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Gaede, Bill

The Rope Hypothesis/

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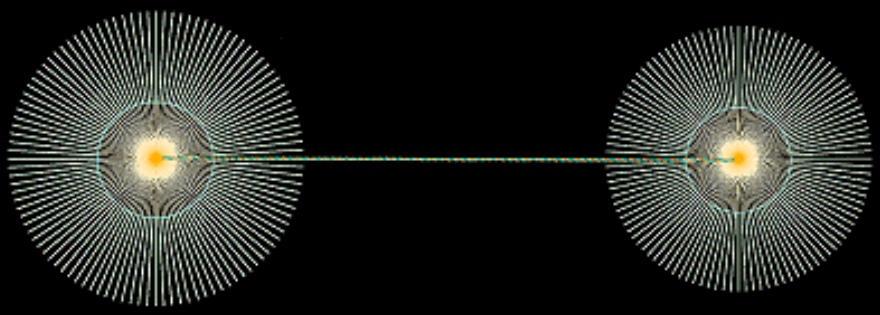
The Rope Hypothesis



Bill Gaede

ViNi
Frankfurt, Germany

To Ans,
whom I know as Yabbs,
my buddy, my sparring partner, my son,
my boss, my manager, my editor,
without whom this book would not have been possible

and

to Nila,
my best friend, my lifelong companion, my wife,
for the adventures we had together,
and for making Ans.

Contents

Contents

Contents

Contents

Preface

This book is an introduction to a distinct model known as the *Rope Hypothesis*, written to pique your interest in the world that surrounds us. It proposes that all atoms in existence are physically interconnected. The mechanisms explained herein are not meant to answer all questions regarding reality. In fact, the book is more likely to generate more questions because the arguments are revolutionary. The Rope Hypothesis is ultimately no more and no less than a radical way of visualizing how our Universe works.

The Rope Hypothesis was designed from the start to be available to all human beings who have an interest in science. Therefore, it is specifically tailored to be downloadable from any computer with access to the Internet. Its target audience is anybody and everybody, but the expectation is that the theories enrich the imagination of the new generations.

The book's primary objective is to present an alternative model for light, gravity, magnetism, electricity, and the workings of the atom. The visible things and mechanisms are straight forward. We see galaxies, stars, planets, moons, asteroids, comets and, with more sophisticated instruments, we can also detect the presence of gases, molecules, and

other compounds. It is the invisible stuff – *phenomena such as light, gravity, and magnetism* – that need elucidating. How does Mother Nature do these tricks? How does she hide from our eyes and hands the entities that make our visible and tangible world work? That's what we'll try to answer here. Key words that form the Foundations of Physics are highlighted in blue and are found at the end of the book after the appendices.

Bill Gaede

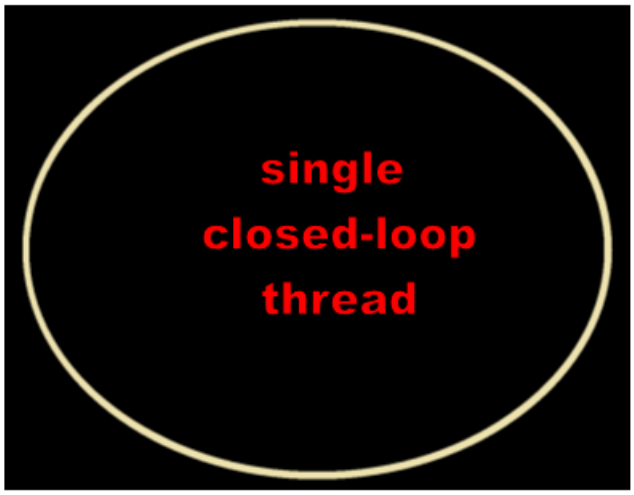
Frankfurt, Germany

January 31, 2020

01 All there ever was and always will be

We start with a radical assumption: all **matter** is made of a single thread. If you began to walk along the thread, you would travel uninterruptedly through every piece of matter in the Universe until you reached your starting point.

Let's attempt to visualize this unprecedented proposal by unraveling all the matter in the Universe. We end up with a single, closed-loop fiber floating in stark nothingness; visualize a ring. The Rope Hypothesis proposes that the Single Thread is the fundamental building block for matter. It is the starting point of the theory.



If you were to unravel all the matter in the Universe, you wouldn't end up with countless discrete particles, but rather with a single, closed-loop thread. If you began to walk along the thread, you would travel uninterruptedly through every piece of matter in the Universe until you reached your starting point.

The thread that comprises matter is not a **concept**. It is an extremely long and immeasurably thin **object**. The thread is an object because it has shape and not because it can be seen or touched.

It is pertinent to clarify that the Single Thread looks like a sewing thread of ordinary experience. It has the familiar thin and elongated shape of the one you use to sew your button to your shirt. But that is where the analogy ends. We should refrain from extrapolating other attributes and properties of everyday 3D threads over to the primordial thread. Specifically, we cannot hope to use any of our five senses to detect the Single Thread. Its existence cannot be detected via technology or experiments. The only way to visualize the thread is through reasoning. We 'verify' its presence by zooming in and giving it shape and color with our imagination.

You cannot approach the Single Thread through any of the physical senses.

The way to approach the Single Thread is through the mind!

The primordial thread is made of a single piece. We conceive it as the *elementary* entity. This means that the thread lacks parts or segments. The thread itself is not made of anything, but rather makes up everything that **exists**.

Despite being made of a single piece, the Single Thread lacks rigidity. The thread is flexible and malleable, properties that we usually associate with things made of atoms such as rubber bands.

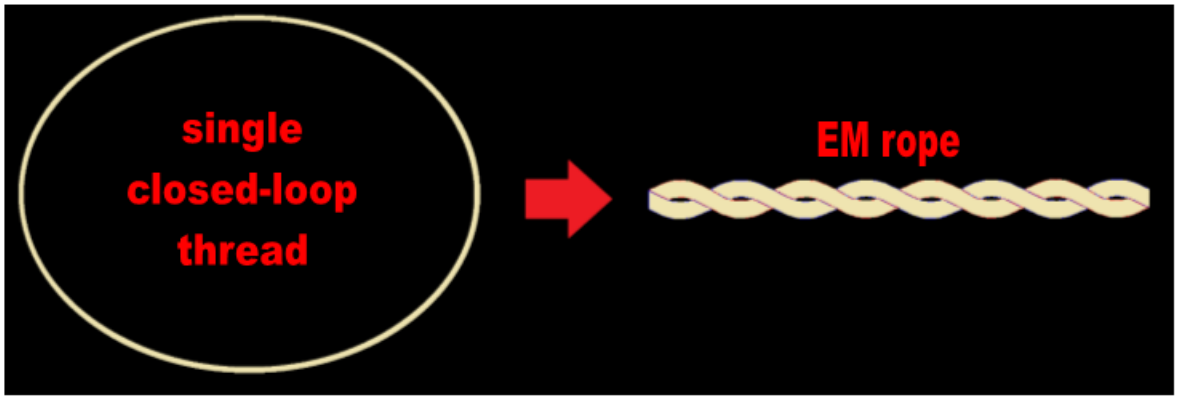
Another underlying assumption is that the total amount of matter floating in space is constant and eternal. It follows that the Single Thread does not stretch, shrink, expand, gain or lose weight, grow or die.

Timewise, the Single Thread could have had no beginning. There was no moment in **time** in which it came to be. The Rope Hypothesis rejects the idea that **nothing** can acquire length, width, and height and suddenly pop into **existence**. Conversely, *something* cannot spontaneously lose length, width, and height and morph into *nothing*.

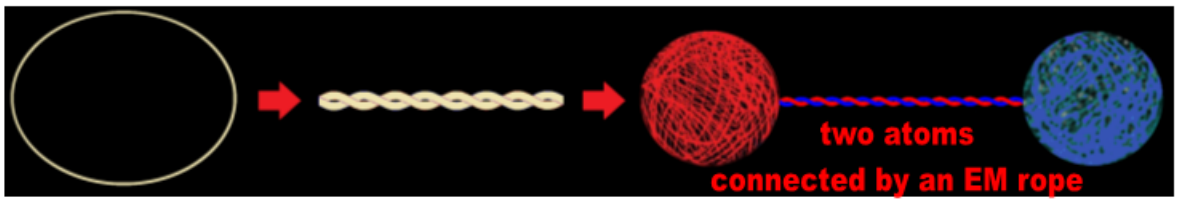
It is these counterintuitive attributes of our everyday experience which have prevented researchers from discovering the proposal that forms the backbone of this treatise and serves as the title of this book: *the Rope Hypothesis*.

02 The Rope Hypothesis

The Rope Hypothesis begins with the revolutionary assumption that a single loop of thread underlies all matter in existence. Imagine, now, twisting this ring and forming a DNA-like double helix. Both strands wrap around each other to form a rope. This electromagnetic (EM) rope is the entity that mediates light, gravity, and magnetism.

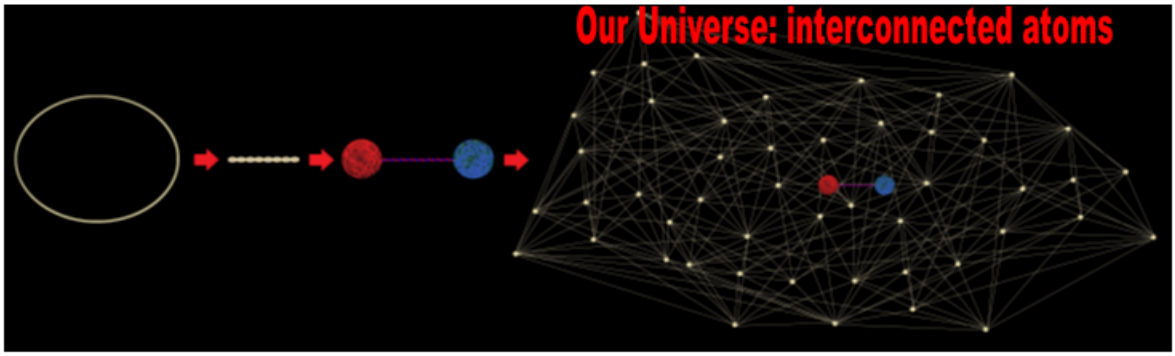


But the picture of our basic model is not yet complete. Let's mold the ends of this rope into balls of threads. These will become our atoms. Thus, any two atoms will be bound by the twined threads that end up constituting them.



Naturally, there are more than two atoms in the universe, but it's the underlying assumption that is crucial: every atom in the universe is bound to every other atom in the universe by the EM rope that constitutes them! We will go into a more detailed description later on.

Imagine starting at an atom and walking along the rope to another atom. If you turn right and walk down the road you encounter another atom. Any path you take from here will end at another atom. All intertwined threads lead to the next knot down the road. What you just visualized is our invisible, simple Universe. This is all there is. This is all we would see if we had all-seeing eyes.



03 The Checklist of Light

Since time immemorial, serious researchers have asked "What is light?"

One way to unmask the nature of light is by making a list of properties and behaviors that we have documented over the years. Here we synthesize them in what can be called the Checklist of Light. The underlying idea is that any agent that a theorist proposes as a mediator for light must simulate these attributes and behaviors.

The Checklist of light

1. ***light must be mediated by an object***
2. ***light originates in an atom when it 'Quantum Jumps'***
3. ***the beam or ray of light either travels rectilinearly or extends straight***
4. ***light travels/propagates extremely fast: 300,000 km/s***
5. ***light has the following wave properties:***

   oscillates around an axis

   Faraday/Maxwell 'laws': one 'field' generates the other

   the electric 'field' is perpendicular to the magnetic 'field'

   light has frequency, wavelength, and amplitude

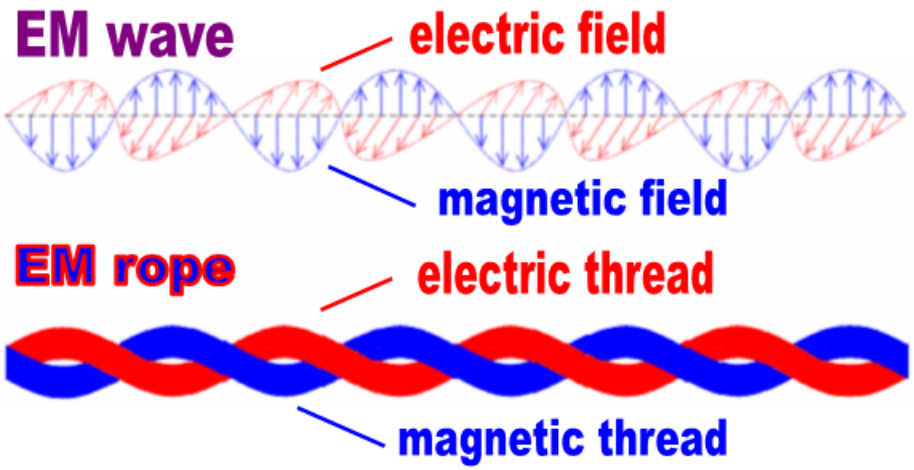
   $c = f \lambda$ (frequency inversely proportional to wavelength)

Let's now check to see whether the electromagnetic (EM) rope model meets the minimum requirements to simulate light.

04 The EM rope is an object

A pair of twined threads has a double helix, DNA-like architecture. Obviously, a rope – *any rope* – has shape, and since an **object** is that which has shape, the EM rope has met the first requirement of the checklist.

The abstract transverse wave illustrated in classrooms and blogs all over the world is but a cross-section of a rope. A significant difference between the two is that the 'fields' that comprise the traditional wave are 'made' of abstract vectors (*magnitude and direction*) whereas a rope is a physical 3-dimensional entity. A 'field' is a **concept**. A rope is an **object**.

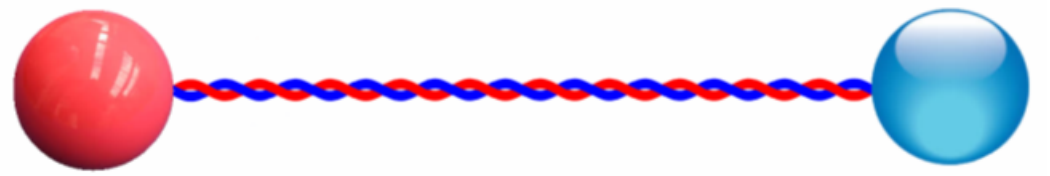


At this point, it is pertinent to clarify, again, that the EM rope does not have many of the properties of an ordinary hardware store rope. Most people have 'touching and seeing' in mind when they hear for the first time that a rope is proposed as a mediator for light. These attributes are not transferrable to the EM rope.

05 The EM rope originates in the atom

The EM rope also easily meets the second requirement of the Checklist of Light: light originates when the atom quantum jumps. The Single Thread Hypothesis proposes that all atoms in existence are physically interconnected. This makes it unavoidable to conclude that all ropes must originate and end in atoms. The atoms are made of the same thread that constitutes the EM rope.

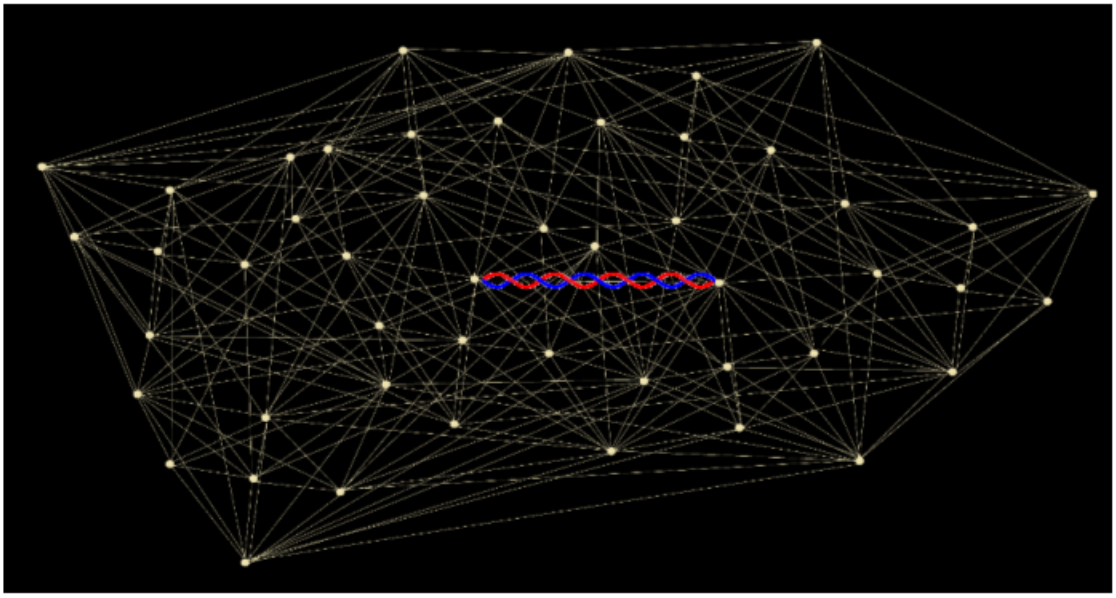
The EM rope begins and ends in atoms, physically interconnecting all of them.



06 The EM rope is permanently taut

An EM rope that binds any two atoms is permanently under tension and never bends. It remains taut forever as a result of the tug exerted by the entire network of EM ropes in existence.

Quantum Jump is the mechanism that relays light from atom to atom. Any slack in the rope is offset by threads being lent to neighboring atoms and ropes. Conversely, demand for threads is borrowed from neighboring atoms and ropes. The EM rope never goes limp. Atoms and ropes do not lose or gain thread, but borrow from and lend to local systems. Actually, the atom is the entity that slides locally like a train along the threads that serve as rails and slip over and around it.



The speed of light is constant throughout the universe because the rope is under constant tension. The constancy of the speed of light is a measure of this tension.

07 The EM rope embraces an imaginary axis

You will note that when you pull an ordinary rope as tight as you can, the two strands embrace an imaginary axis. By its very nature, a taut rope is structurally twined around a straight line. Whereas a transverse wave undulates dynamically, a rope is *structurally* wavy. Therefore, the EM rope does not have the ability to deviate from the axis.

08 Nothing beats a torsion wave!

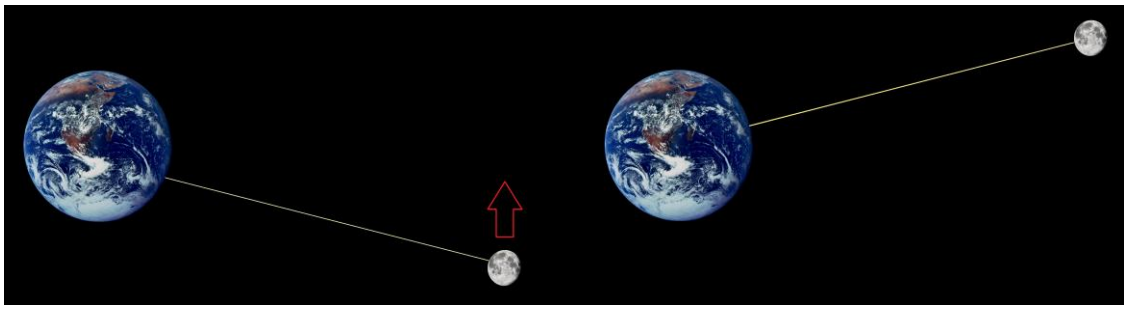
Experience tells us that nothing is faster than light. A simple experiment can put the swiftness of light and its relation to the Rope Hypothesis in perspective for us.

Grab a rope and tie it between two posts. Make sure you stretch it until it is as tight as possible. Place a clothespin at each end. Move one of the clothespins. You will verify that the other one moves ‘instantaneously’. The torsion wave is so swift that it is difficult to see how it was transmitted even when filmed. There is nothing we have invented to date, *no rockets, blinking your eyes, scanning the wall with a flashlight, etc.*, that is as fast as a 3D torsion wave!

This experiment suggests that light is likely a mixture of noun and verb. It consists of both: an elongated mediator and the propagation of a torsion wave along its length.

Light is unimaginably fast because the secret agent that acts as its conduit - *the EM rope* – is already connected at the other end. The rope rotates in place like a drill bit. The atom at the other end is stimulated by the constant pressure thumps of torsion that propagate along the rope. The EM rope acts like an auger conveyor or Archimedes' screw. Those pulses are commonly known as ‘photons’.

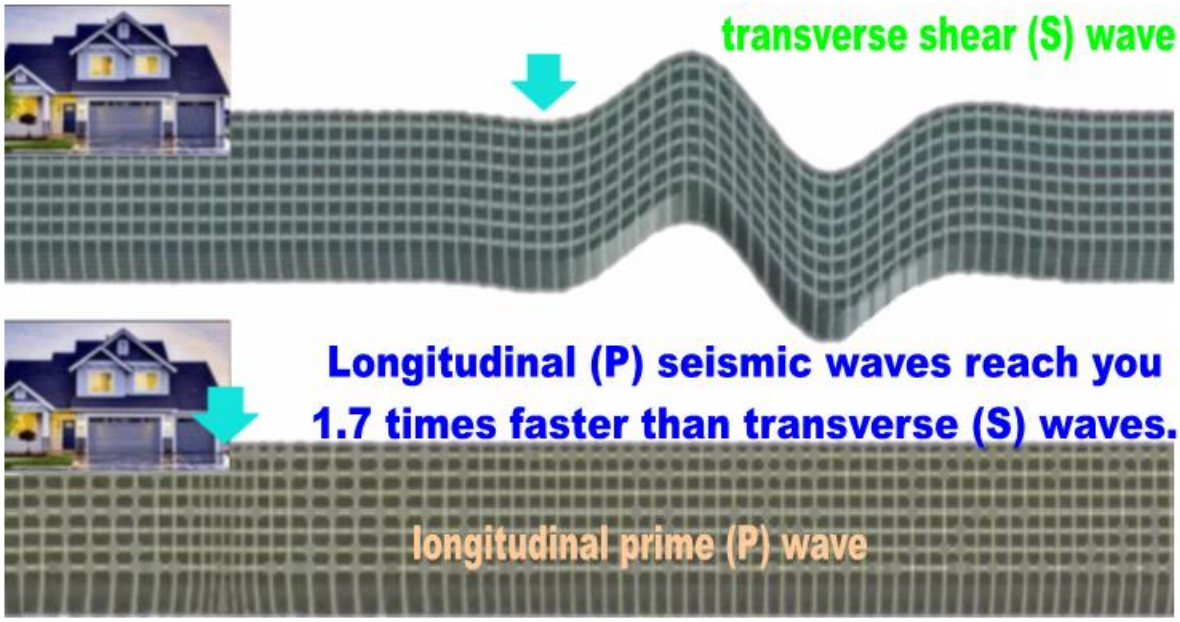
Torsion has no chance of escaping a rope. Torsion propagates in a rectilinear and bidirectional way along the rope that interconnects two atoms. An atom can now move anywhere it wants. Torque will always find it.

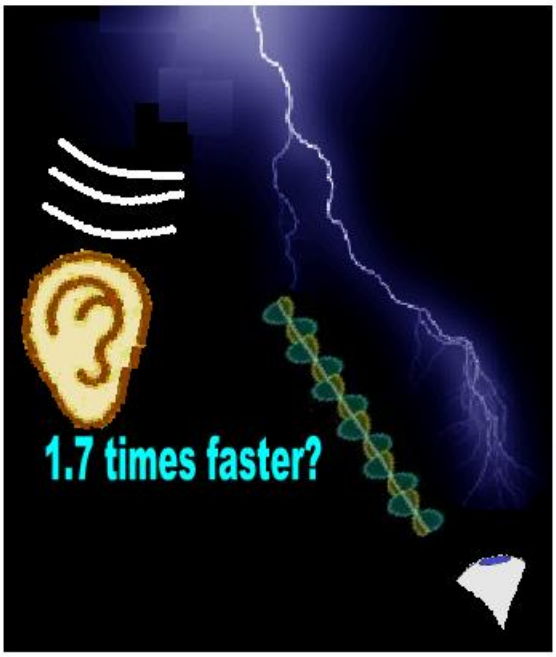


All the atoms that comprise the Moon are connected to all the atoms that make up the Earth. Therefore, the Moon can go anywhere it wants. Torsion propagates rectilinearly between any two atoms and will always find it.

The straightness of a beam of light cannot be modeled with 2D standing waves. If you shake a rope up and down, there would be no physical justification for the signal to travel rectilinearly even if it were attached at the other end.

1D longitudinal waves have been measured to be 1.7 times faster than 2D transverse waves during earthquakes. Both propagate one-way.

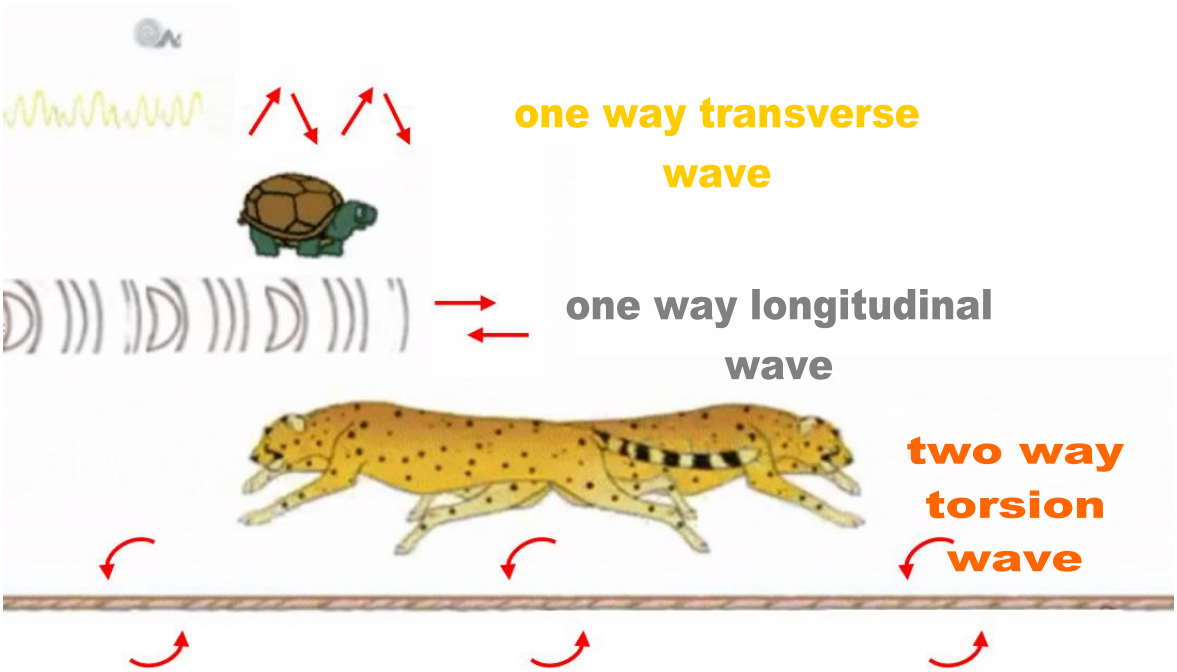




As an analogy, if light consisted of transverse waves, we would hear the thunder before seeing the lightning flash.

