2022: *Added slides 115-121 regarding quark precessional phase, gluon polarization, magnetic resonance of radioactive heavy isotopes, giant resonances.*

Previous revisions *continued:*

July 7, 22: *Added slide 122 regarding accessing gamma ray frequency resonances in the nuclei using the "time crystal" or Bose Einstein Condensate concept.*

July 18-21,22: *Added slides 123-124 about self cooling into a Bose Einstein Condensate and about difference frequencies. Also changed the title of this presentation.*

July 27, 22: *On slide 124, added 2 suggestions for experimenters of "free energy" devices.*

Aug 4-7, 22: *Added slides 125-127, "*Nucleon Internal and External Electrodynamics*" and more.*