Marathon of the Waves

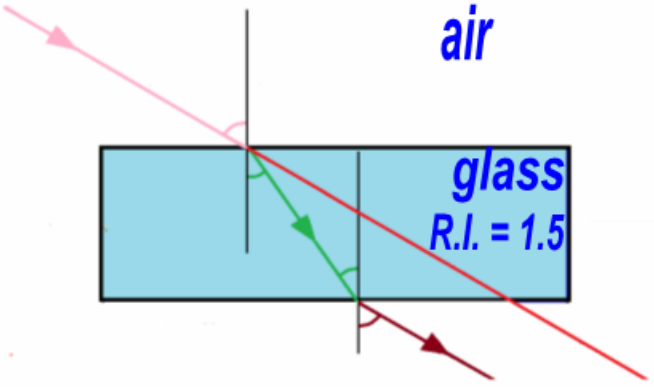
There are three types of waves: Transverse, Longitudinal, and Torsion. Transverse waves are the slowest. They simply go up and down (e.g., standing wave, shaking a rope bound at both ends). Longitudinal waves are a bit faster because they go back and forth on the same axis (e.g., sound). And torsion waves leave both biting the dust. They propagate in both directions (auger drill, Archimedes' screw). The Rope Hypothesis proposes that light is like this last one.



09 Light maintains a constant speed

The wave equation for the speed of light is $c = f \lambda$, where c is 300,000 km/s, f is frequency, and λ is wavelength. Given that the speed of light is constant,[1] when frequency goes up, wavelength goes down. In other words, frequency and wavelength are inversely proportional.

The speed of light here on Earth is calculated, typically using round-trip (reflected) light and measuring angles. The angle in which light refracts depends on the density of the medium it traverses. Theorists explain this by assuming that light slows down when it enters a denser medium. They have devised a table of speeds of light (*refractive index*) for different materials. For glass it is anywhere between 1.45 to 1.5, meaning that light travels about 1/3 slower through glass than it does through the vacuum (glass: c ≈ 200,000 km/s vs. vacuum: c = 300,00 km/s).



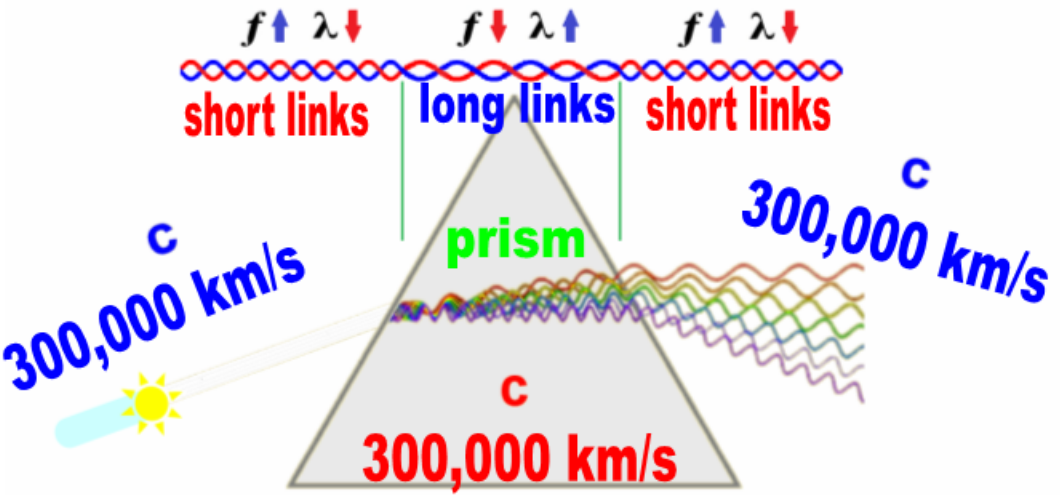
[1] Einstein's second postulate of Special Relativity states that light maintains a constant speed in a vacuum. The issue before us is whether light changes speeds through media that have different densities.

However, theorists have always struggled to explain how light speeds back up to 300,000 km/s when exiting to a lighter medium.

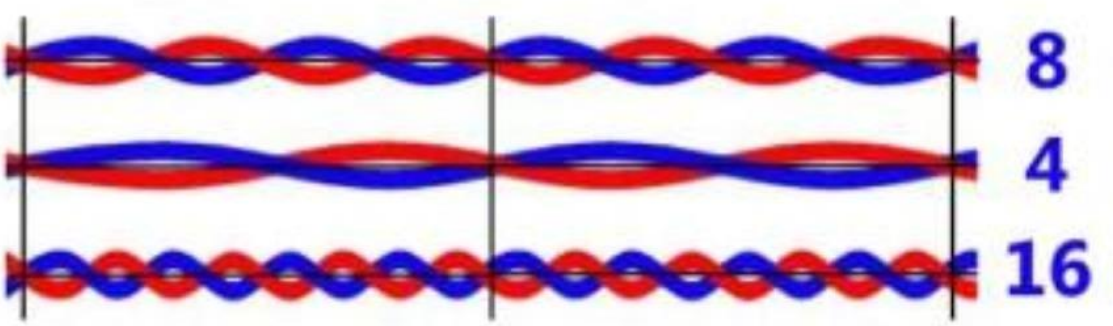
The Rope Hypothesis proposes that the torsion signal we call 'light' always propagates at the same speed between any two atoms. This is consistent with the wave equation. What changes is the number of rope links (frequency - f) between the atoms and the length of each link (wavelength - λ).

This means that light 'travels' at the same speed through any medium, be it dense or rare, heavy or light. Torsion is the same between any two atoms irrespective of whether they are the constituents of steel, water, or air.

Under the Rope Hypothesis, there is no acceleration of light after it exits a prism. Torsion always 'propagates' at the same speed. The EM rope merely increases the number of links at the expense of the lengths of the links.



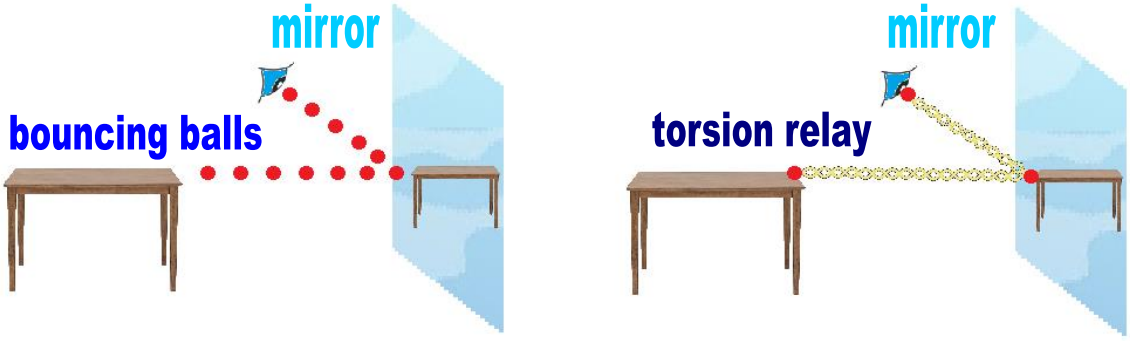
The wave equation c = ƒ λ is the equation of a rope. A rope is an ideal structure to simulate why little c is a constant and why 'wavelength' (λ) is inversely proportional to 'frequency' (ƒ). Increasing the number of links (frequency) makes each link shorter (wavelength) for any given length of rope.



c = 300,000 km/s (constant speed of light)
ƒ = frequency (# of links)
λ = wavelength (lengths of links)

10 Reflection and refraction

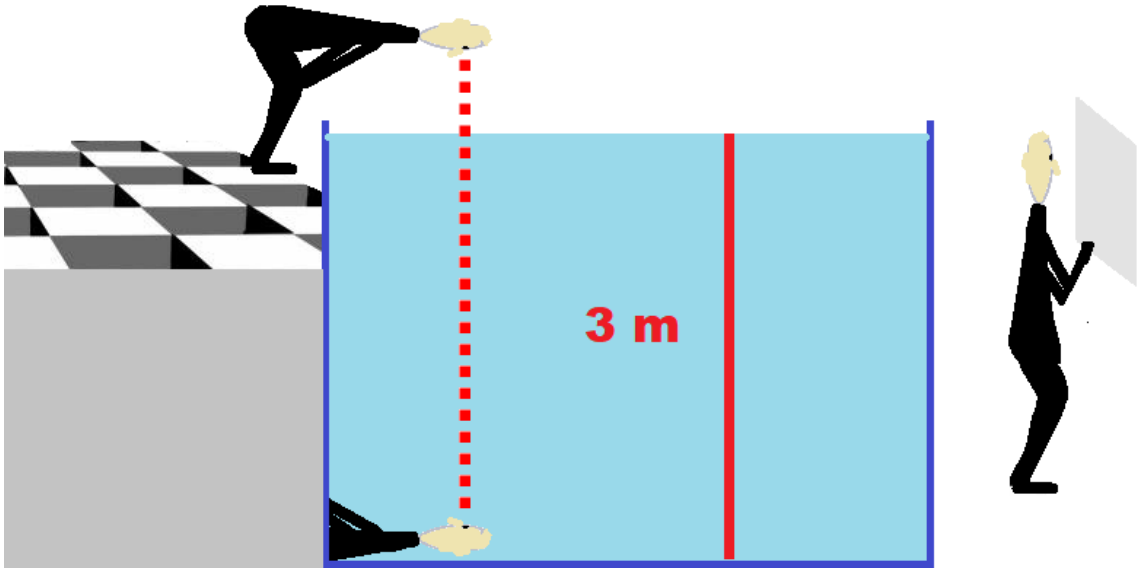
The Rope Hypothesis explains reflection and refraction not as balls bouncing and ricocheting from walls, but as atoms relaying torsion signals to all the rest.



If you look through 3 meters of water in a pool you can see your reflection right through countless atoms that stand between your eyes and the bottom of the pool. If light consisted of a stream of corpuscles, they would bounce against the atoms comprising the body of water. Few would make it through during the round trip. These same corpuscles can't seem to penetrate a thin sheet of paper whose width consists of fewer atoms.

Under the Rope Hypothesis, the atoms of your eyes are already connected to the atoms at the bottom of the pool before you begin to look down. Light torques in both directions, from the atoms in your eyes to the atoms at the bottom of the pool. At such short distances, light is practically instantaneous.

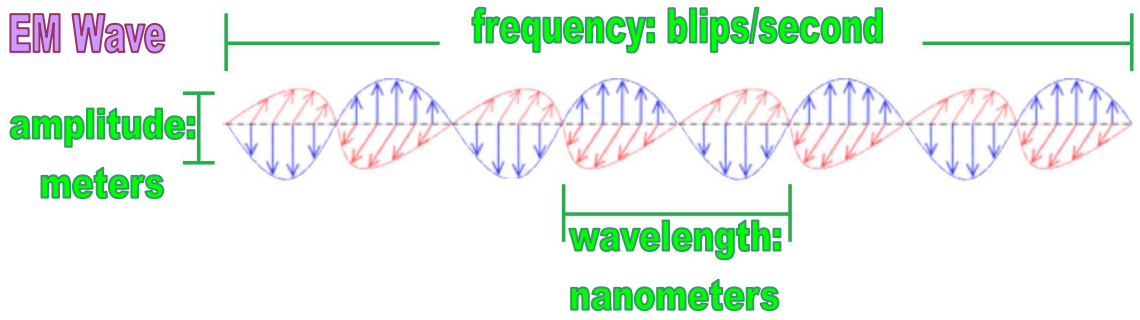
You can see your image through countless atoms of the water that fills a swimming pool. In contrast, a thin sheet of paper stops light altogether.



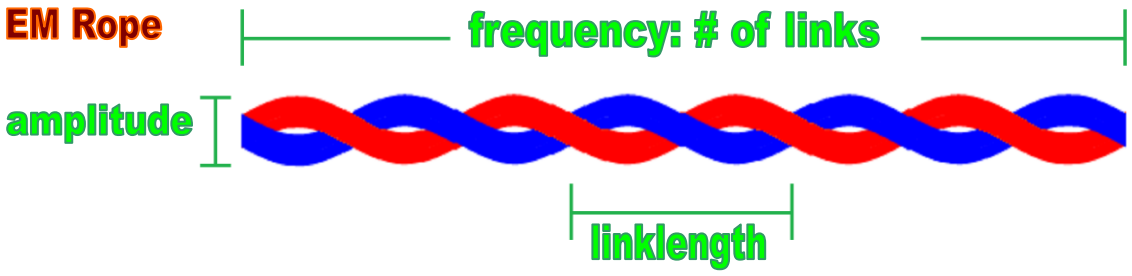
11 The EM rope has all relevant wave properties

Any candidate that wishes to serve as a mediator for light must in some way account for wave features discovered since the 19th Century. Experience indicates that the salient wave properties of light should include frequency, wavelength, and amplitude.

In traditional longitudinal and transverse waves, these parameters are quantitative and dynamic. They are measured with clocks and specified with units such as seconds and meters.



The rope model proposes, in contrast, that these attributes have a structural nature. Take an ordinary, twined, two-strand rope. It is segmented into links, each of which consists of one twist of the rope. To avoid straying too far from convention, we refer to the length of each of these twists as a *linklength*. Frequency then becomes the number links that we count in a given length of rope between two atoms. In an orthogonal direction to the axis of the rope, we find peaks and valleys: *amplitude*.

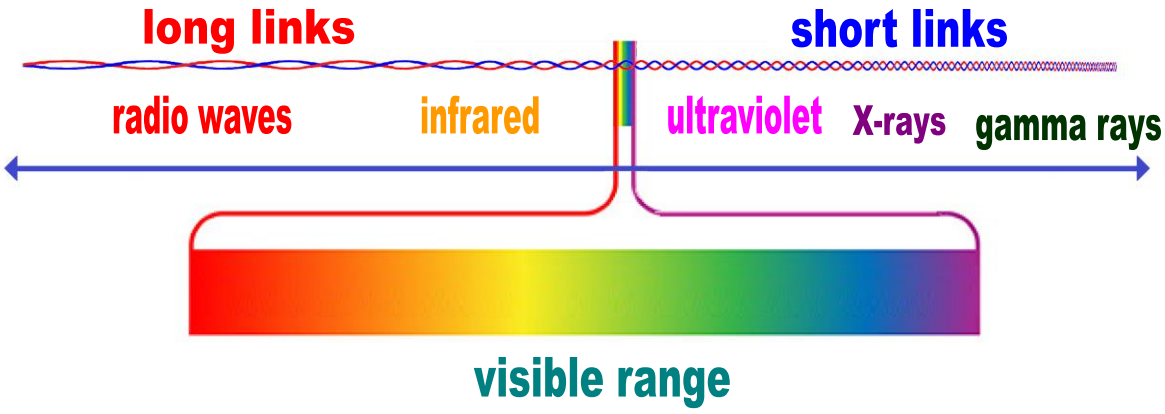


The EM rope incorporates all features of transverse waves. This means that all wave equations applicable to light can be simulated with a rope.

12 Color

The electromagnetic spectrum has a region that falls within the visible range for different living beings. Humans can see anywhere from just above infrared to just below ultraviolet. The differences in colors that we perceive are directly correlated to linklengths, red being the longest and violet being the shortest.

EM Spectrum



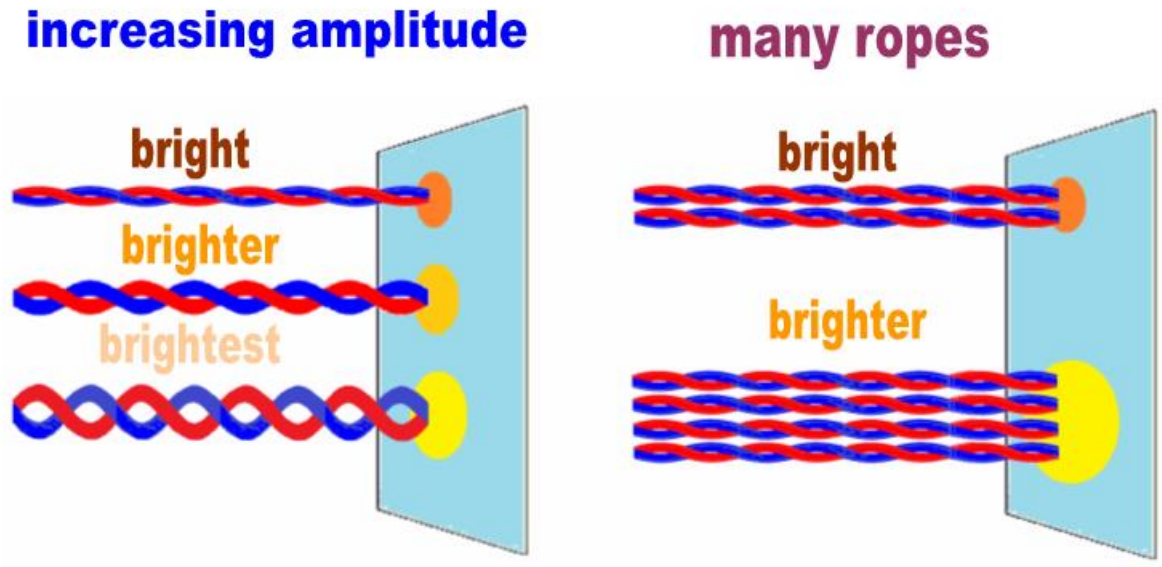
13 Amplitude

Last but not least, the EM rope can also simulate another widely-documented aspect of light: *intensity*. Under the Rope Hypothesis, *amplitude* is simply a taller link: the taller the link, the brighter the intensity of light.

Note that this feature is independent of frequency or linklength. The color red may have the same amplitude as the color blue despite both having different linklengths.

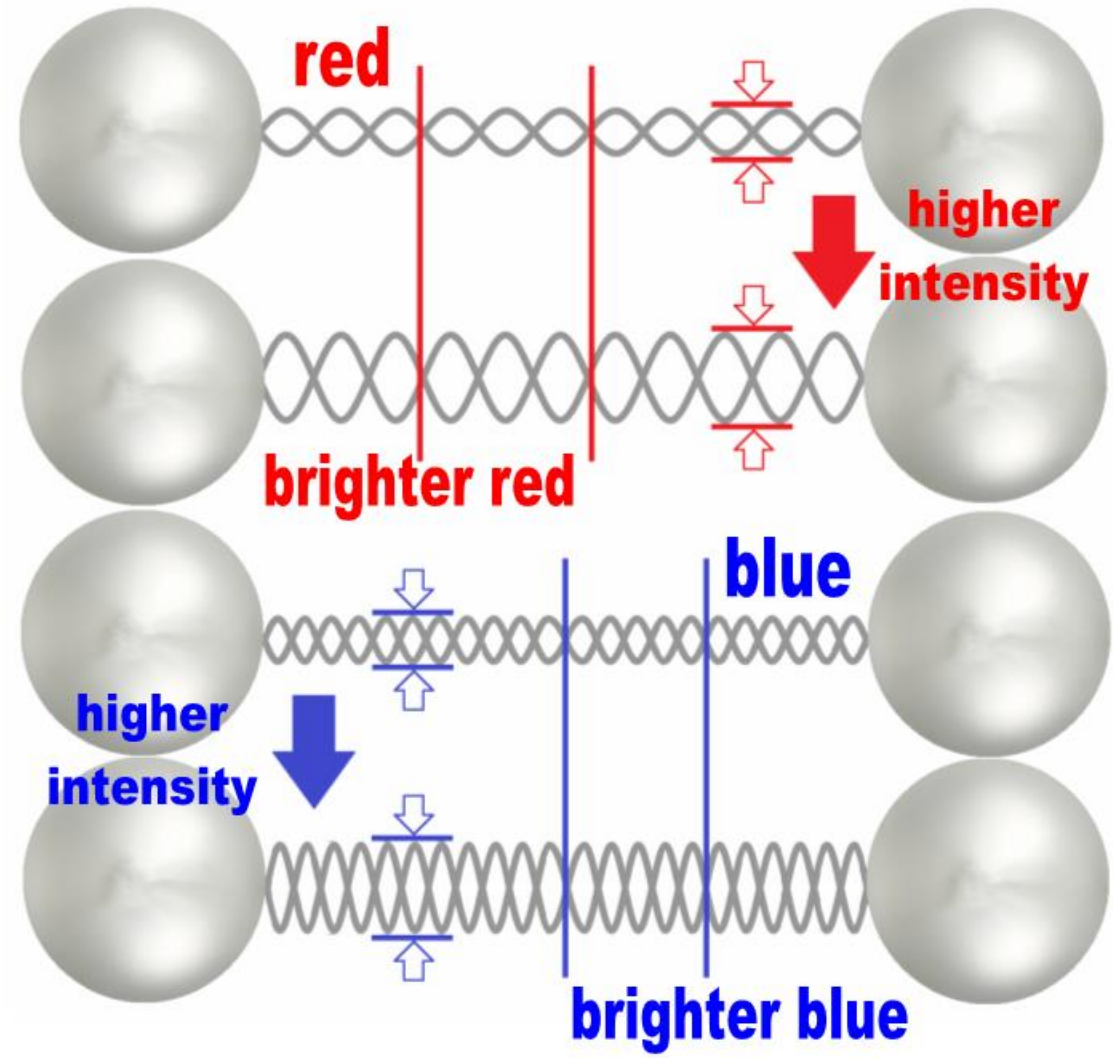
There is, however, another way to increase brightness. We can also have more ropes impinging on a given surface.

Bright, brighter, & brightest



Amplitude

The rope model proposes that intensity of light is a function of amplitude: height of the link. A taller link translates into more intensity.



A rope architecture handily explains why amplitude is detected as intensity. The key is that there is more thread per length of rope.

Similarly, for any given length of rope, there is more thread for higher frequency. This leads many to erroneously attribute higher intensity (*amplitude*) to a change in the color of light (*a function of frequency and wavelength*).

14 Summary of Light

Summarizing the main points of the last few sections:

- Light is mediated by an invisible, intangible entity that has the architecture of a double helix (a rope).
- Torsion propagates along the rope at the constant speed of light according to the wave equation ($c = 300{,}000$ km/s $= f \lambda$).
- Intensity is a function of amplitude: the taller the link, the greater the amount of thread involved, and the brighter light will be.
- Color is a function of link length: the further we move from blue towards the red end of the spectrum, the longer the link.

The comprehensive wave features embodied in the EM rope — *amplitude, frequency, wavelength, undulating structure, straightness/rectilinear propagation, speed, orthogonal electric and magnetic fields, and color* — establishes this secret agent as a promising candidate for simulating light.

15 Checklist of the atom

Unless stated otherwise, for the remainder of this book, whenever we say *atom*, we are referring to the hydrogen atom. It's the simplest atom to use as an example.

- It appears that the atom has two main components: a proton center and an electron that seems to be everywhere around it like a cloud or shell.
- It is theorized that when the electron falls to a lower energy state, the atom releases a 'packet' of energy.
- When the electron rises to a higher energy level, the atom absorbs a 'packet' of energy.
- It is this constant '*Quantum Jumping*' that generates light. It is thus that light originates in the atom.
- When an atom loses its electron, it is said to be *ionized*.
- A flow of these electrons from atom to atom is theorized to be the mechanism underlying *electric current*.
- Atoms form molecules by binding with other atoms in four ways known as ionic, metallic, covalent, and hydrogen bonds.

Any structural proposal for the atom has to account for these architectural and behavioral features.

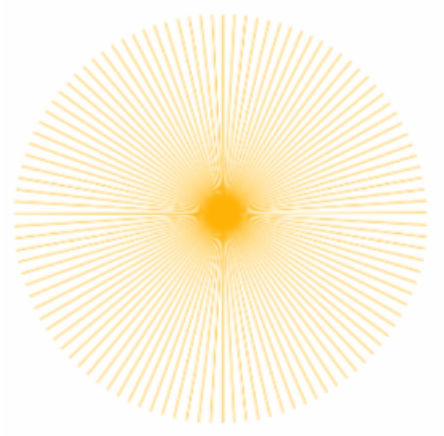
In the coming sections, we will propose the rope architectures for the atom, the proton, and the electron, and alternative mechanisms for Quantum Jump, ionization, and electricity. Concerning the atom, the relevant features to keep in mind are...

- The DNA-like rope binds any two atoms.
- Threads construct both the rope and the atoms.
- The atom is a balloon (electron shell) that encapsulates an urchin-like star (proton). The electron shell is the surface of the atom.
- The electron shell is a membrane that expands and contracts (Quantum Jump).
- Expansion and contraction of the electron balloon torque the EM rope (light).

16 Achitecture of the atom

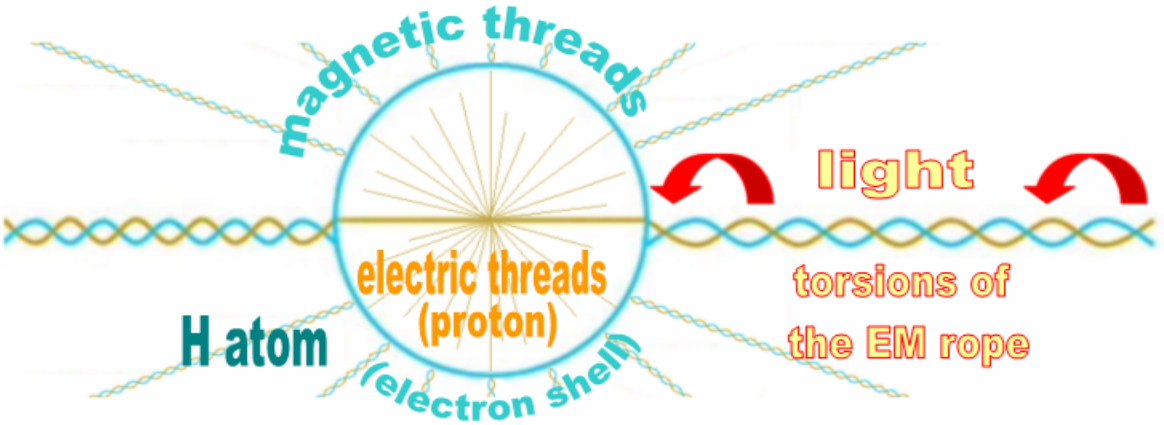
Under the Rope Hypothesis, the two twined threads that mediate light also construct the atom. As the EM Rope approaches an atom, the two strands fork out at its perimeter. One thread continues straight to its center. To keep with convention, we refer to this component as the *electric* thread. Threads from every atom in existence converge upon our atom and meet at its center to form what is known as the *proton*.

The proton is a tiny star constructed by 'electric' threads converging from every atom in existence.



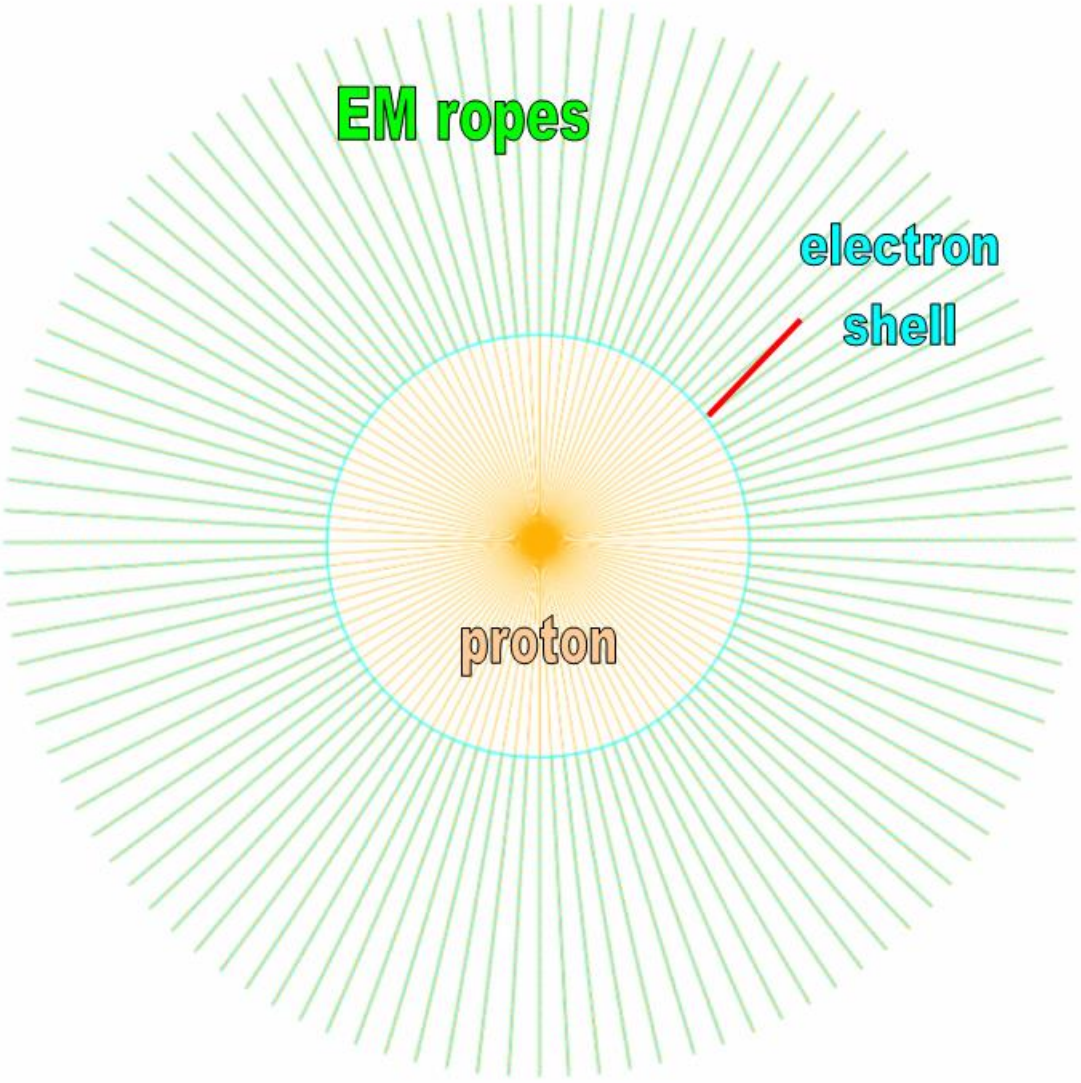
The other strand of the EM rope bends around the perimeter of the atom. If we trace it, we will find that it meets up with an electric thread elsewhere at the perimeter. From there the two continue as a rope to another atom. To keep with convention, we refer to this second fiber as the *magnetic* thread. Threads from every atom in existence converge upon our atom, weave around its perimeter, and construct a 'ball-of-yarn' membrane that encapsulates the proton star.

Constructing the Atom



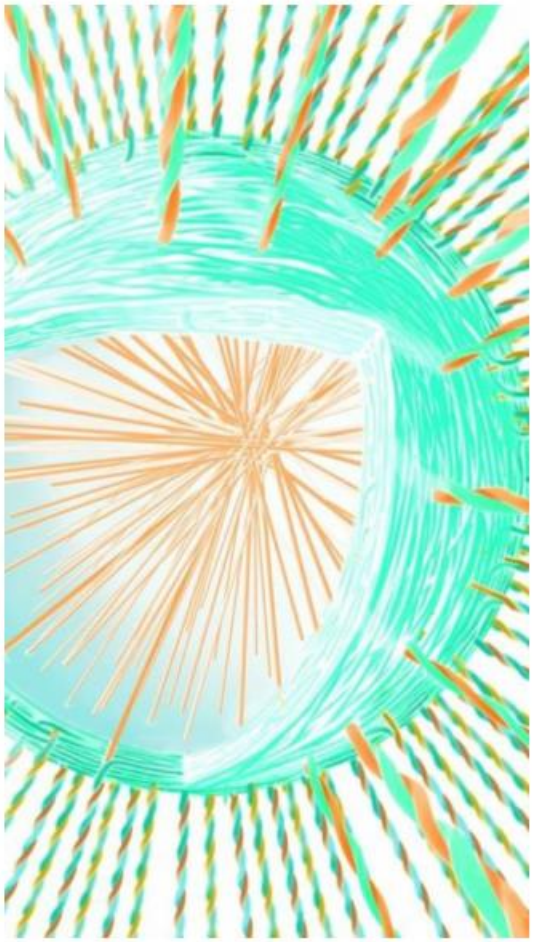
Electric and magnetic threads coil around each other to form a double helix. The threads fork out at the surface of the atom. The electric threads continue straight to its center and form the proton star. The magnetic threads coil around the atom's perimeter, weave a wavy 'ball-of-yarn' membrane, and form the electron balloon that encapsulates the proton.

The 2D Atom



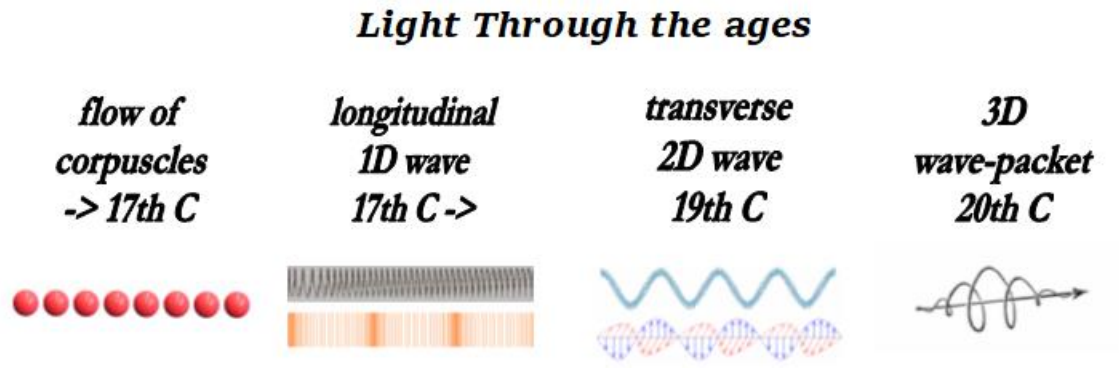
(Credit: David Robison)

The 3D atom

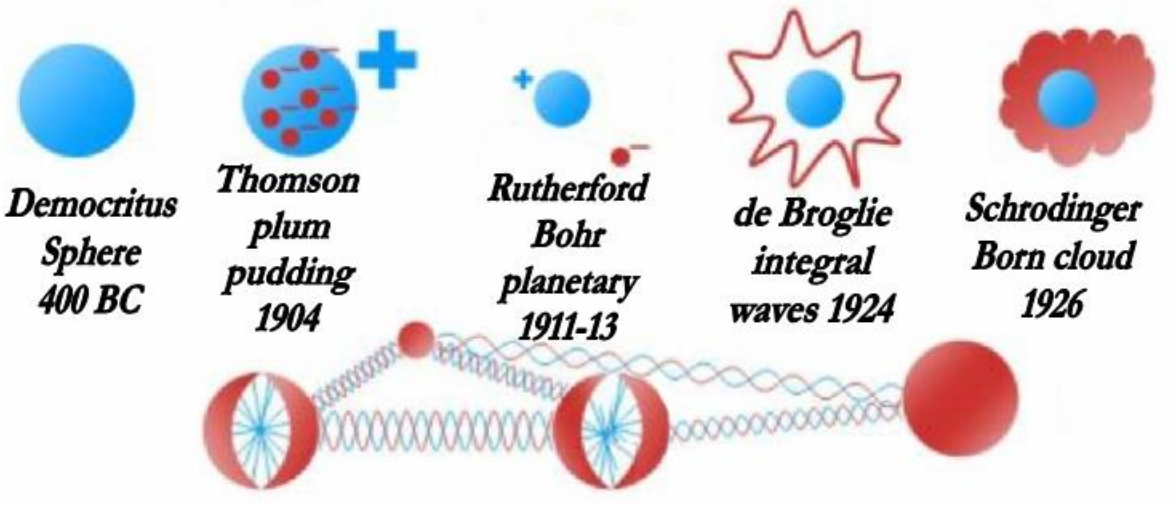


(Credit: Daniel Ferguson)

The Rope Hypothesis leads to the conclusion that no two atoms can possibly be exactly the same. First and foremost, two atoms cannot occupy the same location. And despite being constructed by the same number of threads, the ropes that constitute one atom are not the same that construct another.



21st Century Rope Model of Light
torsions of a physical rope



21st Century Rope Model of the Atom
electron membrane encapsulating proton star

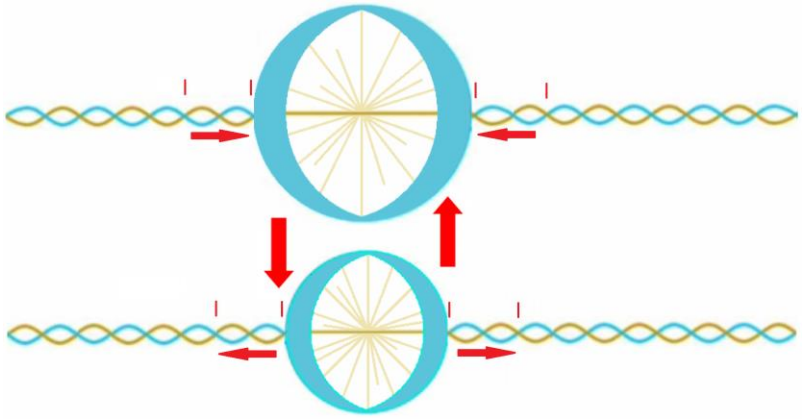
17 Quantum Jumping

The atom has several motions. In this section, we will discuss the expansion and contraction of the electron balloon.

The Rope Hypothesis proposes that the electron balloon expands and contracts consistent with what is known as *Quantum Jump*. When the balloon expands, it absorbs a link of the EM rope; when it contracts, it releases a link of the rope.

Quantum Jump

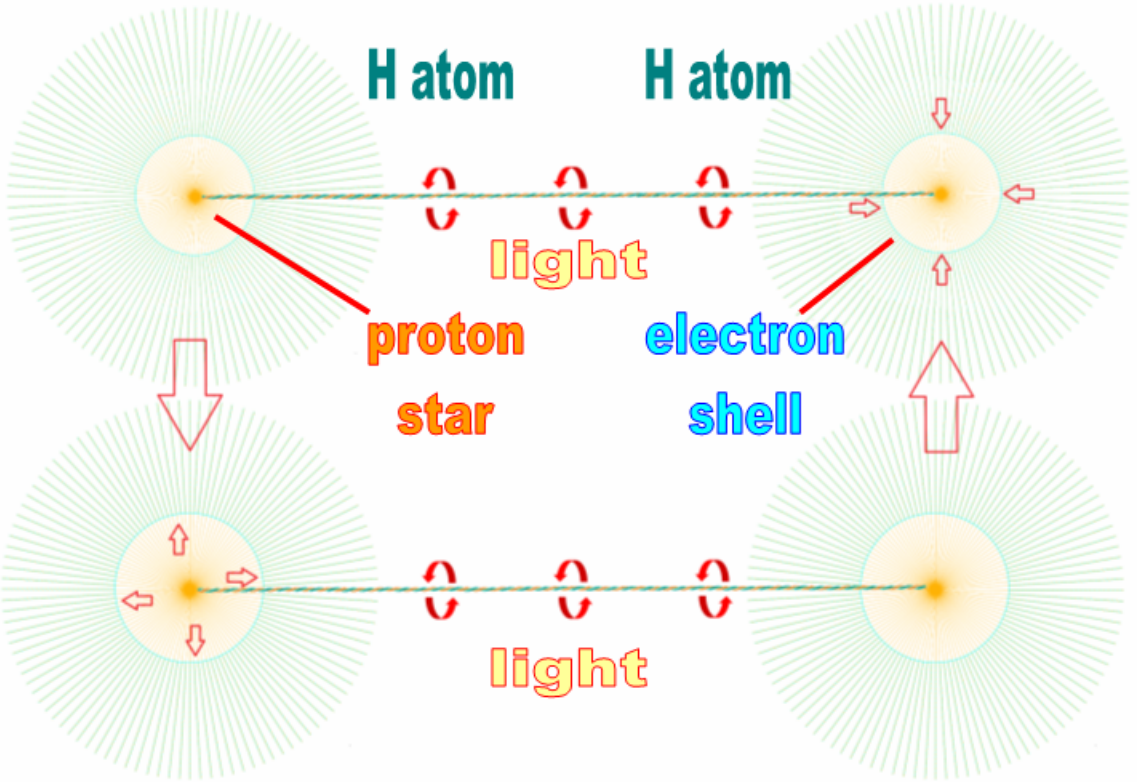
The electron balloon constantly expands and contracts, absorbing and releasing a segment of the EM rope.



All atoms in existence expand and contract. By doing so they induce other atoms to do the same. It is this back and forth expansion and contraction that torques the rope to produce what we perceive as light. In short: atoms pump.

When atoms pump, they relay the linklength to other atoms. This relaying mechanism induces changes in the lengths of the links along the rope. We measure these as changes in frequency, temperature, and color.

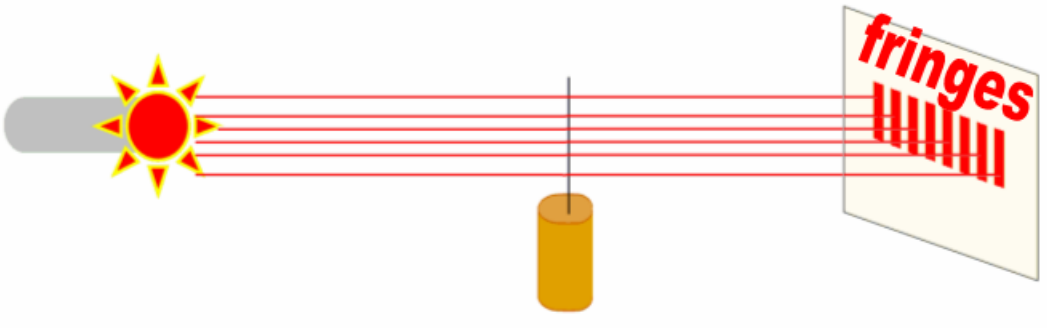
Quantum Jump between two atoms



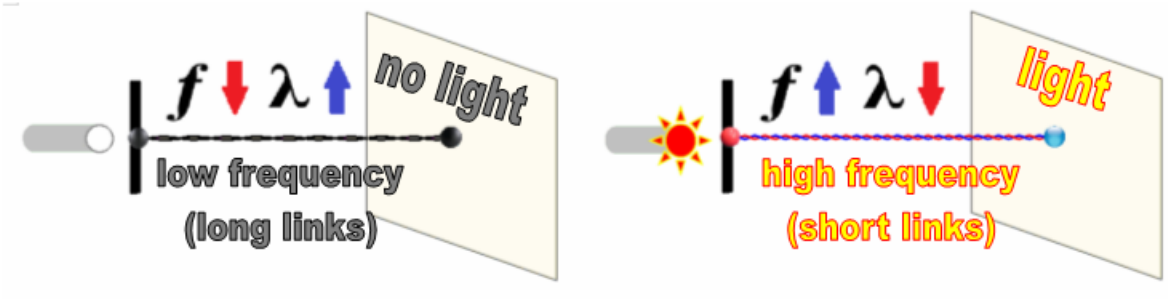
The electron membranes of any two atoms expand and contract. When expanding, the atoms reel in a link of the EM rope. When contracting, the atoms release a link of the EM rope. This constant activity torques the rope between them. This torsion is what we identify as light or electromagnetism. We measure these as frequency, color, and temperature.

18 The quintessential wave experiment

If there is an experiment that exposes the undulatory nature of light, it is the *Double Slit Experiment*. Stick a needle in a cork and shine a laser pointer at it. You will see fringes on the wall. How does light produce these fringes?



The rope model proposes that all atoms are interconnected. Therefore, the atoms that constitute the needle are already bound to the atoms that constitute the wall before we turn on the light. When you press the button on the laser, you increase the frequency of participating ropes (*that is, you increase the number of links and decrease their lengths pursuant to* $\mathbf{c} = f\,\lambda$). This impels the beam of light to jolt into the visible regime.



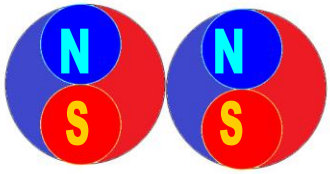
For simplicity's sake, we will focus on two atoms, one on each side of the needle, both connected to the same atom on the wall. We will analyze only the two extreme scenarios: fully in-phase and fully out-of-phase.

If the links of these two ropes are in phase they will enhance the pumping of that atom on the wall. In other words, if both ropes torque into the surface of the electron balloon in the same way at the same time, they maximize the balloon expansion. This is like pushing a playground swing as it reaches its peak. The effect is known as *constructive interference*.

If instead, the threads of one rope are oriented north-south (vertically) at the atomic surface and meet the threads of the other rope which are pointing east-west (horizontally), then the ropes are 'out of phase'. In other words, if both ropes do not torque into the surface of the electron balloon in the same way at the same time, they prevent the full expansion of the electron membrane. The balloon of the atom on the wall will attempt to expand in response to the stimulus applied by the torsion of the first rope. However, halfway into the membrane's expansion, the torsion signal of the other rope, converging half a link later, stifles this explosion. Using the swing analogy, this is like pushing on the swing as it comes towards you. This quelling effect is known as *destructive interference*.

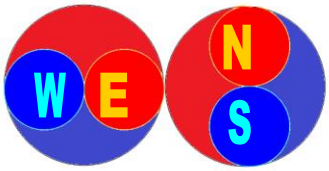
The Rope Hypothesis

constructive interference



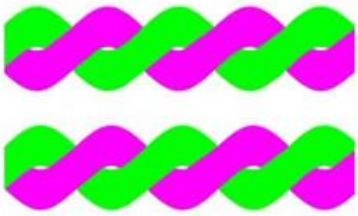
ropes in phase

destructive interference

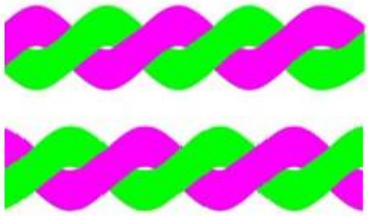


ropes out of phase

constructive interference



destructive interference

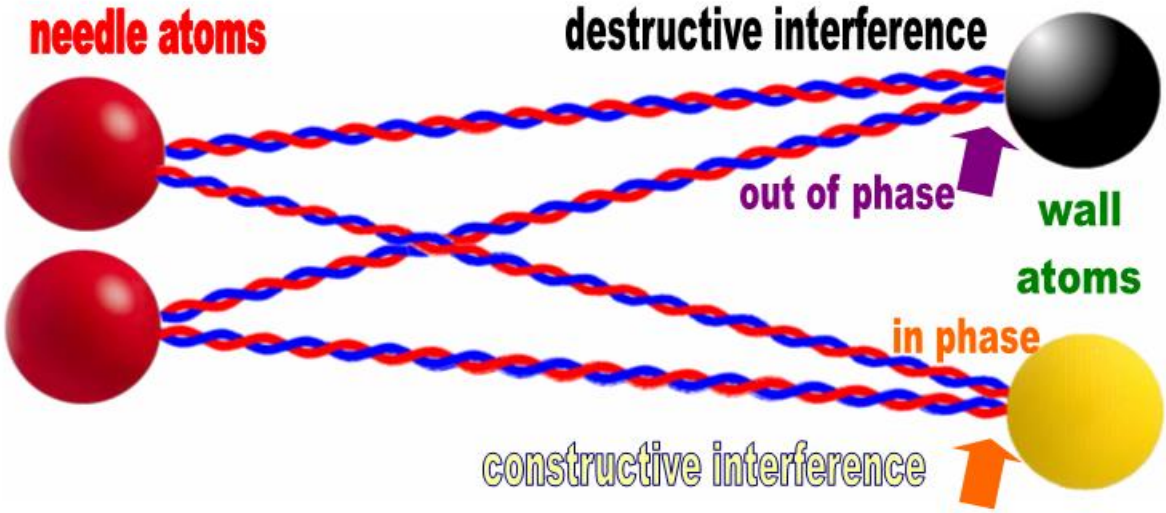


Constructive and destructive interference regions are due solely to distance from needle atoms to wall atoms.

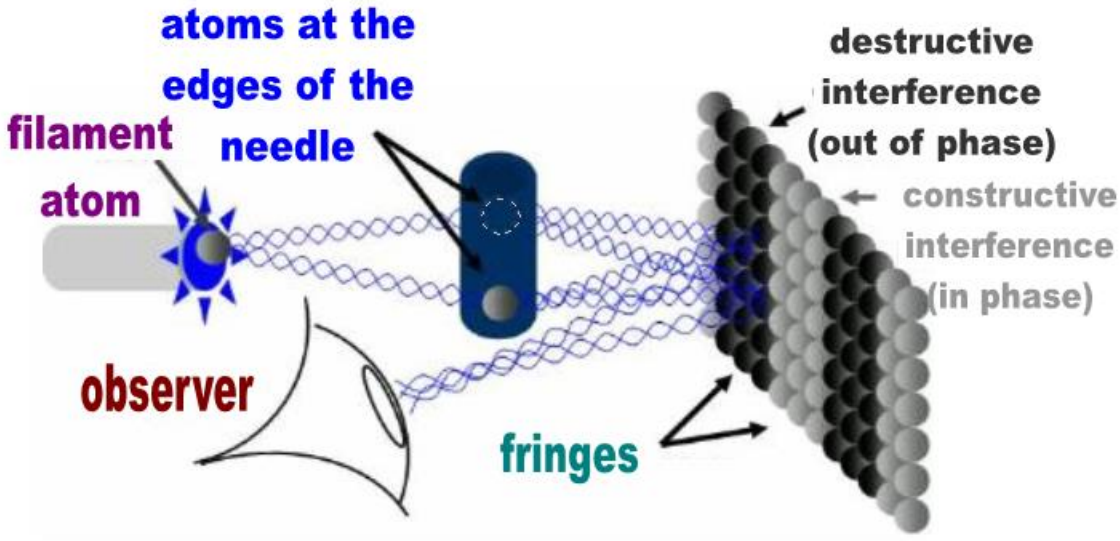
Constructive interference (bright region). Let's look at the rope that binds an atom on one side of the needle to an atom in a bright fringe on the wall. We compare it to the rope binding an atom on the other side of the needle to the same atom on the wall. In this case, the two ropes converge upon the surface of the wall atom with threads oriented in the same direction (e.g., north-south vs north-south).

Destructive interference (dark region): We now look at the same two atoms of the needle. Two ropes from those atoms are also interconnected with an atom in a dark fringe of the wall. As a result of the difference in angle and therefore of distance, one rope converges a fraction of torque later for the same link length (e.g., north-south vs east-west).

In between the constructive and destructive regions, we find a gradient of phases consistent with ropes converging at different fractions of a link.

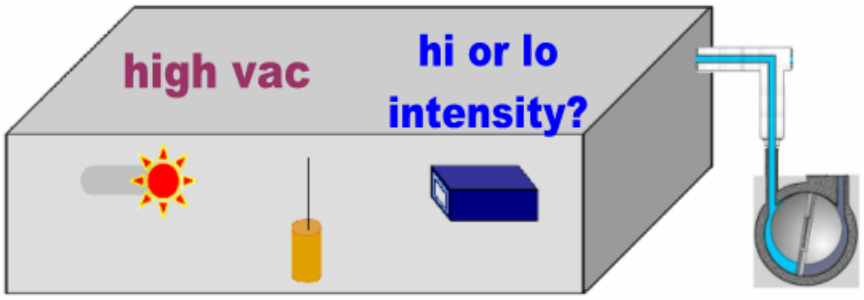


It is important to keep in mind that atoms of the observer's eyes are connected by EM ropes to the atoms that comprise the wall. The observer detects high-frequency torsions from the constructive regions and low-frequency torsions from the destructive regions directly.

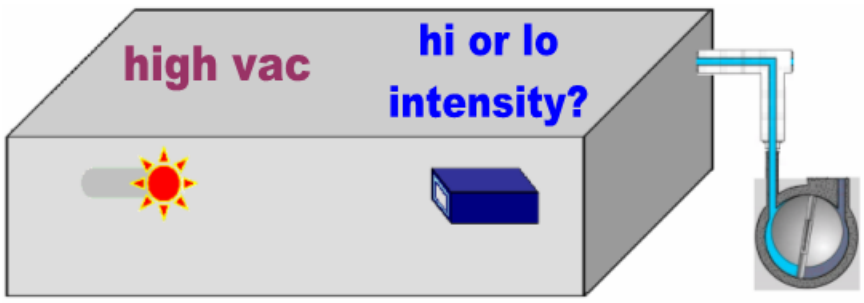


19 Slit-in-a-Vac

Let's modify the slit experiment to experience another aspect of light. We replace the wall in the slit experiment with a photomultiplier (*a device that counts 'blips', i.e., measures the intensity of light*). Place the needle in a vacuum chamber and pump the air out. Will the intensity of light detected by the photomultiplier rise, stay the same, or decrease?

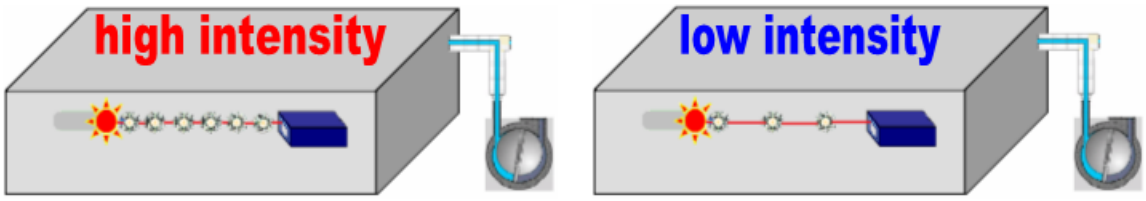


Actually, we can explore this question just as well without the needle assembly. We merely shine a laser at an intensity detector at atmospheric pressures and then pump the chamber down. Same question: Will the intensity rise, remain the same, or drop? In other words, will the mean free path of light increase now that we have removed material obstacles from the enclosed environment?



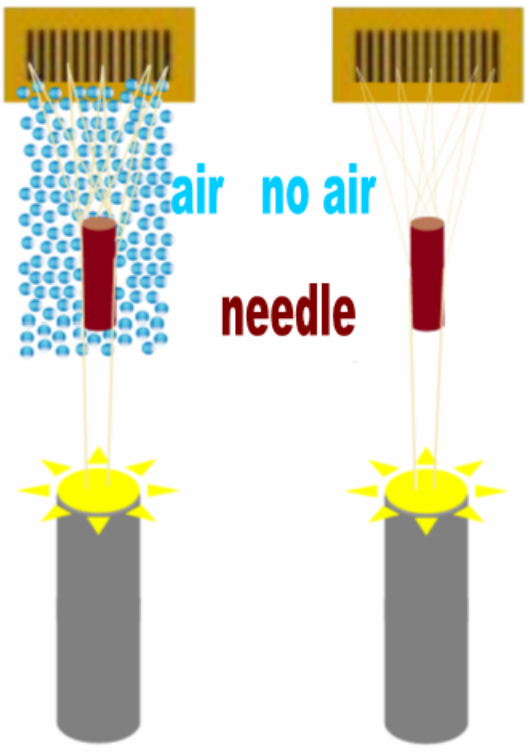
Under the rope model, atoms relay signals to other atoms through the twined mediator that already binds them. As we remove atoms that serve as bridges for the relaying of torsions, there are fewer and fewer agents contributing to the tandem. The intensity of light should fall or, at best, remain the same.

Fewer EM ropes = lower intensity



As the chamber is pumped down, there are fewer atoms available to relay torsions to the photomultiplier.

Ambient ***Slit-in-a-Vac***



The Slit-in-a-Vac experiment proposes placing the entire slit assembly under vacuum. As the chamber is pumped down, the number of ambient molecules decreases. The rope model proposes that intensity should decrease or remain the same as there are fewer molecules to convey the signals from the needle to the wall. [2]

2 Hans Geiger performed a variation of this experiment in 1908 and showed that removing a sheet of mica that is obstructing the slits results in sharper images on the screen. Unfortunately, the experiment did not settle whether the mica refracted more of the beam or allowed more particles to go through after it was withdrawn. Comparing atmospheric versus high vacuum pressures will clarify whether intensity rises or falls.

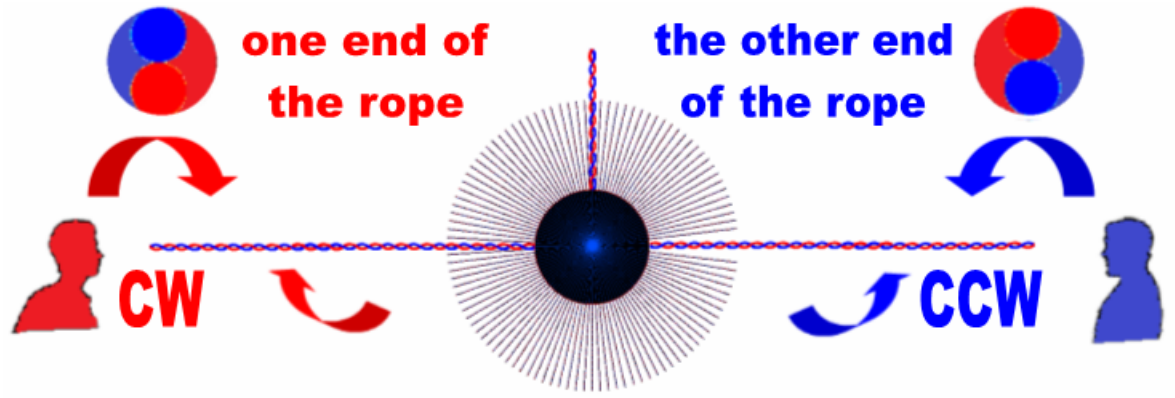
20 Entanglement

It has been established that when an atom emits two photons in opposite directions, when you verify that one rotates clockwise (CW), the other one spins counterclockwise (CCW). If you induce the first one to spin CCW, the second one instantly rotates CW. The phenomenon is known as *Quantum Entanglement*.

Under the Rope Hypothesis, entanglement is a function of the structure of the EM rope. Look along at an ordinary rope from one of its ends. Rotate it CW. Your friend staring at the rope from the opposite side should see his end turn CCW.

Now turn the rope CCW. Your friend should see his end spinning CW. This is not an issue of measuring the time it takes for the signal to reach the other end once you revert its spin. It has to do with the fact that a taut rope can only turn in one direction at a time.

Untangling Entanglement



21 Slipping and sliding

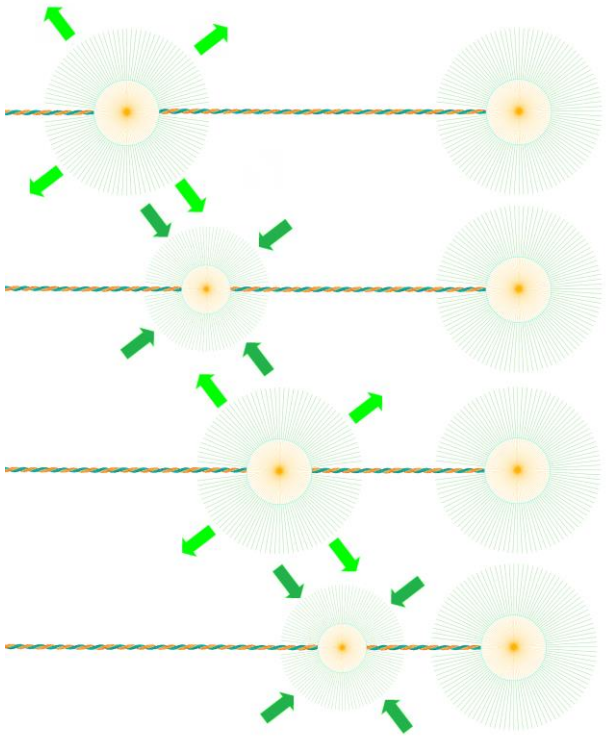
Experience shows that the more you torque a rope of a given length, the shorter will be the distance between its ends. If the EM rope doesn't stretch, shouldn't the atoms at its terminals come closer together? Otherwise, where is the extra rope coming from? Are the atoms actually coming closer together or is the rope creating matter from the void?

Static scenario. If we torque the rope we increase the number of links and the links are shorter. The EM rope borrows threads from atoms at its ends. The atoms at its ends also borrow threads from other ropes that converge upon them. Threads slide along ropes and atoms frictionlessly. Atoms do not need to move; ropes do not create matter.

Dynamic scenario. When an atom does move, it *slides* along the rope, reeling in threads that are going to construct it. The atom likewise releases threads in its rear. An atom slips through the rope like a bead gliding along the wire of an abacus. The length of a rope increases when two atoms move apart. Thus, the movement of the atom can be independent of the movement of the rope.

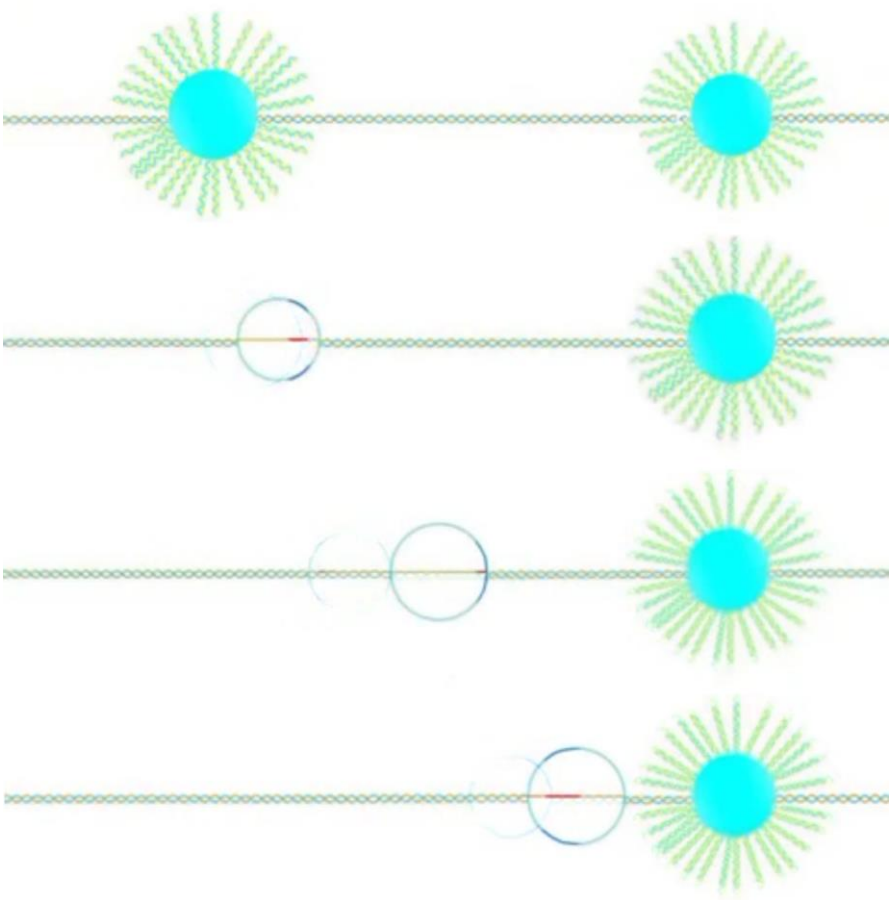
This feature of the Rope Hypothesis readily explains why the speed of light is independent of the speed of the source. [3] An atom does not push on the EM rope like a train that carries a passenger walking through its aisles. It, therefore, can never overtake the torsion propagating along the rope it is sliding through.

While Quantum Jumping, an atom slides along the EM rope like a bead gliding through the wire of an abacus. The atom constantly reels in threads when the electron balloon expands and releases threads when it contracts.



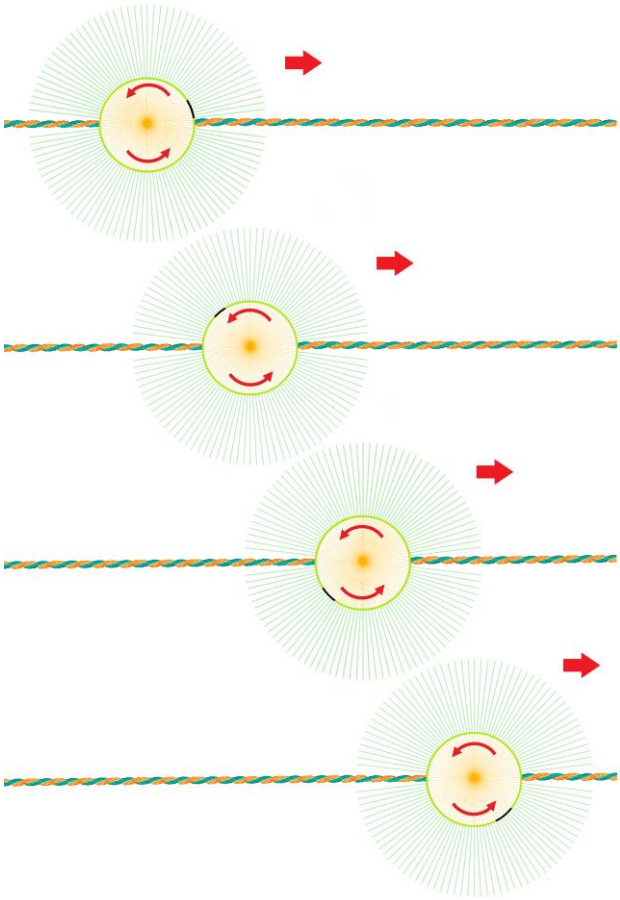
3 Albert Einstein's second postulate of the Principle of Relativity.

Torquing the EM rope further does not necessarily change the distance between two atoms. The EM rope reels in threads from the universal Single Thread through the atoms at its ends. The speed of light is independent of the motion of the source because an atom reels in rope as it moves forward.



22 The atomic top

The electron shell allegedly has the ability to spin. There could be an alternative physical interpretation for this phenomenon under the Rope Hypothesis. It is just as likely that the threads comprising the electron balloon are sliding around its spherical surface, giving the impression that the shell is spinning.



Under the Rope Model, the electron shell may 'spin' in a novel way. As the atom glides along the EM rope, the magnetic threads slide around the electron shell at great speeds, giving the impression that the atom is rotating.

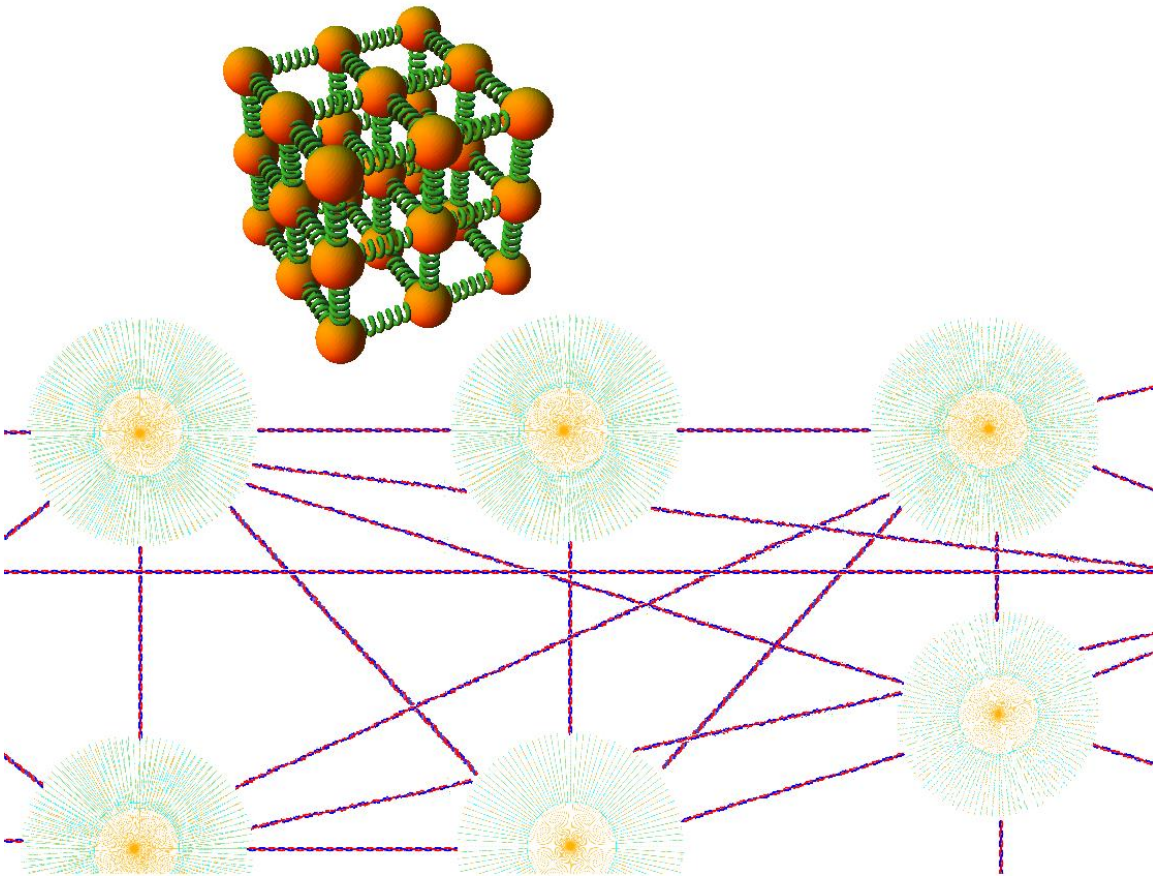
23 Good vibrations

In addition to all the motions covered so far, it has been thoroughly established that the atom also vibrates back and forth, up and down, sideways, and all directions in between. Under the rope model, it is theorized that the rest of the atoms in existence incite these vibrations. The nearest neighbors are likely to be the ones that exert the greatest influence because of their proximity to the target atom. These atoms influence it through their own vibrations, collisions, quantum jumping, molecular binding, and other behaviors and interactions. All atoms are constantly vibrating because of incessant universal activity.

An exception to this can be found in what is known as the *Mossbauer Effect*. The atom is believed to send signals without vibrating (*or vibrating imperceptibly*) because it is held firmly in a crystal lattice. Think of the atom as acting like a cannon that is securely anchored to an enormous platform. The cannon spits out cannonballs without recoiling. Likewise, the atom emits light without recoiling.

Vibrating Springs

Atoms in a crystal lattice are often described as held together as if with vibrating springs.



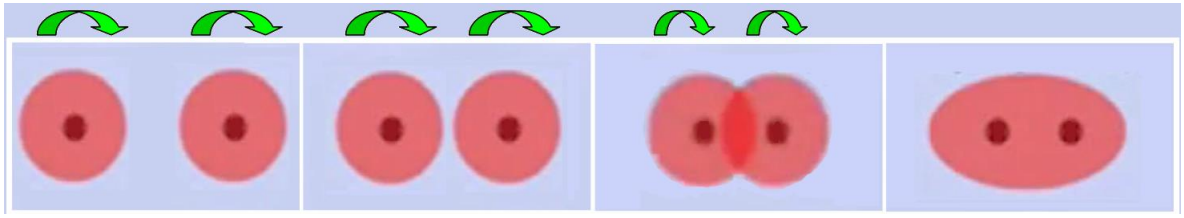
The Rope Hypothesis proposes that the atoms are indeed physically interconnected and vibrate with respect to each other. Depending on the rigidity of the crystal, torsions may propagate without shaking the atom.

24 Molecules

There are several ways two atoms can bind to form a molecule, including what are known as covalent, metallic, ionic, and hydrogen bonds. A known case of covalent bonding is the hydrogen gas molecule (H2). If two H atoms are spinning in the same direction, they merge into each other to form H2. If instead, they're spinning in opposite directions, they collide and bounce away from each other.

The Rope Hypothesis proposes that a *covalent bond* is formed when the outer electron membranes of two atoms blend. The membranes screw into each other when the atoms are spinning in the same direction. One membrane of one atom draws in the membrane of the other. When spinning in opposite directions, they can't. Think of a machine arm spinning a balloon CW. If you spin the other end CCW, the balloon will contort into a figure-8. The only way to get it to be spherical again is to spin your end CW.

Two CW spinning hydrogen atoms bonding covalently to form the H2 gas molecule

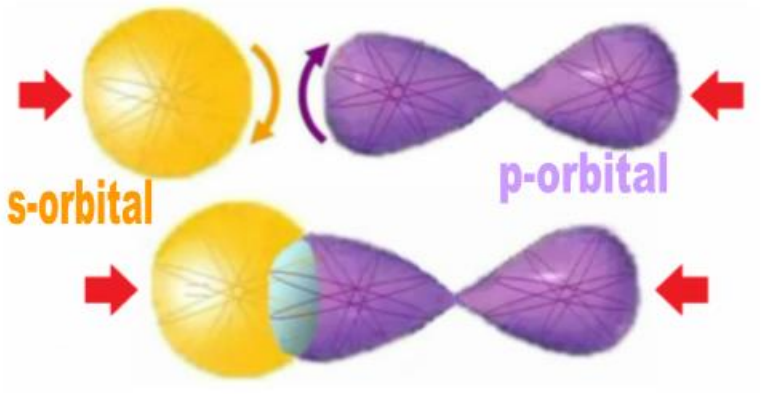


Ionic bonds are weaker than covalent bonds because the electron shells don't blend. Instead, they engage in a loose electrostatic relationship in which the shells are tenuously in contact.

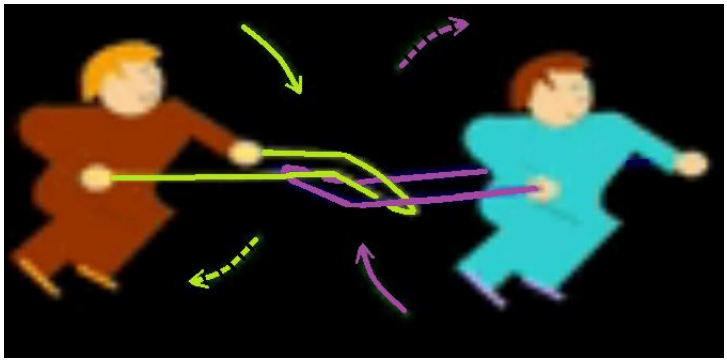
Under the rope model, the electron membranes spin against each other, latching like the ropes of two people jumping rope in the same direction too close to one another. Unlike in covalent bonding, the membranes do not merge. Instead, they sweep through the other, creating a friction-based bond.

For instance, let's assume that the outer spherical electron membrane of one atom (typical of an s-orbital) is spinning CW from your vantage point. It can form an ionic bond with the figure-8 electron membrane (p-orbital) of another atom that is also spinning CW.

Ionic Bond



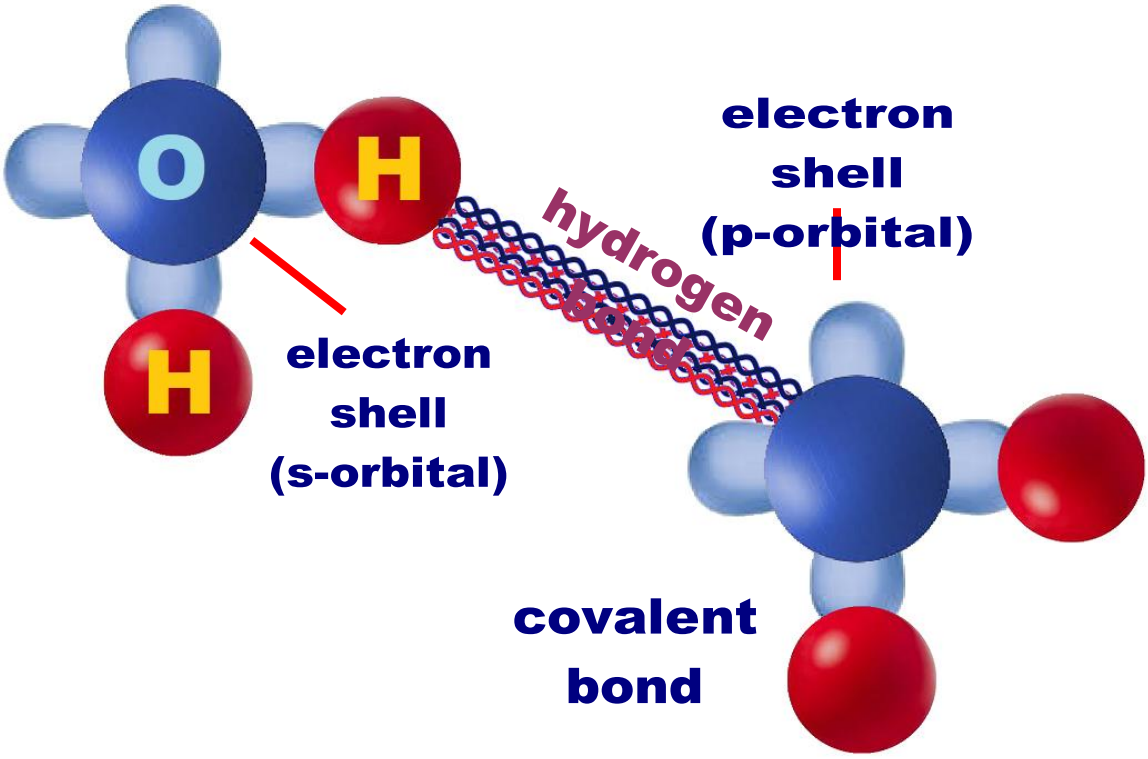
Spherical outer electron membrane spinning CW sweeps across another membrane also spinning CW.



An ionic bond is like the brothers Axel and Rod who are skipping with their ropes a bit too close to each other. As Axel's rope comes up behind him it latches on to Rod's rope coming down in front of him.

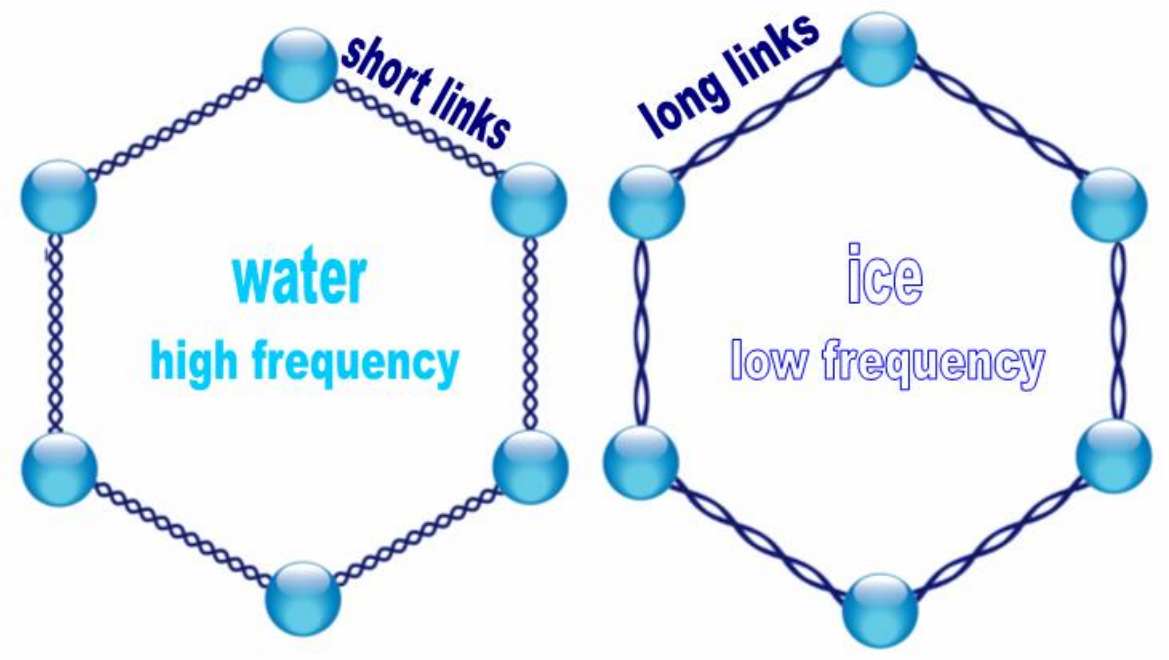
The *hydrogen bond* loosely interconnects water (H2O) molecules. This bond consists of EM ropes that have long links (*i.e., low frequency*). Temperature is known to be a direct function of frequency: the higher the frequency, the hotter the substance. The Rope Hypothesis is consistent with this relationship in that linklength is inversely proportional to frequency which is a function of atomic pumping rate: the longer the link, the colder the substance. As the temperature drops, the links become even longer and the rope becomes stiffer. Water morphs into ice.

Hydrogen bond connecting water molecules



Turning water into ice

Water molecules are interconnected by low-frequency EM ropes (long links). This is known as a hydrogen bond. If the temperature drops further, the links become even longer and vibrations between atoms and molecules gradually dissipate. The EM rope eventually stiffens and water turns into ice.



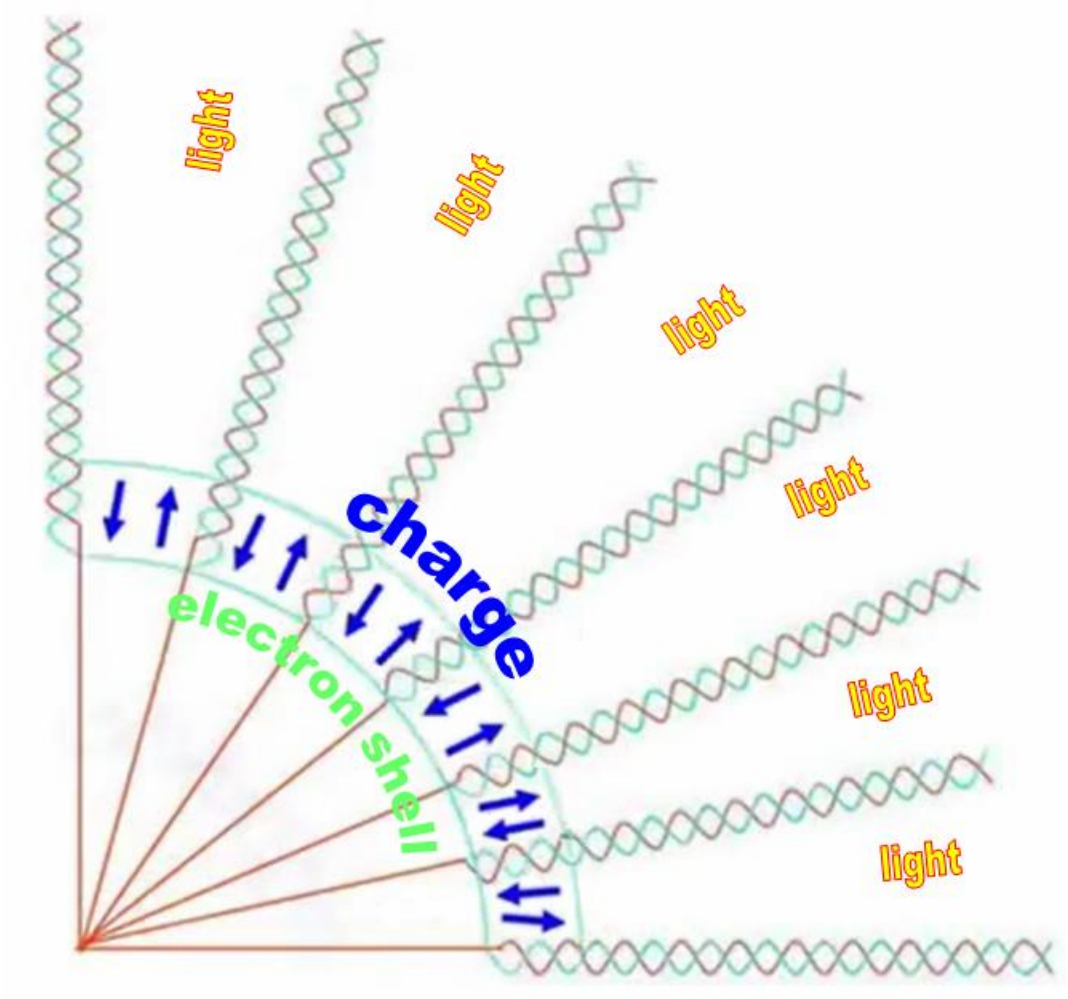
25 Charge

When the membrane (the electron shell) expands during the Quantum Jump fluctuation, it reels in a link of the EM rope, and when the shell contracts, it releases a segment. It is there, during that breakneck back-and-forth pulsation, that the two strands of the rope constantly fork out and coil back again.

When the atom pumps, the point at which the threads branch out shifts rapidly between two distances from the atom center. This causes the EM rope to wind and unwind a link length repeatedly at the atom perimeter.

The constant winding and unwinding of the rope on the surface of the electron generate almost imperceptible friction. The aggregate of frictions of every rope forking out on the surface of the atom is what we detect as *charge*.

Charge

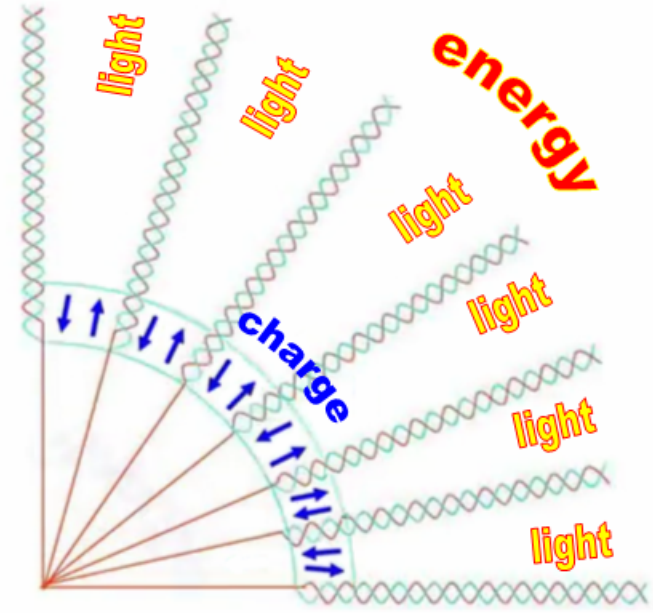


As the shell expands during Quantum Jump, the atom absorbs a link of rope. When the shell contracts, it releases a link of rope. Charge consists of the aggregate of friction at the boundary of the electron membrane generated by the constant back-and-forth forking out and coiling of the threads.

26 Energy

We now arrive at a physical interpretation of the mystical word *energy*. Atoms are theorized to release packets of energy radially.

The Rope Hypothesis proposes that the aggregate of frictions all along the surface of the electron membrane generates a glow or region of activity that surrounds the atom like a halo. It is this radial emission and absorption which we identify as *energy*.



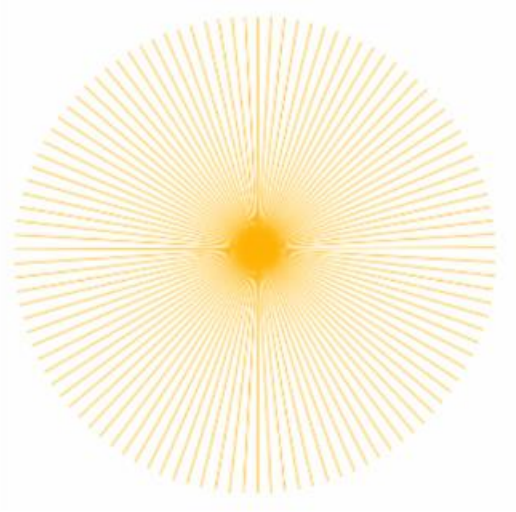
Energy consists of the aggregate of light emanating radially from an atom as it Quantum Jumps.

Energy is directly proportional to frequency. The higher the flickering rate of an atom, the greater the number of goosebumps it triggers along a given EM rope (frequency), and the shorter are the links that comprise it (linklength). It is the link of a rope that is absorbed and released that is identified as a 'packet of energy'.

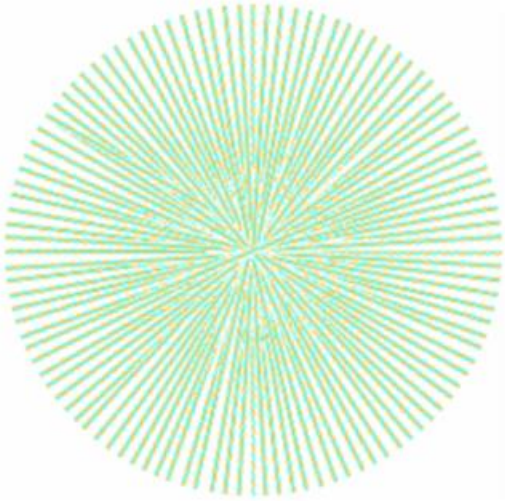
27 Why the neutron has no charge

The Rope Hypothesis version of the neutron gives us an idea of why the neutron lacks the property known as 'charge'. Whereas the proton star consists of convergence of *electric threads*, the neutron is a juncture where *electromagnetic ropes* intersect.

Proton
***convergence of* <u>threads</u>**

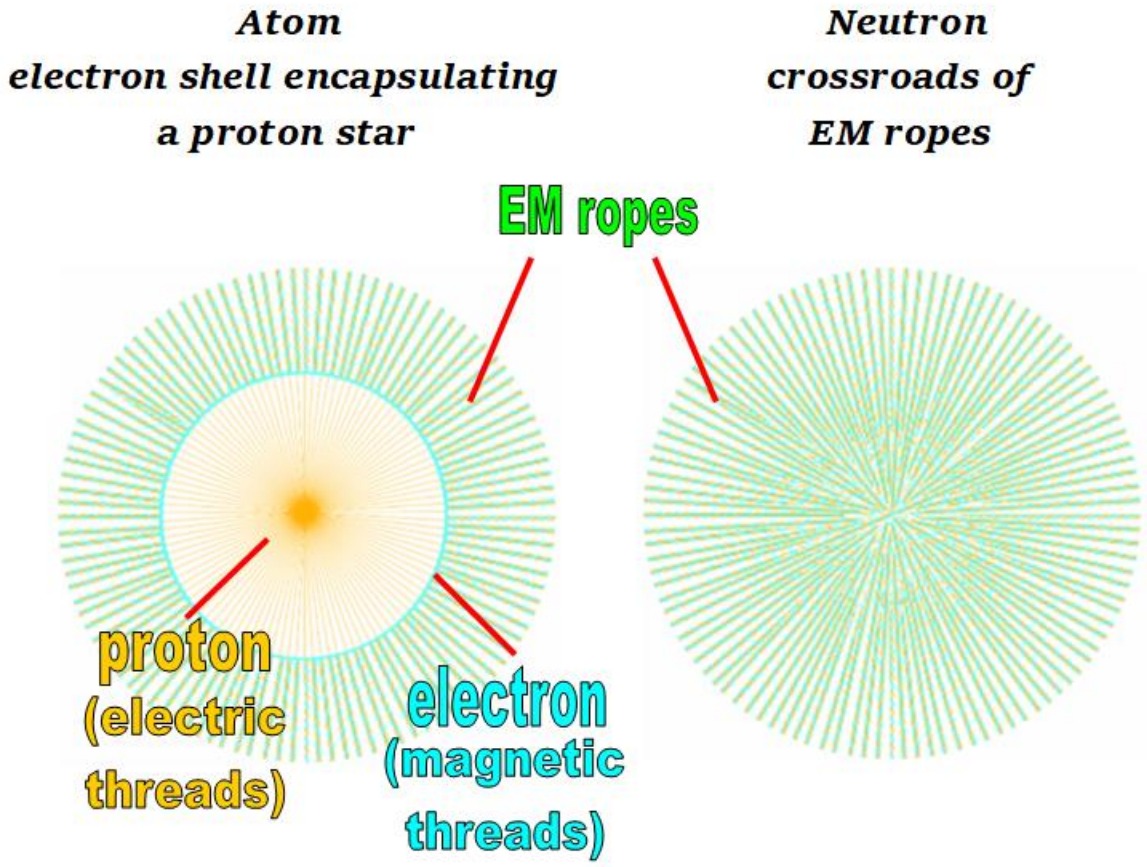


Neutron
***convergence of* <u>ropes</u>**



There are convergences of EM ropes that we call *free neutrons*. Unlike nuclear neutrons, free neutrons stand alone outside the atom and are theorized to decay into H atoms within 15 minutes.

The neutron's architecture explains why it has the approximate mass of a hydrogen atom yet lacks 'charge'. Whereas the atom possesses an electron shell that pumps back and forth, producing friction at every point on its surface (*i.e., charge*), the neutron has no such encapsulating membrane to generate the same effect.

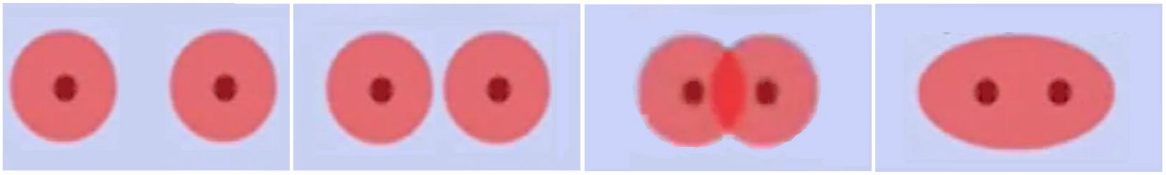


28 Electricity

The Rope Hypothesis emphasizes that electrons are not discrete orbiting beads. The electron is a balloon that *encapsulates* the proton. This assumption results in a different mechanism for how electricity works.

When the distance between two hydrogen atoms shortens, the EM rope that connects them is gradually reeled into the atoms. What happens next if the atoms spin in the same direction (say, CW), their electron shells blend to form the familiar figure-8 shape of hydrogen gas (H2).

Two H atoms merging to form the H2 gas molecule



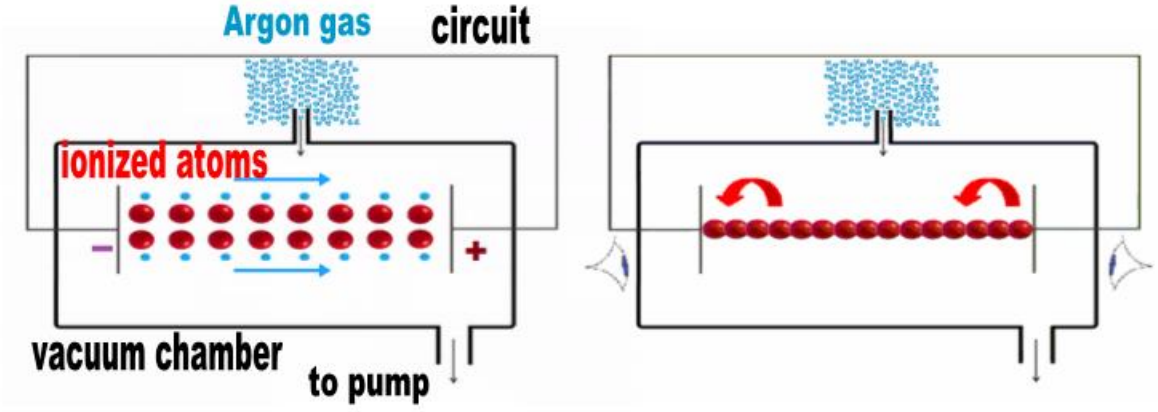
Imagine now a series of merged electron membranes. We refer to this as a *serpentine*. The rope model proposes that electricity consists of the spinning of this serpentine. Electricity can be likened to a drill bit twirling in place. Electric current doesn't flow; electricity spins!

traditional version of electricity: flow of bullets

proposed version of electricity: drill bit spinning in place

traditional current: flow of electron beads

electricity (Rope Hypothesis): spinning of a serpentine



29 Voltage

The typical analogy used to explain voltage consists of two water tanks at different altitudes. The point of the analogy is to show that there is a difference in potential between the upper and the lower tank. Water flowing downwards through an interconnecting pipe simulates the flow of electron beads.

The first practical batteries had lead terminals immersed in a sulfuric peroxide (H_2SO_4) bath. The lead reacts with the sulfuric peroxide and negatively charged electrons begin flowing to the positive terminal.

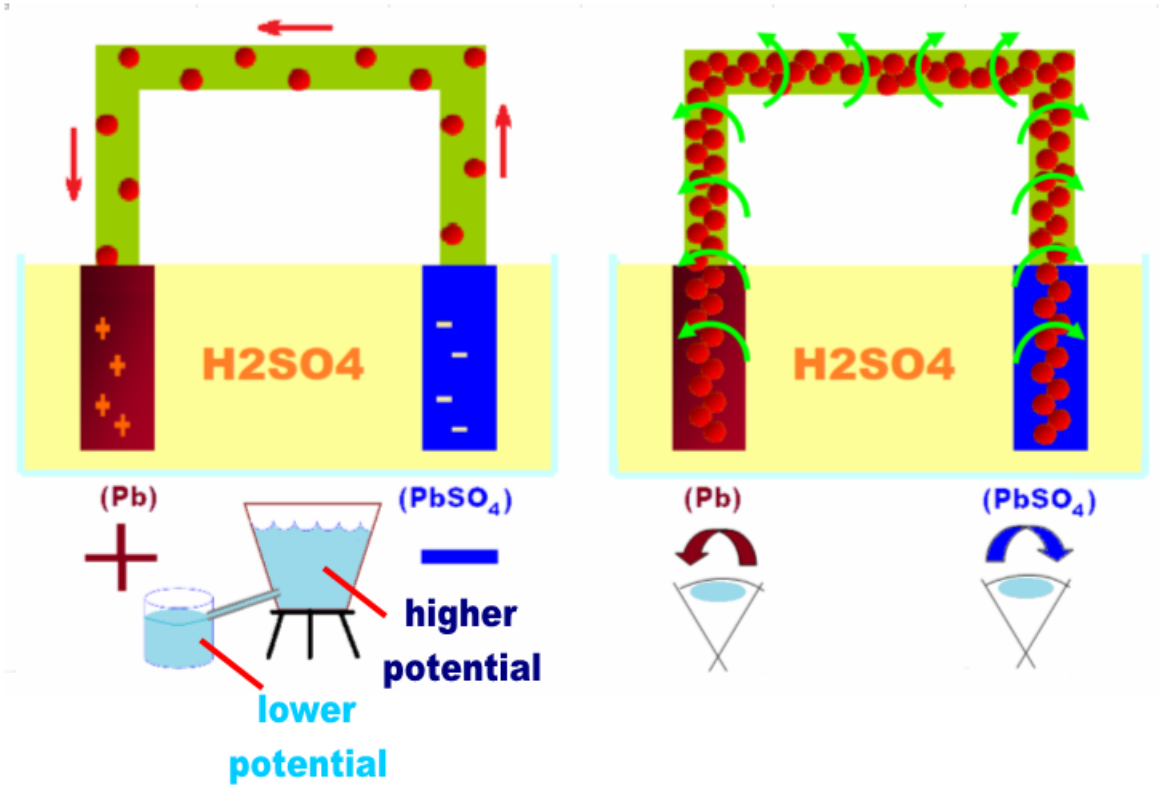
Under the Rope Hypothesis, the chemical reaction compels the serpentines (rows of merged atoms) of one of the lead terminals to rotate CW. This induces the serpentines comprising the wire connected to the terminal to also rotate CW along its entire length. A person looking at the wire at the other end will see the serpentines spin CCW. Keep in mind that it is not the wire that is spinning, but the rows of atoms that comprise it.

Voltage is not an abstract difference of potential involving pluses and minuses. Voltage is CW and CCW spinning of a row of atoms or molecules.

Lead Battery

traditional voltage difference in potential

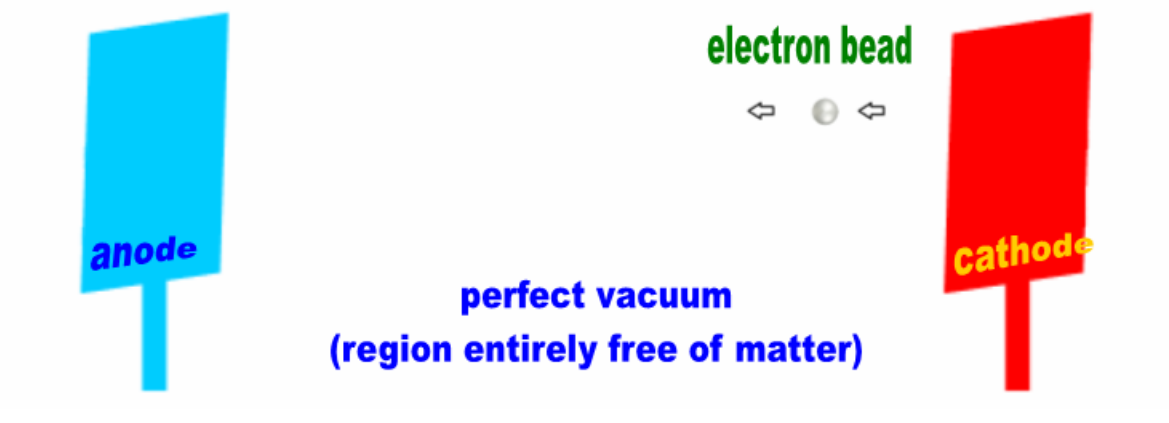
The rope model of voltage CW and CCW spinning of merged electron shells



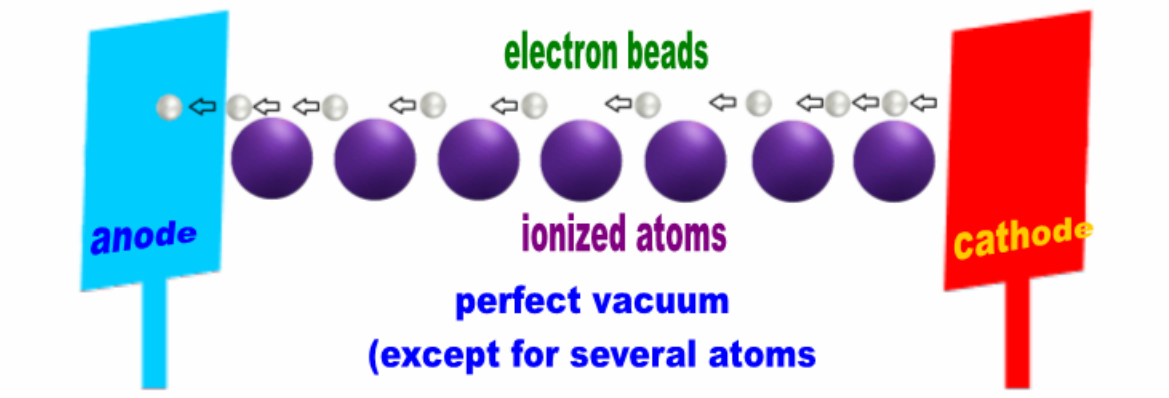
30 Electricity-in-a-Vac

What would happen if we hold current and voltage constant between cathode and anode and continue to pump the vacuum chamber? Will current eventually stop flowing?

Can electron beads flow through perfect vacuum?

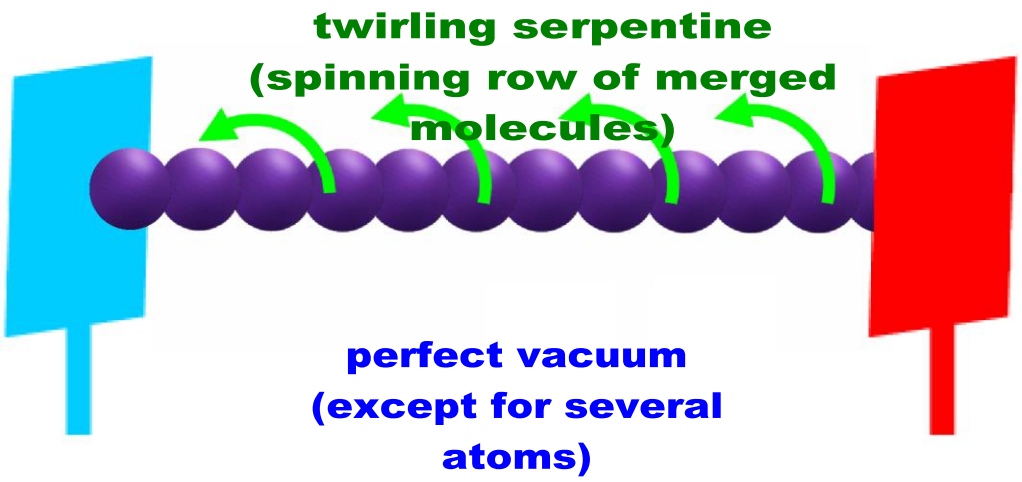


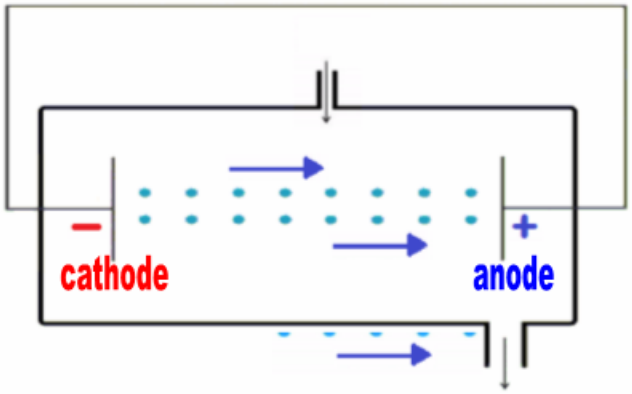
... or do we need matter to conduct electricity?



If we remove atoms, a series of electron bullets would have less obstruction and this should increase the current. Experience shows otherwise. Current stops flowing at some point. This suggests that electron beads cannot flow through perfect vacuum under any voltage. Atoms must be present. A conductor is made of atoms and not of the absence of matter.

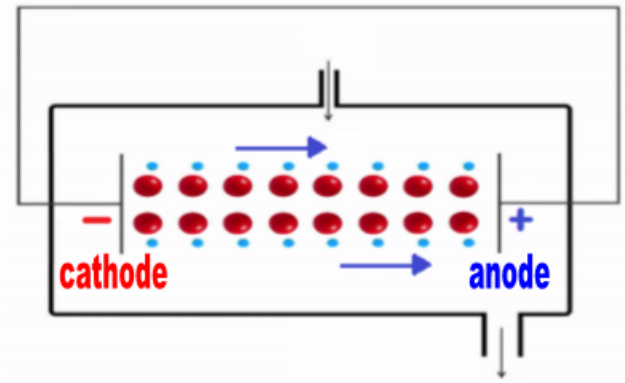
Accordingly, the Rope Hypothesis proposes that electric current is not present unless atoms serve as mediators. The model suggests that electricity is mediated by a continuous string of merged atoms stretching from cathode to anode which we call a serpentine. Thus, 'flow of current' is a serpentine that twirls in place. Think of a string of balloons merged in tandem, surface to surface. You torque the first one and the entire line spirals in place as a helix.





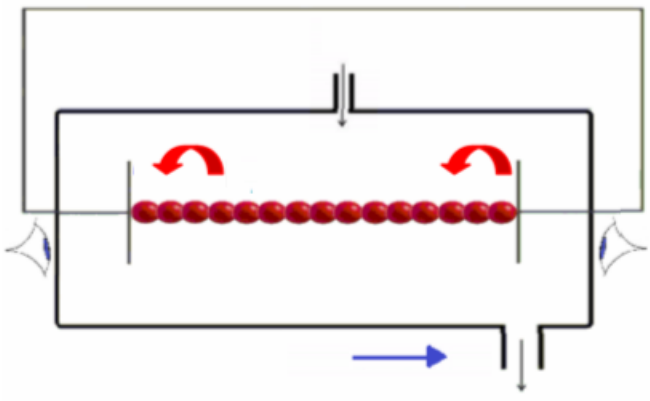
Quantum electricity

Electron beads flow without atoms



Classical electricity

Electron beads flow from atom to atom



Rope Hypothesis electricity requires atoms

serpentine spins in situ

31 The Checklist of Magnetism

Magnets have the following properties:

- A magnetic 'field' encapsulates a magnet.
- The magnetic field consists of exotic '*matter in motion*'. [4]
- A magnetic field consists of '*lines of force*'.
- Lines of force are physical **objects**. [5]
- Lines of force sweep around a magnet and through its center.
- Lines of force enter the traditional south pole and exit the north pole.
- Like poles repel and opposite poles attract.

These features and attributes as well as the mechanisms underlying them need to be explained.

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4 James Maxwell, A dynamical theory of the electromagnetic field, Phil. Trans. 155 (1865) 459 – 512

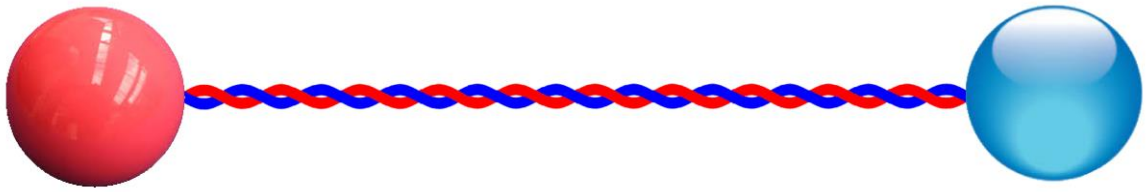
"field… the space in the neighbourhood of the electric and magnetic bodies… in that space there is matter in motion"

5 Michael Faraday, On the Physical Character of the Lines of Magnetic Force, Philosophical Magazine 3 (4), (June 1852) in Experimental researches in electricity, Vol. 3, Bernard Quaritch, London (1855) 407 - 437

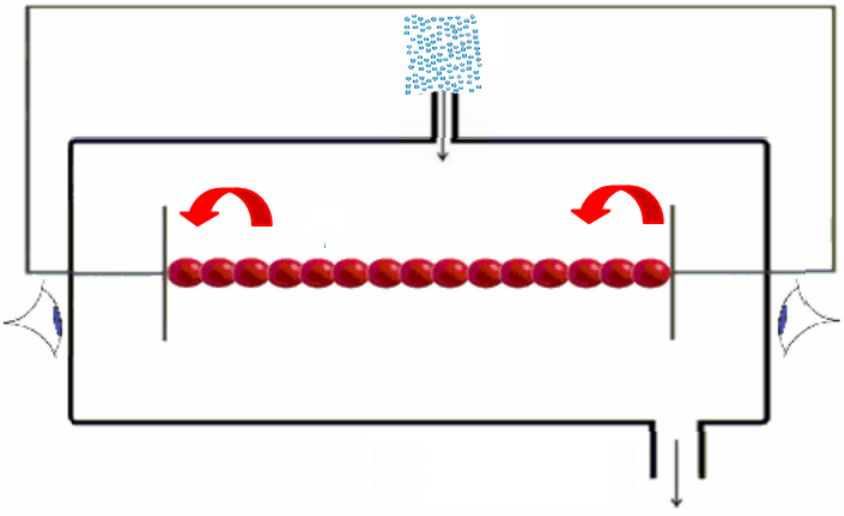
"I cannot conceive curved lines of force without the conditions of a physical existence in that intermediate space."

32 The nature of a magnetic field

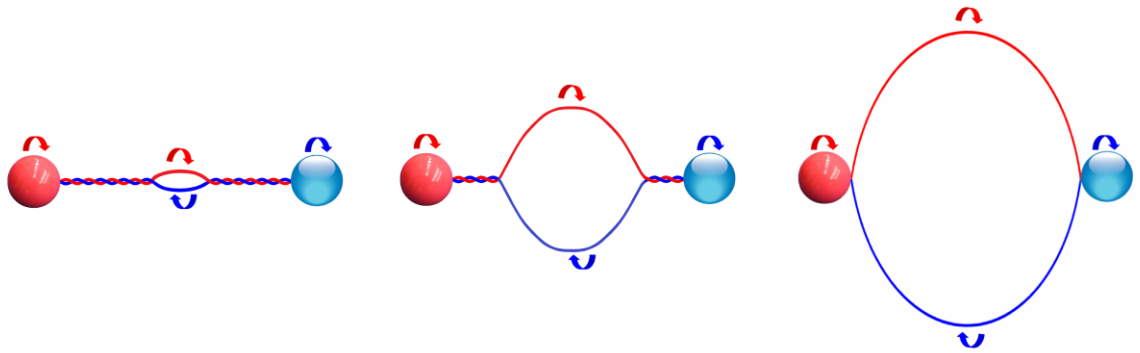
Let's recap and emphasize a couple of the important points we've made so far to set the stage for understanding *what* a magnetic field is under the rope model. We held that all atoms are interconnected by EM ropes and that these ropes are comprised of two twined threads which, to keep with convention, we respectively call *electric* and *magnetic*.



We further proposed that electricity consists of a row of merged electron shells that spins in place: *a twirling serpentine*.

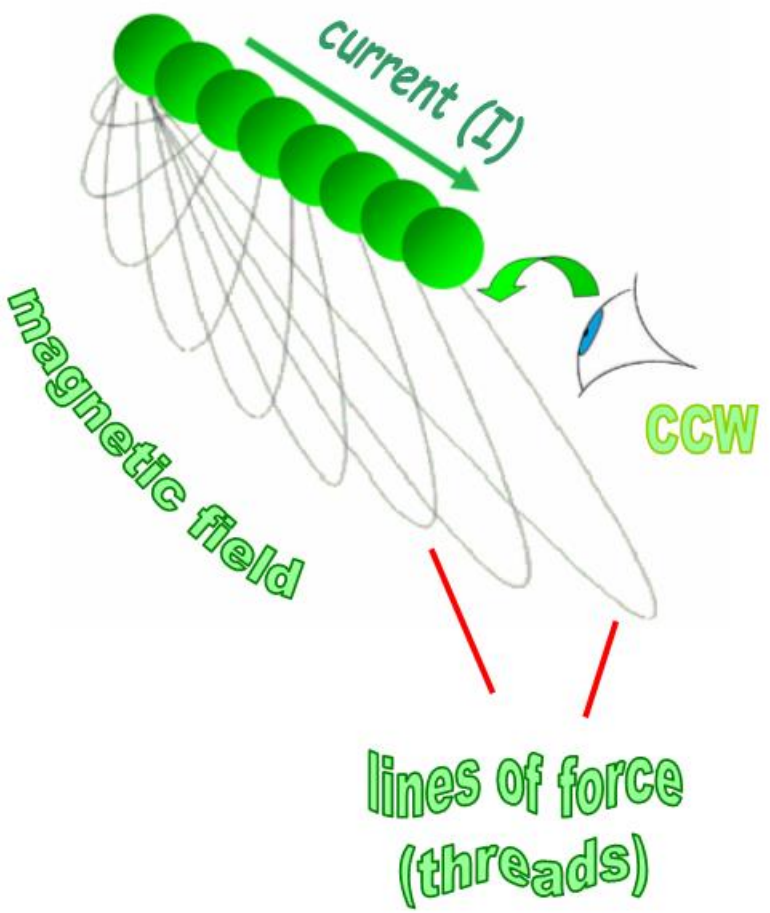


We now propose that when two atoms spin at extremely high speeds, for instance, when they are stimulated by electrical induction processes, the EM rope that binds them unwinds.



The EM ropes interconnecting all of the atoms comprising a serpentine also unwind and swing around the entire serpentine. These swinging threads are what we identify as '*lines of force*'. We call the aggregate of these threads a '*magnetic field*'. The threads (i.e. magnetic field) are spun in the same direction as the serpentine (row of merged atoms).

Spinning Serpentine
(For simplicity, a single thread is shown.)
The magnetic 'field' runs perpendicular to current (I)

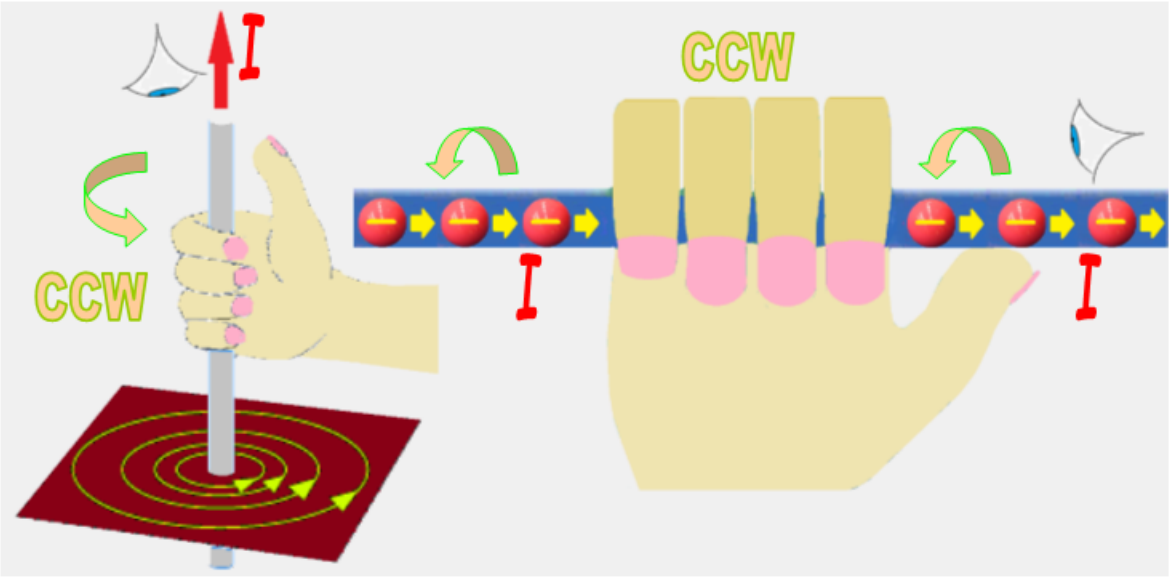


33 The right-hand rule

Experience shows that electrons don't run straight, but rather spiral along a wire. According to the right-hand rule if you point your right thumb at your eye, your thumb points in the direction of the current and the electrons spiral CCW. Your curled fingers point in the direction of the magnetic field (also CCW). The rope model is consistent with the right-hand rule in that the threads spin in the same direction as the serpentine that spins them.

The right-hand rule

A magnetic field sweeps CCW
when your right thumb points to your face
(i.e., direction of current, which also circles CCW).

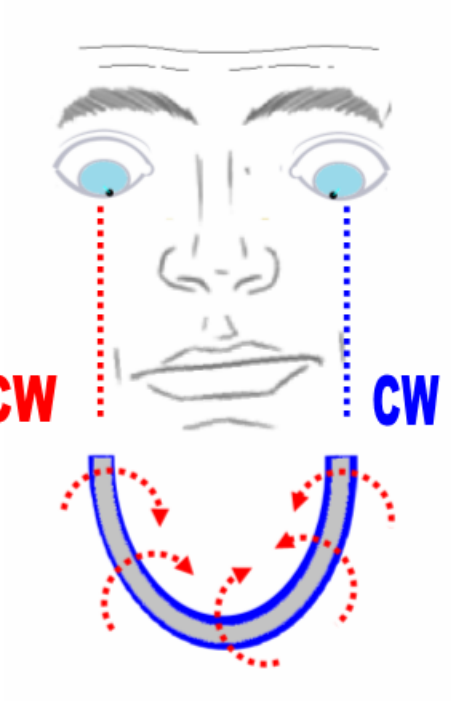


34 Curving a live wire

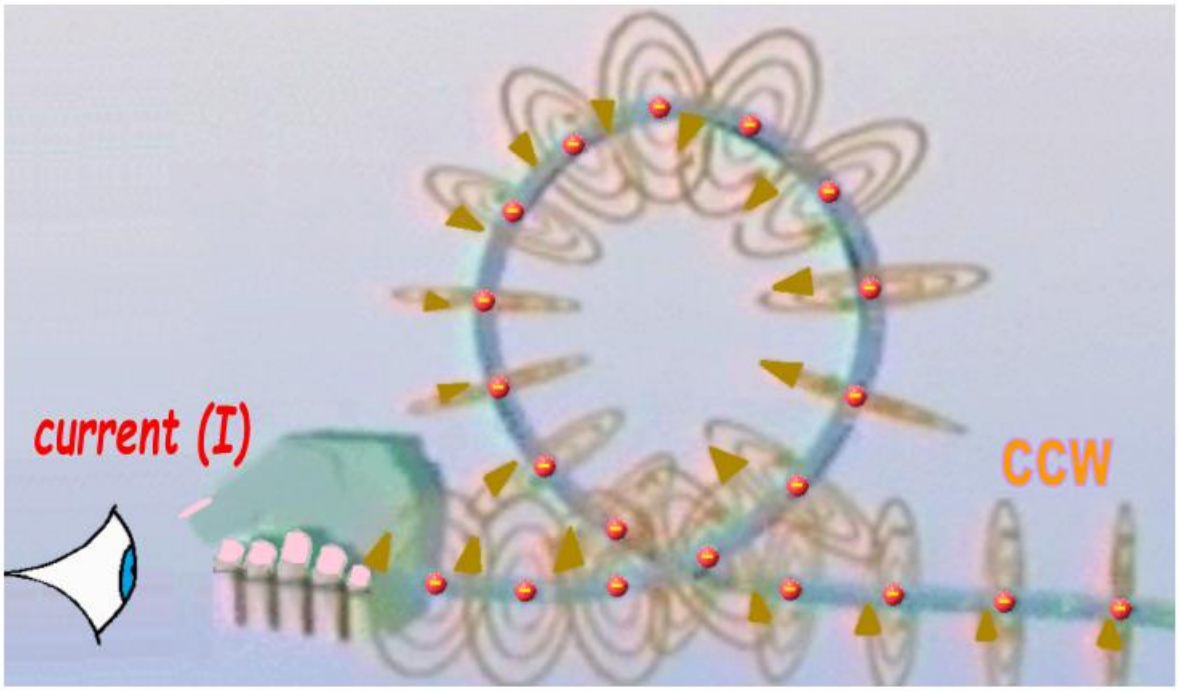
If you curl a string into a 'U' with one end pointing at your left eye and the other pointing to your right, spinning one end CW will induce the other end to spin CCW.

The same principle applies to the serpentines in a live wire curled into a 'U'. You will note that the magnetic field directions at both tips are opposites of each other. One will be spinning CW, and the other will be spinning CCW.

Curving the wire



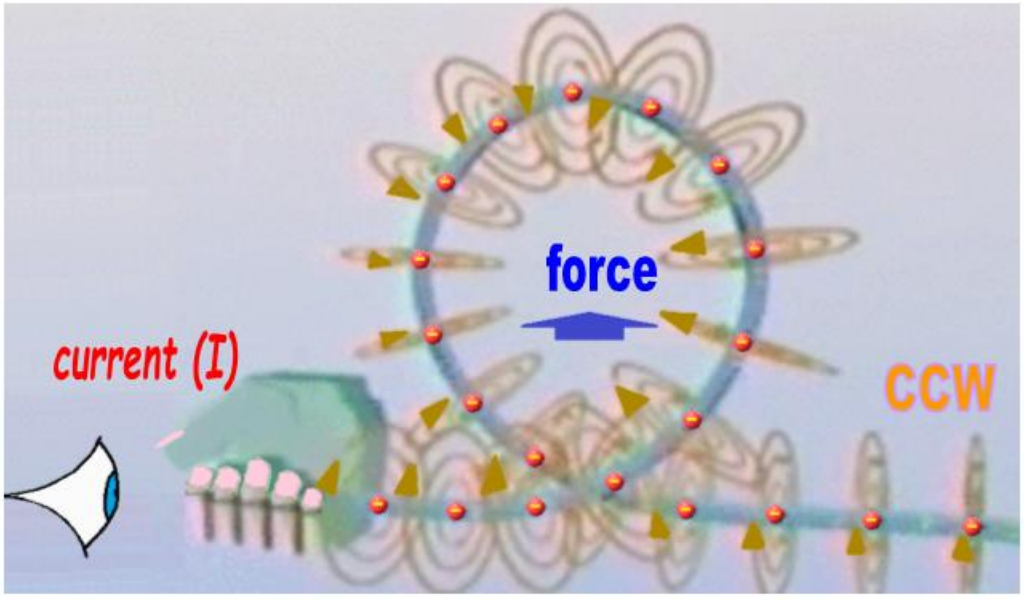
Opposite sides of a bend in a live wire will always produce mirrored magnetic field directions. So if we continue to bend the wire to make an 'O' shape, upon examining any spinning atom along the wire and comparing it to the atom on the opposite end of the loop, we will see that they spin in opposite directions. The threads that they spin also spin in opposite directions.



35 EM Force

Imagine now looking through the hole of the O-shaped wire. If a thread on your right swings into the center of the hole away from you, the one on the left also swings into the hole away from you. They spin in antiparallel directions. As seen from above, the one on the right spins CW; the one on the left spins CCW.

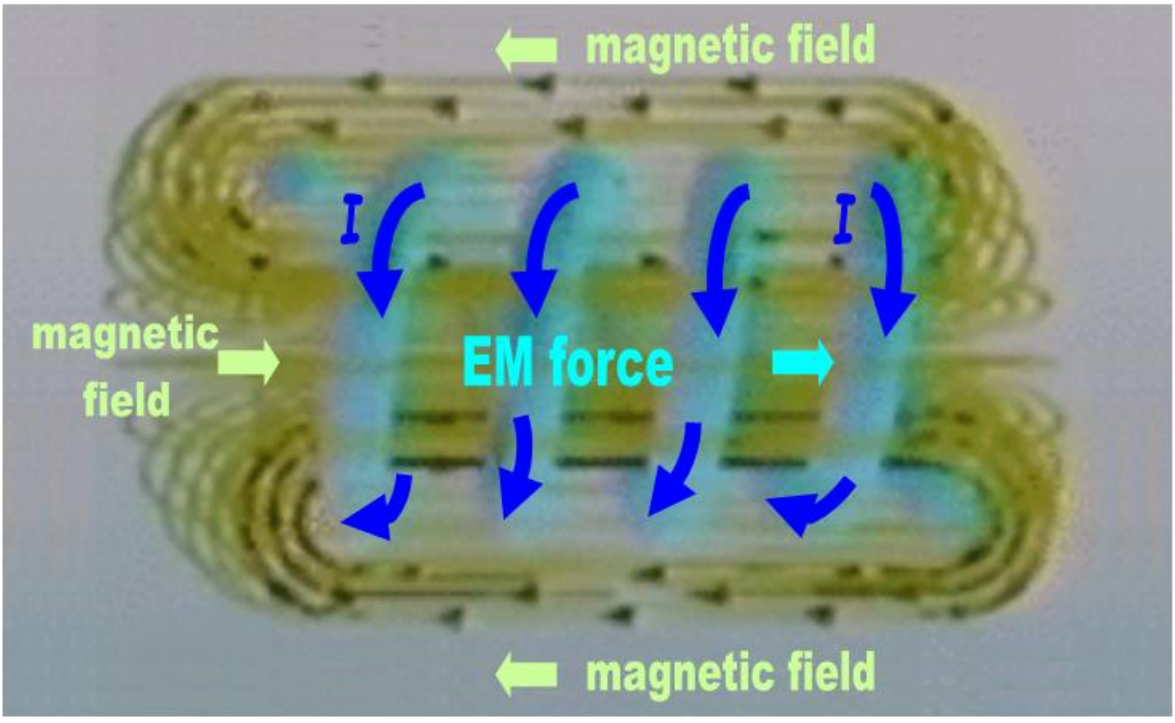
Experience shows that in this case force runs through the center of the loop away from you. In other words, force runs in the same direction as the threads spin. These threads constitute the force that pushes charged objects through a coil. This is like the two rollers of a 19th Century washer-dryer used to squeeze the water out the clothes.



36 Many loops

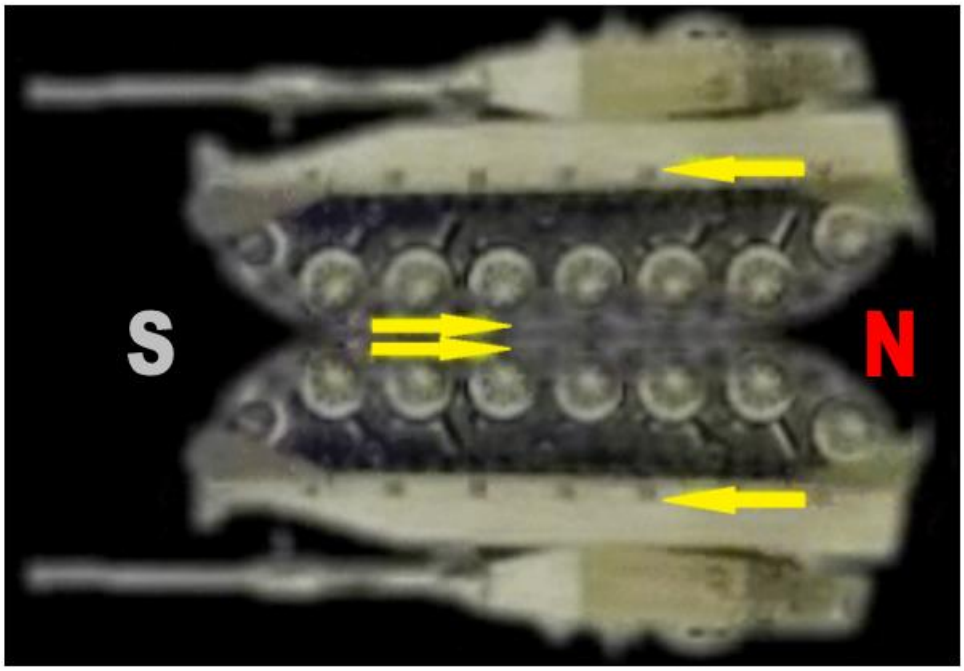
Let's now coil the live wire several times into a spiral known as an *inductor*. The inductor retains the direction of the current throughout its length, the direction of sweeping threads (*magnetic field*) around its inside and outside, and the force through the center of each loop comprising the spiral.

Current, magnetic field, and force in an inductor



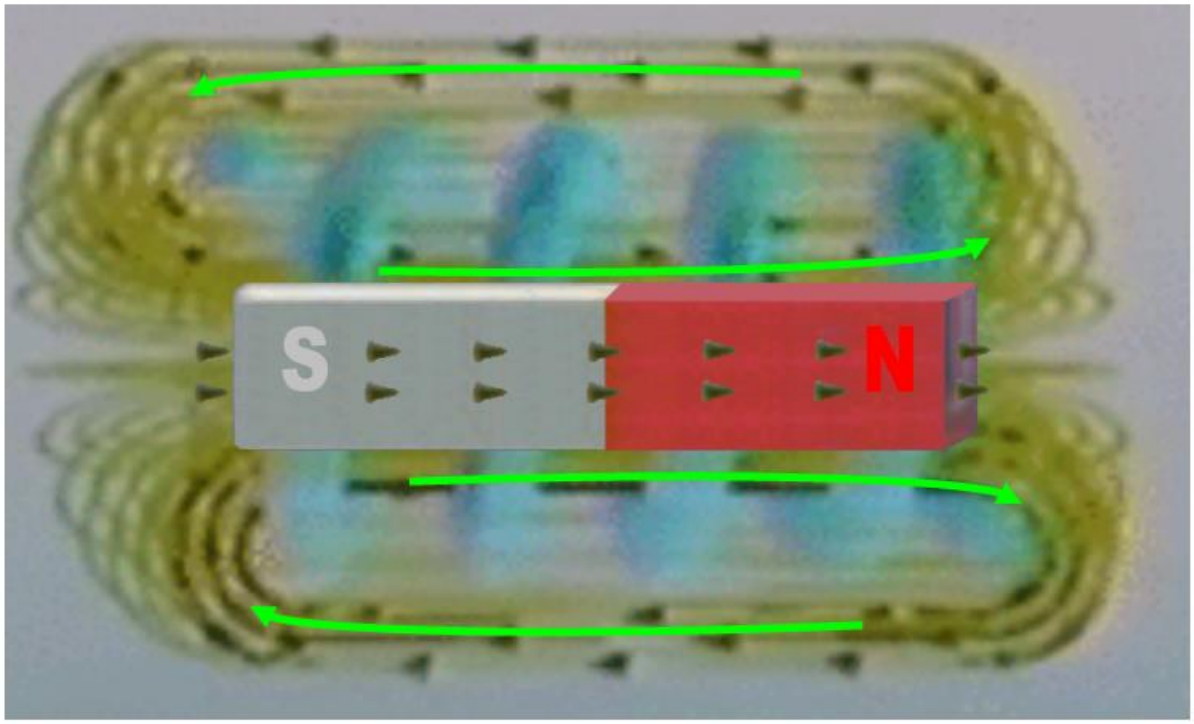
Due to the proximity of the loops, an incessant force flows through the center of the spiral from the first loop to the last. The spinning threads act much like a treadmill.

One way to visualize this mechanism is by imagining two army tanks moving in the same direction, facing track to track, much like a tank reflected in a puddle of water. The tracks on both tanks squeeze through the interface, curve around the rears of the tanks, and travel toward the front again over the tops of the wheels.



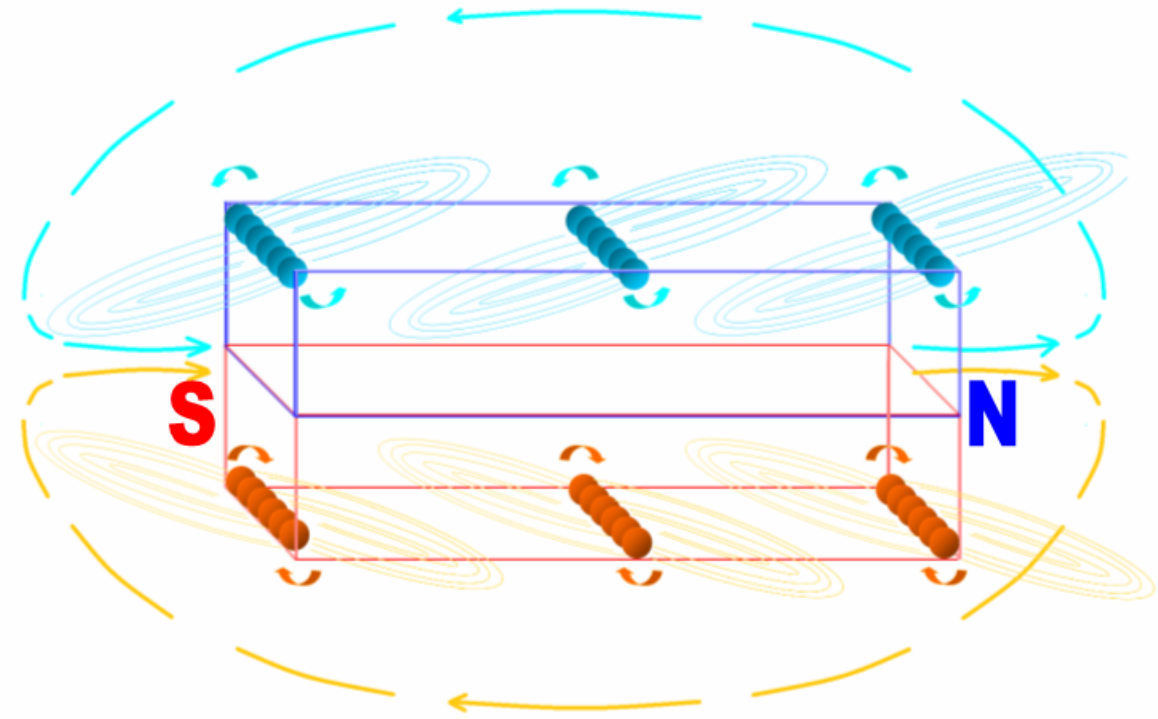
37 Superimposing a magnet on a coil

If we superimpose a magnet on the inductor coil, we note that the magnetic field and direction of the force match exactly.



The rope model suggests that the threads sweep through the middle of the magnet in the traditional south-to-north direction. They exit the north pole, sweep over and around the entire surface of the magnet, and enter the south pole exactly like the treads of the tanks.

Threads swing around serpentines (rows of merged atoms). These threads are what we identify as the 'lines of force' that comprise a 'magnetic field'. The threads are real physical objects. If the lines of force were abstractions, they would not be able to interface with matter. The threads sweep into the traditional south pole of a magnet and travel in the direction of the north pole.



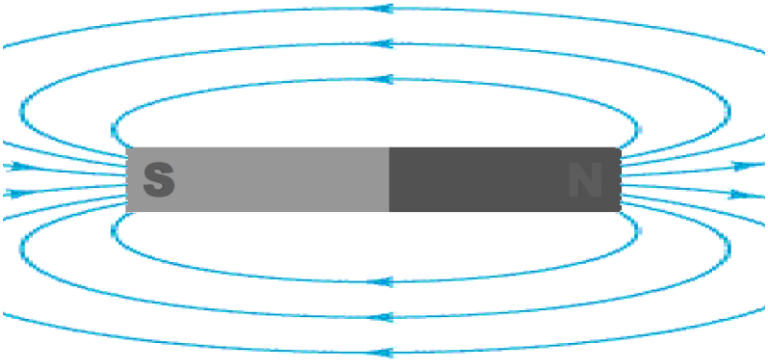
38 Magnets magnetize iron filings

Iron filings are typically sprinkled over magnets to outline the shape of their magnetic fields. If the lines of force were mere abstractions, they wouldn't have the muscle to compel iron filings to align along the familiar patterns. It turns out that because the threads are physical, they also magnetize the iron filings that sit upon a magnet. The threads sweep through the serpentines of the iron filings and force their atoms to spin at great speeds in the same direction as the 'field' of the magnet.

Imagine rubbing the beads of an abacus quickly with your hand. All the beads spin in place. In like manner, the rows of merged atoms of the iron filings begin to spin swiftly when the enormous quantities of swinging threads of the magnet rub across them. The EM ropes between the atoms of the iron filings unwind and the threads begin to swing around the serpentines. The iron filings have become tiny magnets.

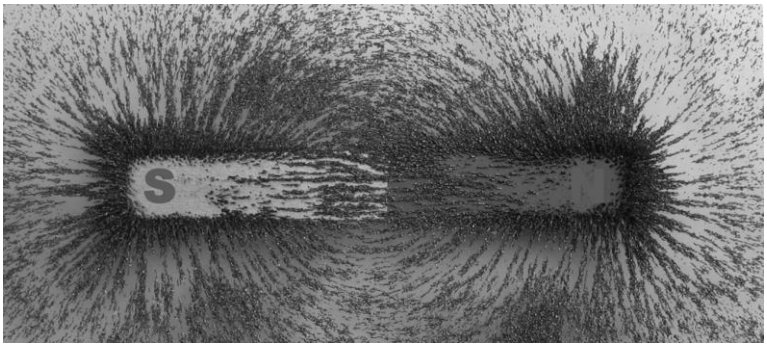
The result is that the magnetic fields of the iron filings blend with the magnetic field of the magnet. They distort the shape of the original magnetic field. In other words, by sprinkling iron filings on a magnet, the aggregate of swinging threads of the entire system assumes a new sweeping pattern.

The presence of iron filings distorts the magnetic field. This happens because the threads of the magnet sweep through the serpentines of the iron filings, forcing them to spin much like your hand when it swiftly rubs the beads of an abacus. The sweeping threads of the iron filings now join the sweeping threads of the magnet and disfigure the global pattern of the field.



theoretical

(perfectly symmetric field)

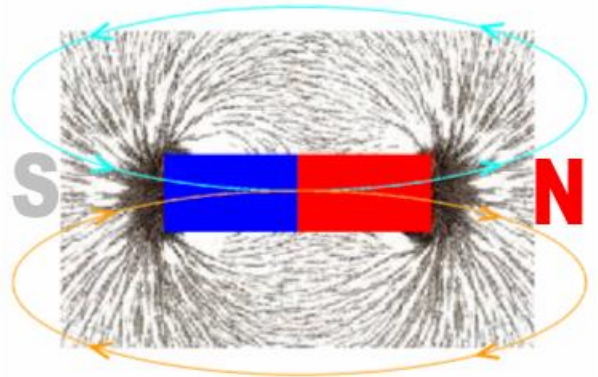


actual

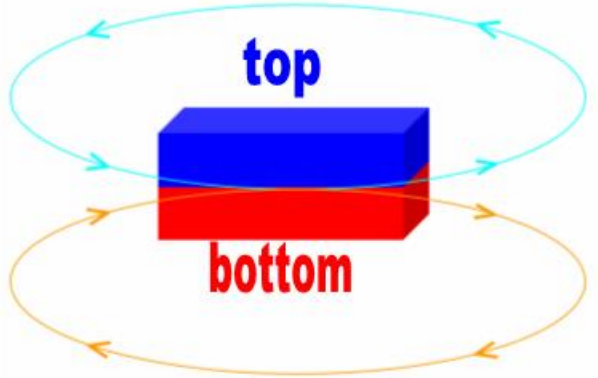
(distorted field)

39 Not south-north, but top-bottom

Under the Rope Hypothesis, a magnet is not divided into the traditional south and north poles, but lengthwise into *top* and *bottom* regions. When the traditional south pole is to your left, the top threads swing CCW over the magnet and through its center, while the bottom ones swing CW under the magnet and through the center.



Traditional south-north orientation of a magnet



Rope Hypothesis top-bottom model

40 Attraction and repulsion

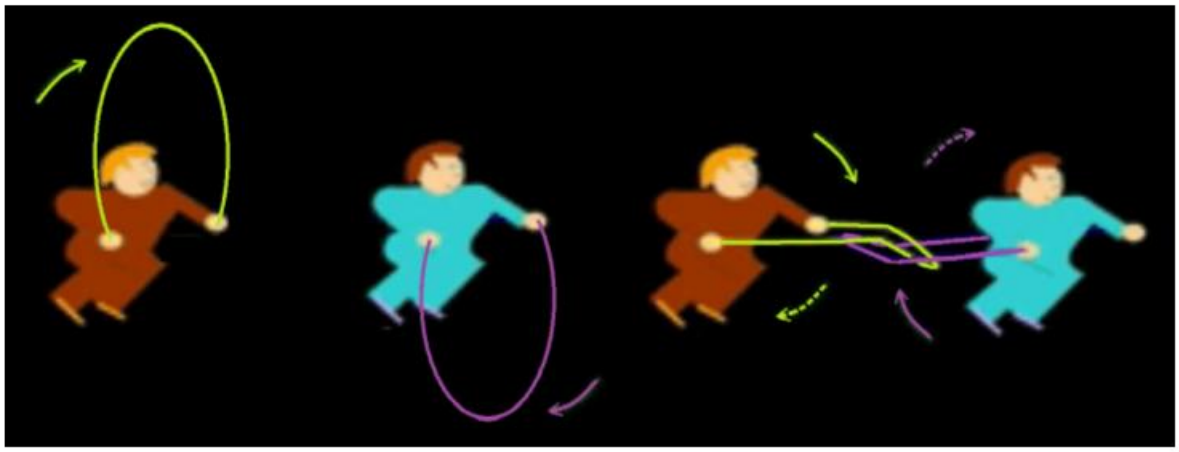
The north side of a magnet attracts the south end of another. The north side of a magnet repels the north end of another. This is common knowledge, but the physical mechanism remains a mystery.

The following analogies illustrate how magnets work under the rope model.

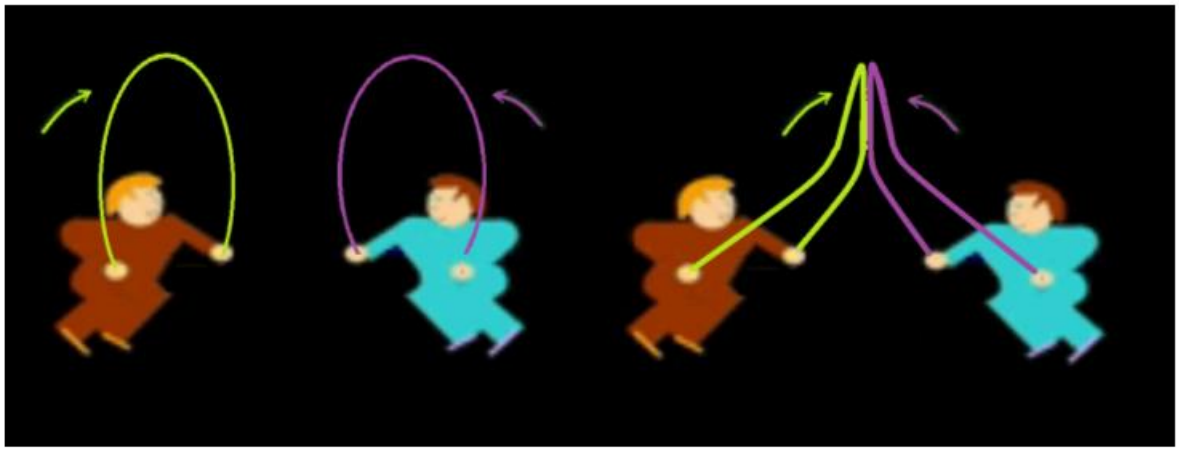
> Attraction. Imagine Axel and Rod skipping their ropes right next to each other. They are both facing in the same direction and spinning their ropes forward. When Axel's rope comes down in front of him, Rod's rope comes up behind him. Axel's rope latches onto Rod's and they tug on each other. That's the proposed mechanism of attraction.
>
> Repulsion. Let's now turn Rod around 180º as you would with a magnet to check its repulsive properties. They are now facing each other. The ropes clash head-on and push each other away. That's the mechanism of repulsion.

It is important to keep in mind that it is not the EM *ropes* that swing around, but rather the *threads* that comprise the rope which have unwound.

Analogy of the mechanism of attraction



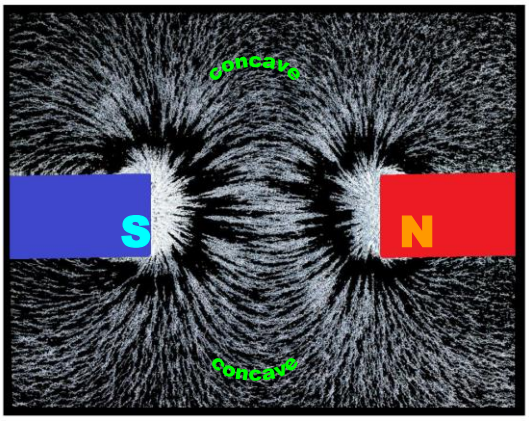
Analogy of the mechanism of repulsion



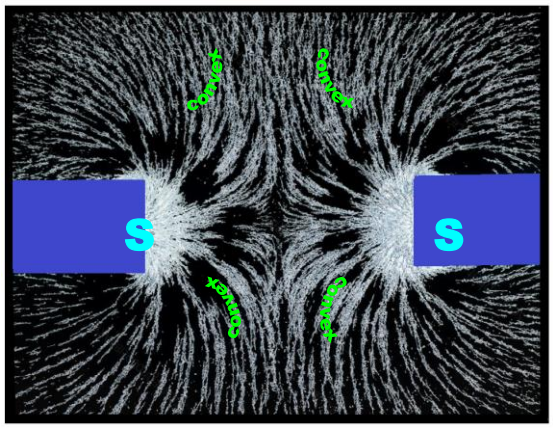
41 Iron filing patterns

Magnets that face one another south to north compel iron filings to form back-to-back concave patterns between them. Two magnets that repel each other (e.g. south-to-south) arrange the iron filings along mirror-image convex lines.

iron filing patterns between two magnets that attract each other



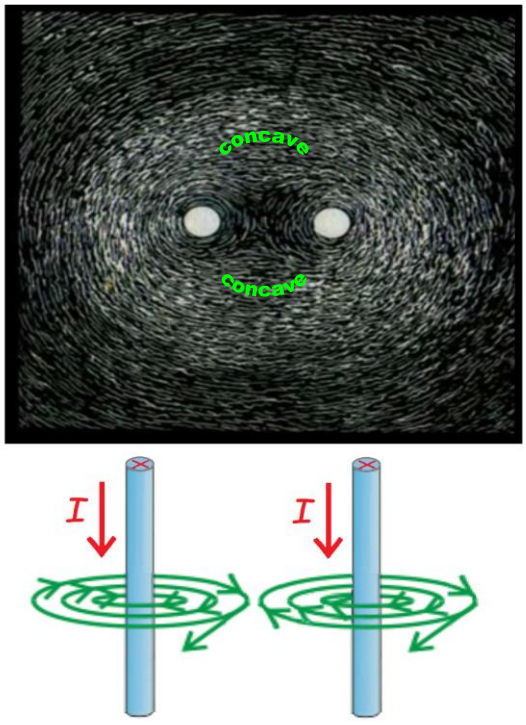
iron filing patterns between two magnets that repel each other



We see the same results if we look at two parallel live wires head-on and sprinkle iron filings over them. If the wires are 'carrying current' in opposite directions, the wires attract each other and the iron filings assume the same pattern as the south-to-north magnets. If they carry current in the same direction, the wires repel each other and the iron filings assume the south-to-south convex pattern.

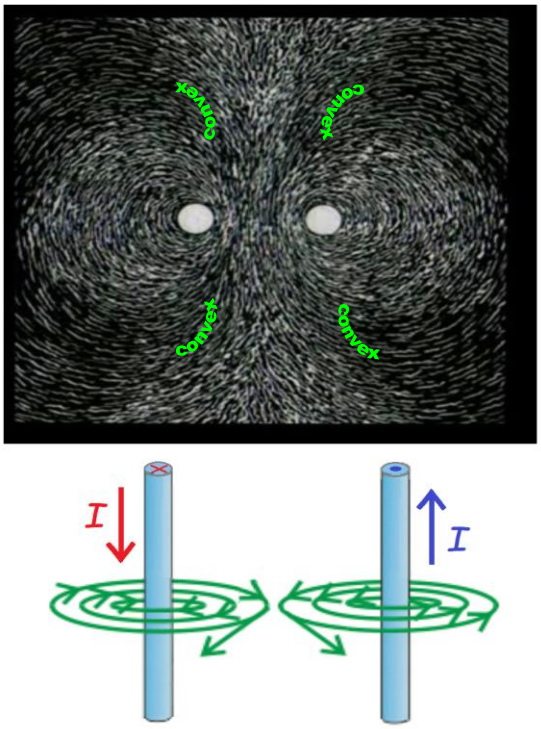
Attraction

iron filing patterns between two wires conducting current in the same direction



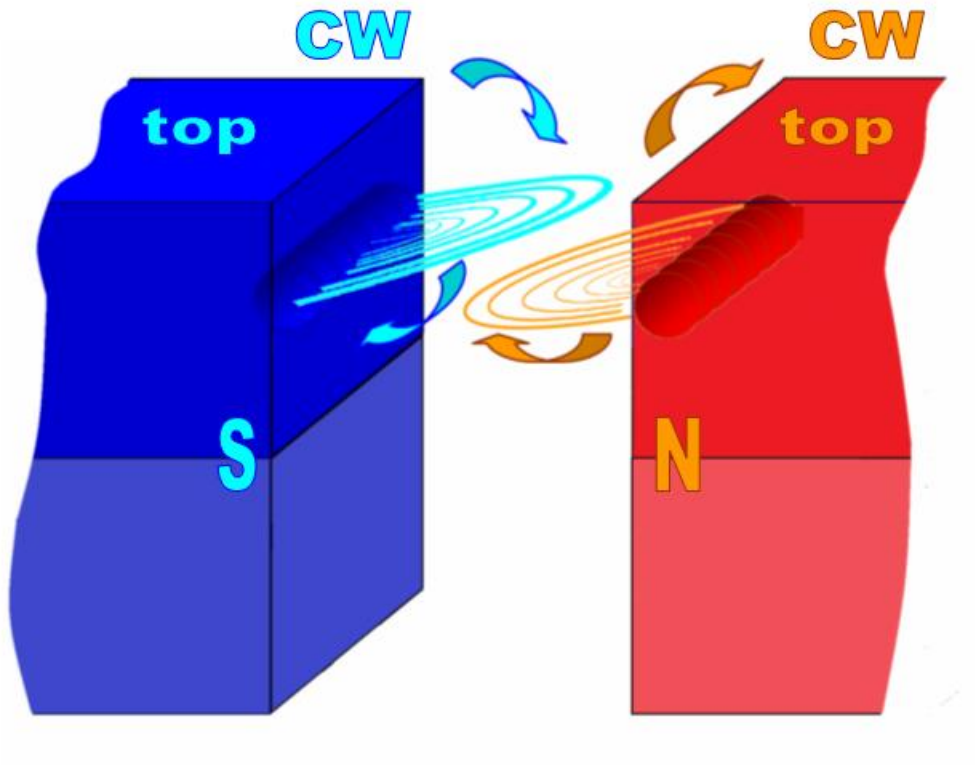
Repulsion

iron filing patterns between two wires running current in opposite directions

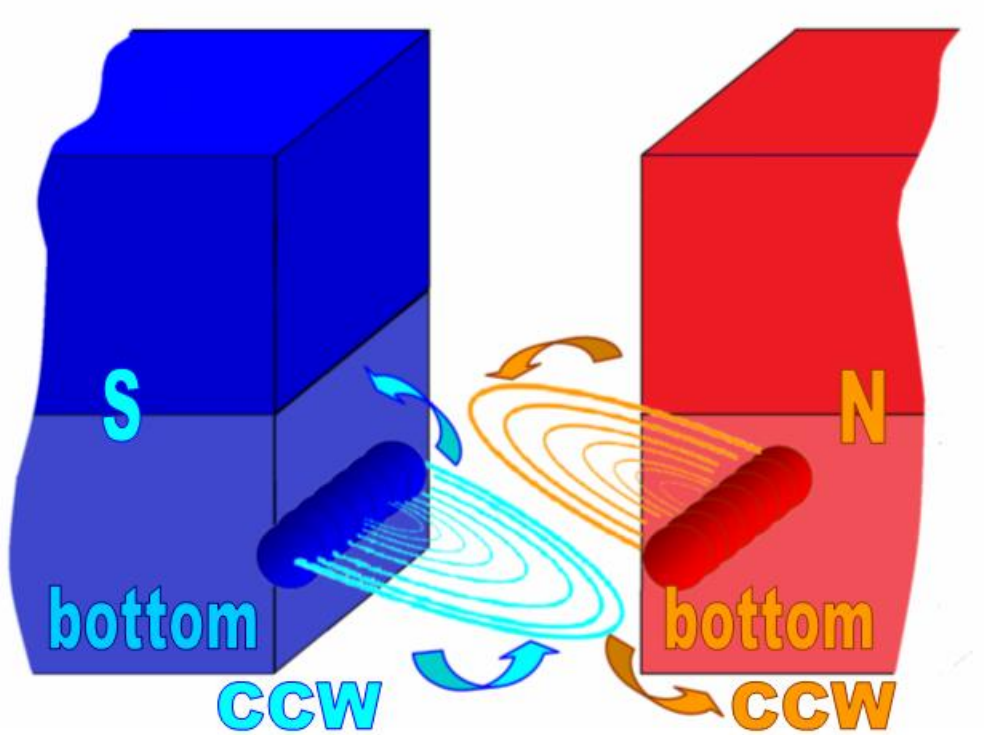


42 How magnets attract

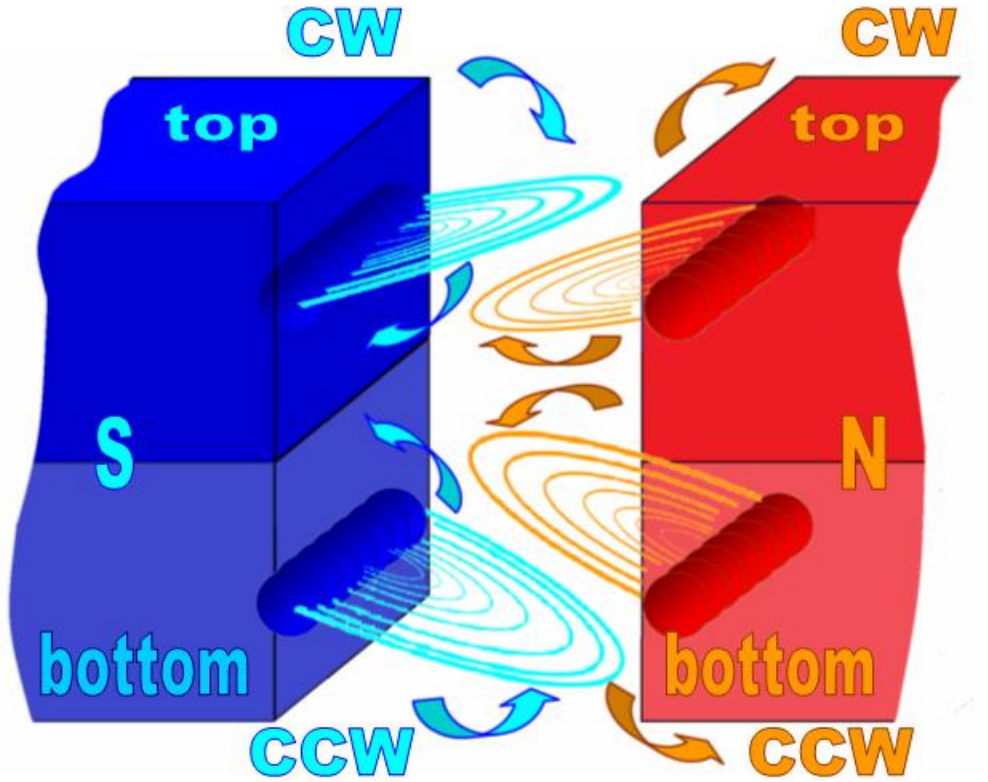
Let's consider the scenario of magnetic attraction where the traditional south pole of one magnet faces the north pole of another. The Rope Hypothesis proposes that the threads of the top half of the south pole swing CW. They latch onto the threads of the top half of the other magnet which are also swinging CW.



The threads of the bottom half of the south pole of the first magnet swing CCW. They latch on to the bottom half of the second magnet which are swinging CCW as well.



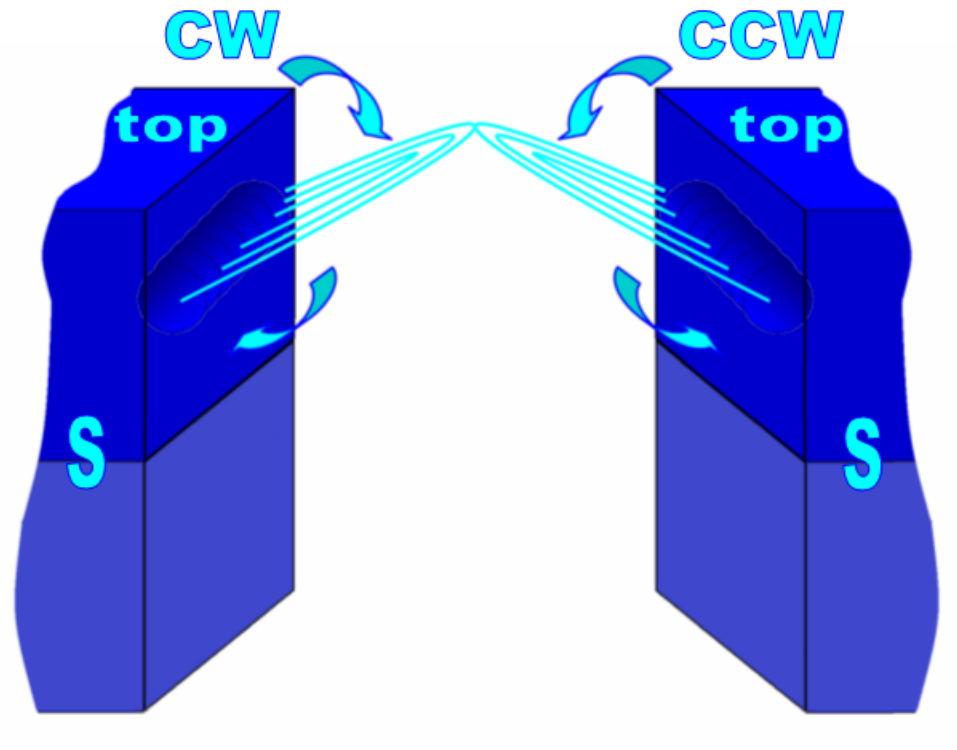
Thus, the threads at the four corners of two magnets facing south-to-north match the well-established direction of the lines of force and explain the mechanism of attraction.



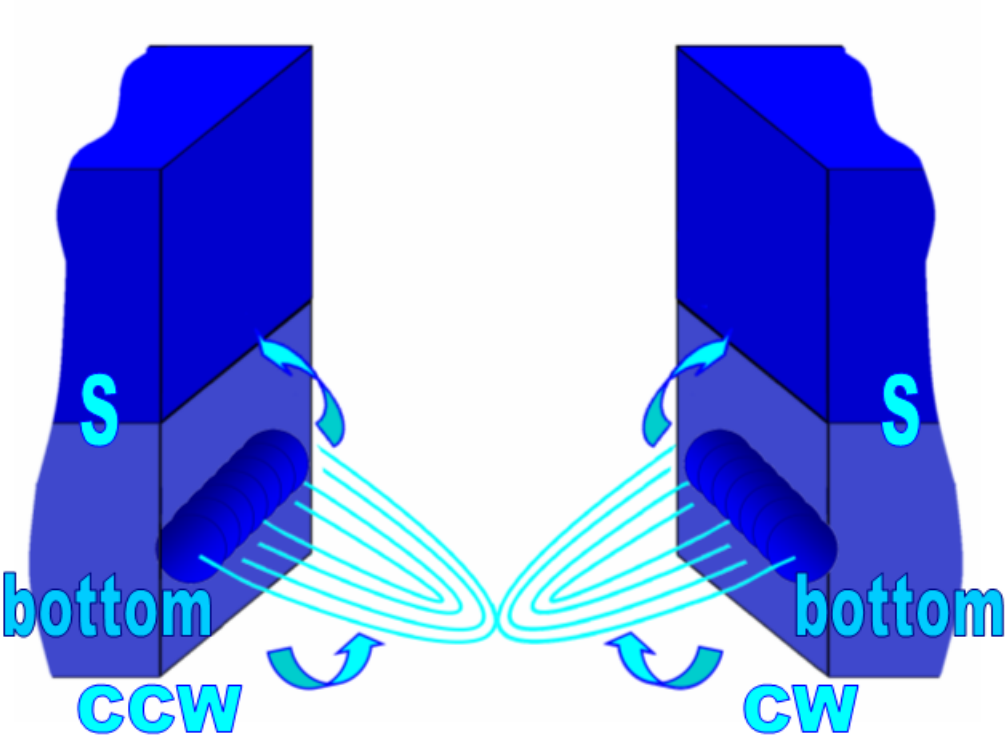
43 How magnets repel

Now we consider the scenario of magnetic repulsion. Let's turn the second magnet around. We end up with south-facing-south.

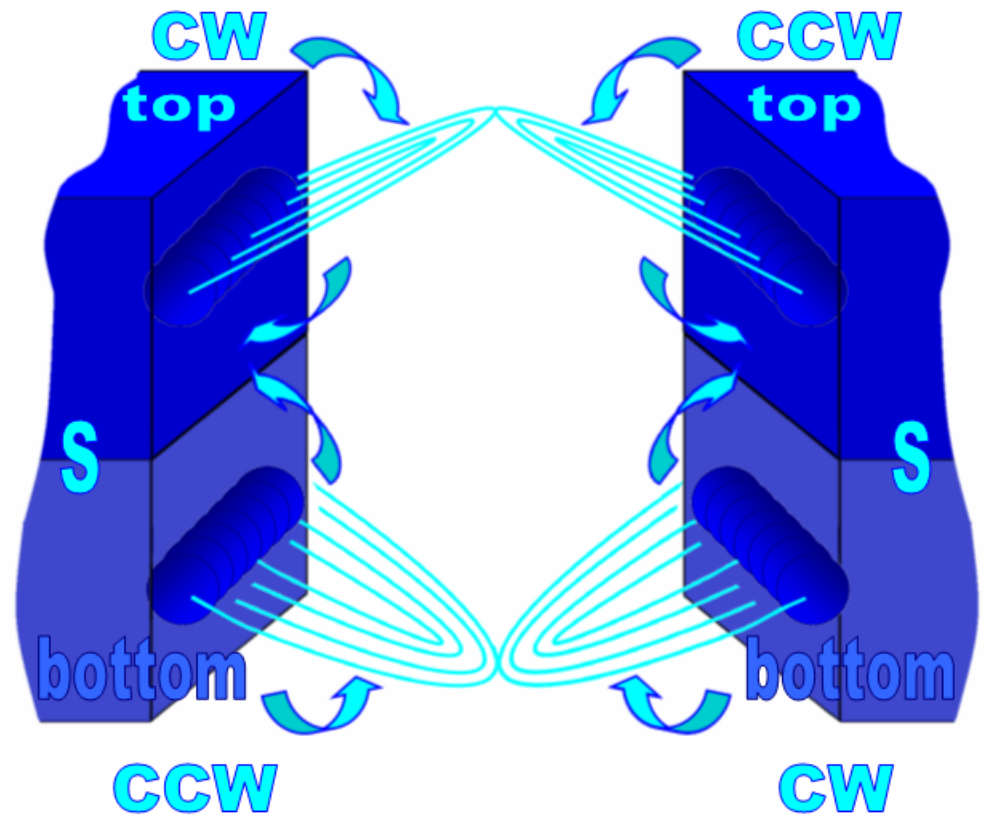
The threads of the top half of the second magnet are now swinging CCW. By doing so, they are clashing against the threads of the top half of the first magnet which are still swinging CW.



The threads of the bottom half of the second magnet are now swinging CW. By doing so they are clashing against the threads of the bottom half of the first magnet which are still swinging CCW.



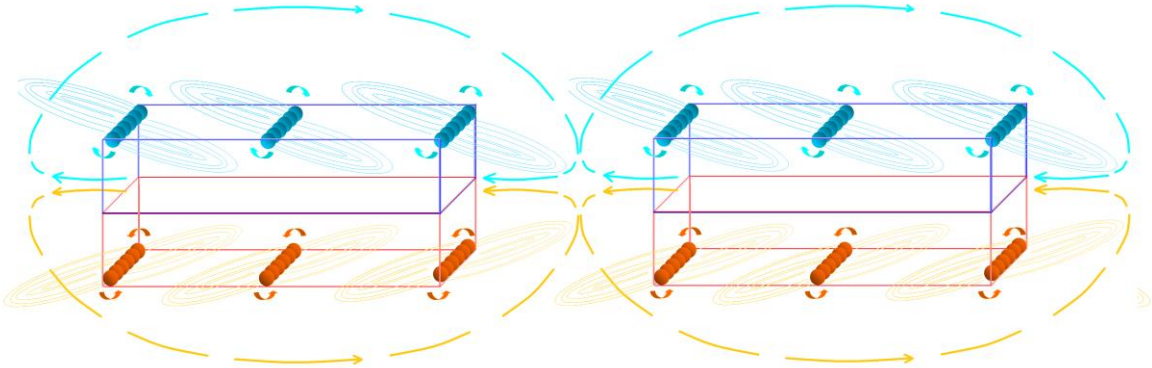
The threads at the four corners of two magnets facing south-to-south match the well-established direction of the lines of force and explain the mechanism of repulsion.



Whether attracting or repelling, the closer two magnets are to each other, the more threads that are involved and the greater the force of attraction or repulsion. This feature is also consistent with experience.

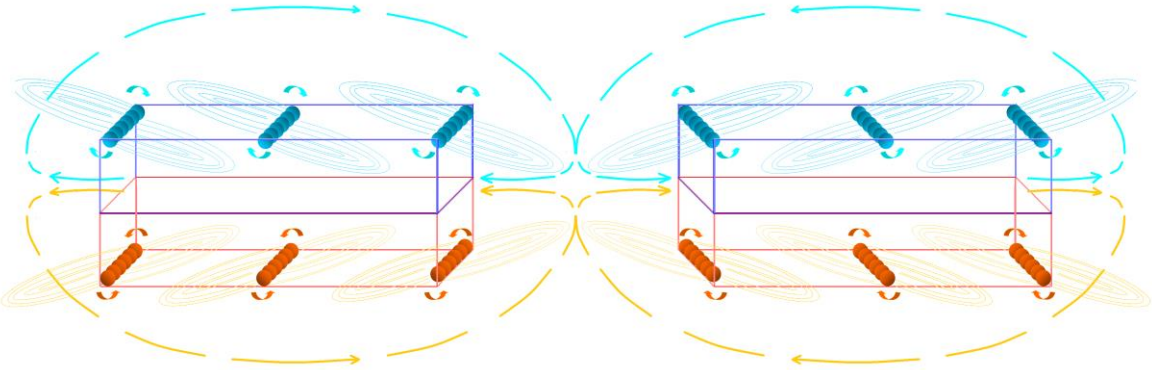
How a magnet physically attracts another

The closer the magnets are to each other, the more threads that participate, and the stronger the force of attraction.



How a magnet physically repels another

The closer the magnets are to each other, the more threads that participate, and the stronger the force of repulsion.



44 The Checklist of Gravity

What has experience taught us about gravity?

As a minimum, a theory of gravity must satisfy the following properties:

- Gravity must be mediated by an **object**.
- The mediator of gravity is invisible and intangible.
- Gravity brings objects together.
- Acceleration is in the direction of the center of objects.

  (e.g., you fall ever faster to the center of the Earth)
- Gravity goes through objects.
- Weight changes with location.

45 How does gravity work?

In answer to the question, *"Why do the planets go around the Sun?"*, NASA provides the following:

> *"...in addition to falling toward the Sun, the planets are moving sideways. This is the same as if you have a weight on the end of a string. If you swing it around, you are constantly pulling it toward your hand, just as the gravity of the Sun pulls the planet in, but the motion sideways keeps the ball swinging around. Without that sideways motion, it would fall to the center; and without the pull toward the center, it would go flying off in a straight line, which is, of course, exactly what happens if you let go of the string."* [6]

In a nutshell, this is the mechanism that the Rope Hypothesis proposes. If the Earth does not leave the Solar System, it is because all the atoms that constitute it are connected to each of the atoms that constitute the Sun. Likewise, the rope model suggests that the Moon doesn't spontaneously fly away from the Earth because the atoms that comprise these celestial objects are physically interconnected.

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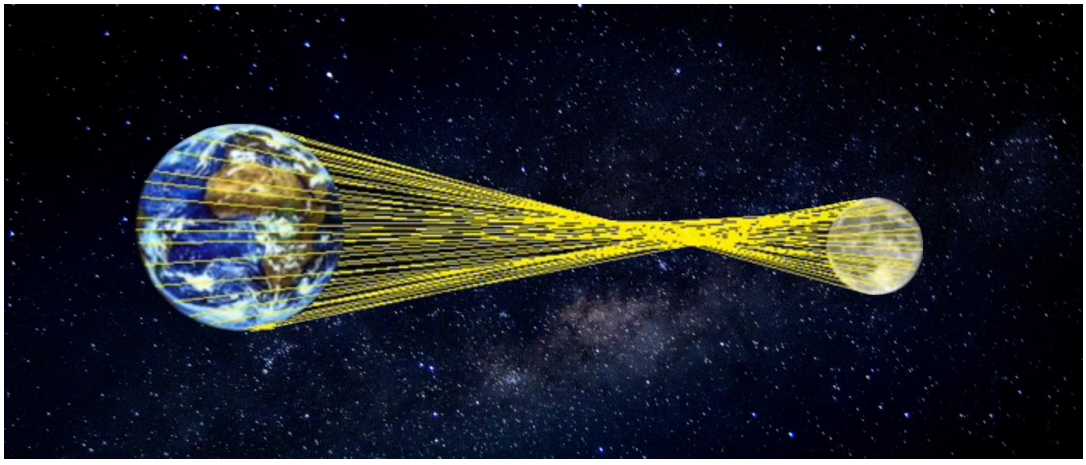
6 Why do the planets go around the Sun?
https://spaceplace.nasa.gov/review/dr-marc-solar-system/planet-orbits.html

The mechanism of gravity

The Rope Hypothesis proposes that gravity works in the same way as a boy swinging a ball at the end of a string.

The reason the Moon doesn't fly away from the Earth is that all the atoms that constitute the Moon are connected to each of the atoms that comprise our planet.



46 Gravity goes through walls

The universal gravitational equation states that two objects attract each other in direct proportion to their masses and inverse proportion to the distance that separates them. The mathematical relation is:

$$F = G \text{ mass } 1 \times \text{mass } 2 \div \text{distance}^2$$

This equation implies that the bigger the elephant, the more it will attract you, and that the greater the distance between the two of you, the weaker will be that attraction.

Berkeley Professor Richard Muller synthesizes the behavior of gravity and what any theory is required to explain:

> *"So, for example, if you have the Earth – there's a big mass here – and you have you with your little mass here, every atom on the Earth is pulling on every atom of you. You're also pulling on it! The amazing thing about gravity is that it goes right through things!* [7]

The rope model matches both Professor Muller's description and Isaac Newton's equation. The Single Thread Hypothesis proposes that all atoms in existence are interconnected via EM ropes. Every atom of you is bound to

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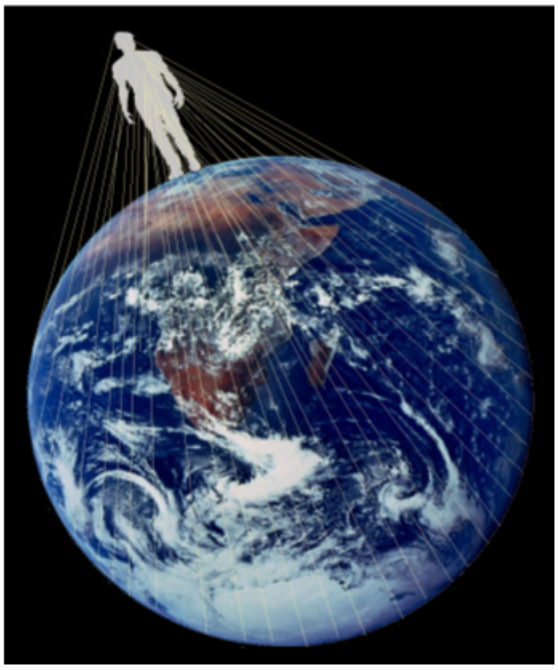
7 Richard Muller, Gravity and Satellites, UC Berkeley (July 11, 2017)

every atom that makes up the Earth. The more atoms an object is made of, the more ropes that bind you. The reason you fall back to Earth after you jump is that every atom in your body is connected to every atom that comprises the Earth and everything on it.

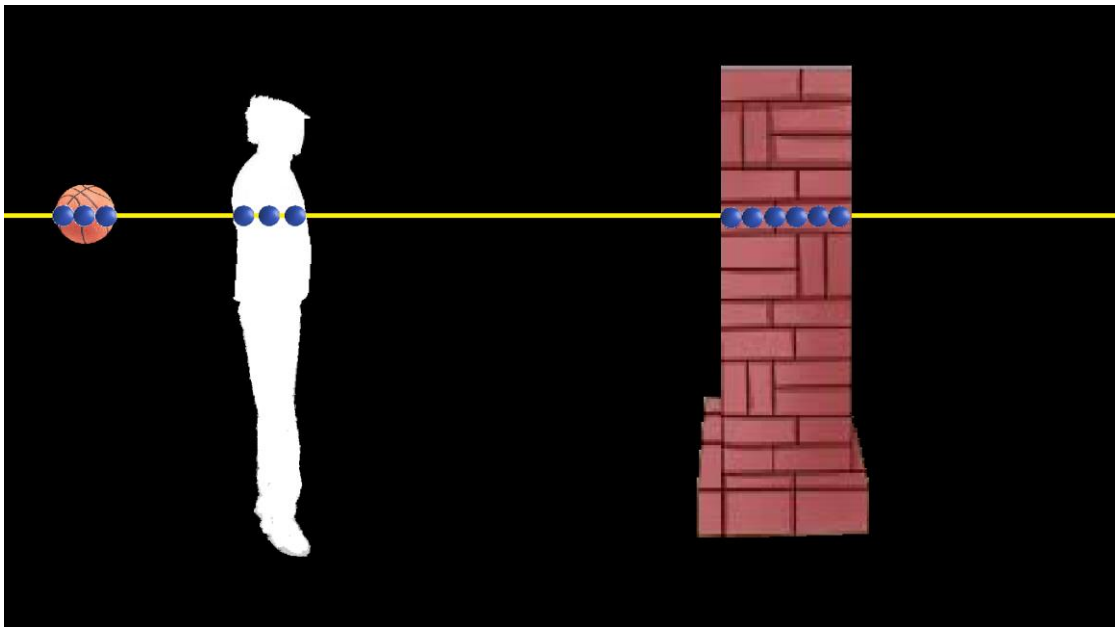


Why you don't fly out of the Earth as it spins:

...all atoms in your body are physically connected to all atoms of the Earth.

The rope model also justifies Professor Muller's claim that gravity goes through things. You cannot hide behind a wall to shield yourself from the gravity of an elephant because it pulls on you right through the wall! It does so because each of the atoms that constitute it is connected directly to each of the atoms that constitute you.

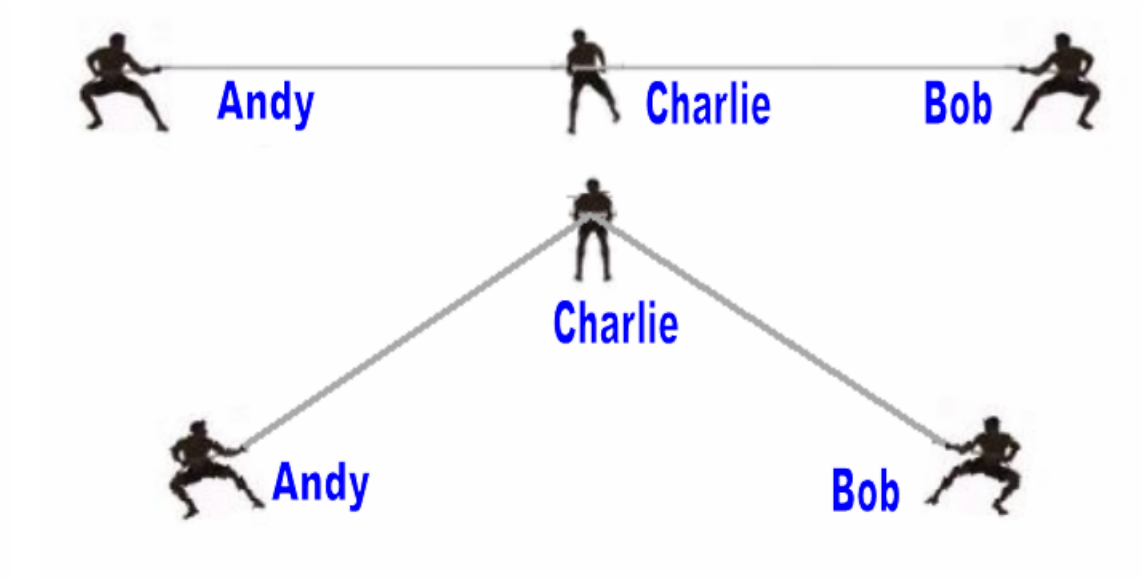
The Rope Hypothesis proposes that gravity permeates every object in existence because all atoms are interconnected via EM ropes. The atoms of a basketball behind you are connected to the atoms of the wall right through the atoms that constitute you!



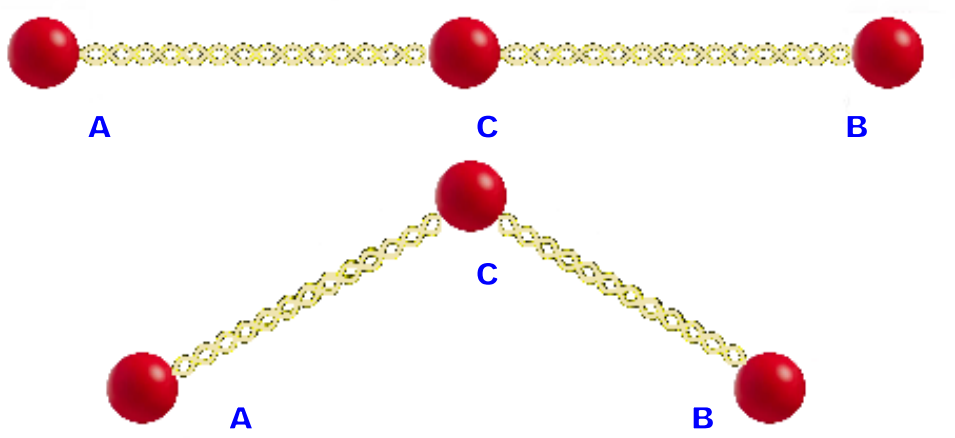
47 Gravitational force is a function of location

Imagine two boys, Andy and Bob pulling on a rope with a force of 10. Neither budges. Now we introduce a third boy Charlie holding the exact center of the rope. Is it possible for Charlie to pull on both Andy and on Bob with the same force of 10?

For him to do so he has to step out of alignment. If Charlie stays on the axis and the rope remains taut between Andy and Bob, they don't even feel him. Charlie is not pulling at all.



Let's replace Andy, Bob and Charlie with identical atoms A, B, and C. Let's assume that atom A is part of one object, and B and C are atoms of another. C is located between A and B. All three atoms are lined up on the same axis. Under these conditions, C is like Charlie. The only way A and B feel C is if C goes out of alignment.

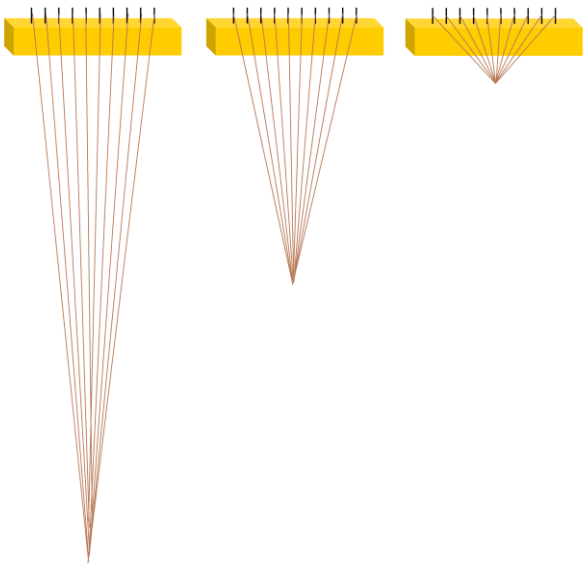


The rope model proposes that because C does not participate, it is not effective. It is as if atom C doesn’t exist to atom A. Only when C is located outside the axis does A feel its presence. We refer to the EM rope that binds A and C as an *effective rope*.

48 Gravitational acceleration & effective EM ropes

When you let go of a rock, it doesn't fall at a constant speed but rather accelerates. Here on Earth, the acceleration is 9.8 m/s^2. This means that an object falls ever faster – *at a rate of 9.8 m/s for every second that passes* – towards the center of the Earth.

If every atom of the rock is connected to every atom of the Earth, as the objects approach each other, the interconnecting ropes spread apart. We illustrate this with the following thought experiment. There are ten long rubber bands tied to ten nails stuck far apart from each other on the floor. You are holding the other ends in outer space. As you fly downwards towards the Earth with the opposite ends, you will note that the closer you get, the more the rubber bands separate from each other.



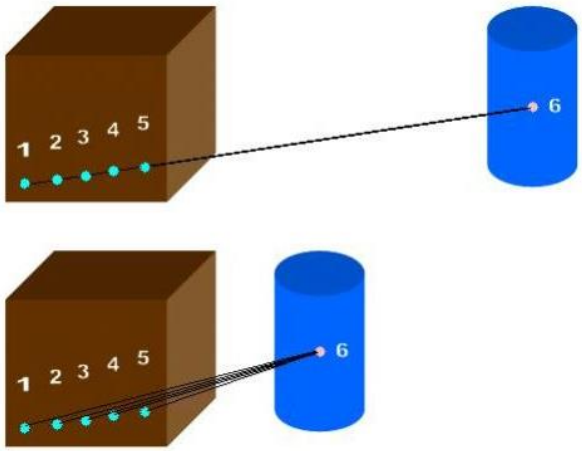
The farther you are from the nails, the strings come together and tend to act as one. The closer you are, the more they separate.

The closer two objects get, the fewer axes that atoms share. You could say more axes are generated and there are fewer atoms per axis.

Consistent with Newton's gravitational equation, this mechanism is by its very nature a function of distance. The closer two objects are to each other, the more effective EM ropes that separate from the axis that runs between their centers of gravity.

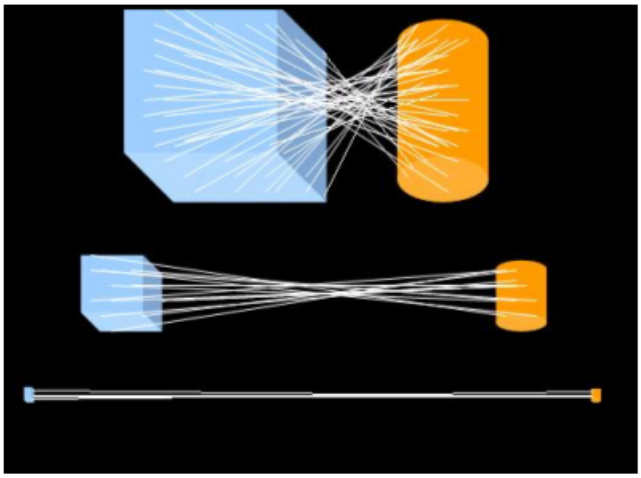
Conversely, when one object recedes from the other, the ropes come together and act as a single coaxial along the axis that runs between their centers of gravity. If two objects continue to drift apart, they end up with the minimum of effective ropes and gravity is predictably weak.

Spontaneous acceleration



An atom of a cylinder is connected to several atoms of a cube by EM ropes lying on the same axis. When the cylinder moves towards the cube, the ropes instantly fan out.

Action-at-a-distance



short distance,
EM ropes fan out

longer distance,
EM ropes come together

enormous distance,
EM ropes act as one

49 Weight is not force, but tension

It is pertinent to clarify at this point that each individual EM rope does not pull! As an object drifts towards another the ropes between them fan out. This fanning out process is exponential, which again is consistent with the fact that acceleration is a function of distance.

Force requires that one object move in the direction of the other. Tension means that neither object moves in either direction. It is a stalemate.

There is no force acting on the EM rope because force requires that one atom win the tug of war against another. Between any two atoms, the rope is under *tension*.

Under the rope model, gravity is better described as an 'aggregate' type of phenomenon. You need two or more effective EM ropes to produce acceleration.

It is thus that the Rope Hypothesis proposes an amendment to Newton's gravitational equation. We replace force with tension (T):

$$\mathbf{T = G\ mass\ 1 \times mass\ 2 \div distance^{2}}$$

As an example of why this should be so, think of weight. Weight is routinely regarded as a force acting on an object due to gravity. However, weight is a static phenomenon. There is a different weight for each location that an orbiting astronaut has with respect to the Earth. As soon as he moves a tad towards the Earth, he instantly weighs more.

This implies that weight is not a force, but rather a tension. The astronaut has a given number of *effective* EM ropes converging on him from the Earth at that location.

Unlike force, tension (e.g., weight) is a static parameter!

Under the Rope Hypothesis, an astronaut weighs more when he's closer to the Earth because the number of effective EM ropes converging on him is much greater.

Closing Arguments

We have now explained Mother Nature's invisible mechanisms using the Rope Hypothesis as a foundation. The book was not designed to persuade or convince, but rather to explain.

You may have further questions about the Single Thread, the EM rope, the atom, etc. Before we get to those, we want to make sure you have understood the theories contained in this book. By 'understanding' we mean that you can visualize the mechanism fulfilling the requirements underlying light, the atom, electricity, magnetism, and gravity. If they have, this book has achieved its purpose.

The book is meant to be an introduction to the Rope Hypothesis. Hence, there are details that are outside its scope. For instance, when we explain how a magnet attracts another, the issue before us is '*pull*' and not whether the threads avoid passing through each other or getting tangled. Although thought-provoking, such tangential processes are unnecessary to understand the mechanism of pull that we are attempting to explain. Further details concerning the rope model can be found in the book *Why God Doesn't Exist*.

The Rope Hypothesis 102

In the following sections, we briefly touch upon issues of interest to more advanced readers. We apply the rope model to give a physical interpretation of the gravitational constant G, the solar and galactic magnetic fields, black holes, dark matter, and interstellar travel.

Components of the gravitational constant G

The gravitational constant G is routinely measured using Cavendish's Torsion Balance. It is famously comprised of cryptic units and an indecipherable magnitude:

$$G = 6.67 \times 10^{-11} \frac{\text{meter}^3}{\text{kilograms} \times \text{seconds}^2}$$

What could that quantity and those units possibly represent?

The Rope Hypothesis is able to provide a physical interpretation to this equation. Let's begin by rewriting the equation and multiplying by unity ($10^{16}/10^{16}$):

$$G = \frac{6.67}{10^{11}} \frac{m^3\,kg}{kg^2\,s^2} = \frac{6.67}{10^{11}} \times \frac{10^{16}}{10^{16}} \frac{m^3\,kg}{kg^2\,s^2} = \frac{6.67 \times 10^{16}}{10^{27}} \frac{m^3\,kg}{kg^2\,s^2}$$

We now factor out the velocity of light squared...

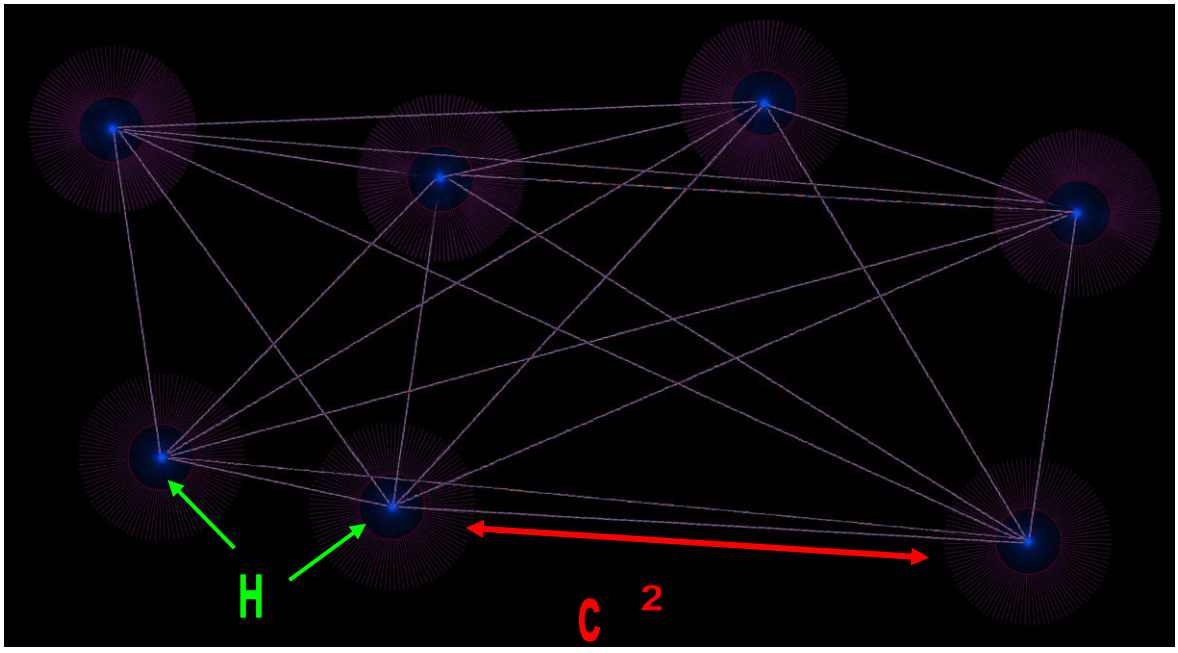
$$= \frac{0.74}{10^{27}} \frac{m\,kg}{kg^2} \times 9 \times 10^{16} \frac{m^2}{s^2} = \frac{0.74}{10^{27}} \frac{m\,kg}{kg^2} \boxed{c^2}$$

Lastly, we factor out the mass of the hydrogen atom, the most abundant atom in the Universe (...*said to comprise 90% of matter*).

$$= 0.44 \frac{m}{kg^2} c^2 \frac{1.67}{10^{27}} kg = 0.44 \frac{m}{kg^2} c^2 \boxed{H}$$

What is interesting about this high school level mathematical exercise is that the entire denominator disappears. That's quite a coincidence! This is of especial interest to the Rope Hypothesis because of the physical interpretation founded upon it:

Torsion 'propagates' along the EM rope
in both directions simultaneously (c^2),
from every atom in existence (H)
and to every atom in existence (H).



Elucidating the remaining factor (0.44 m/kg^2) is left as homework for those curious minds and intrepid problem solvers.

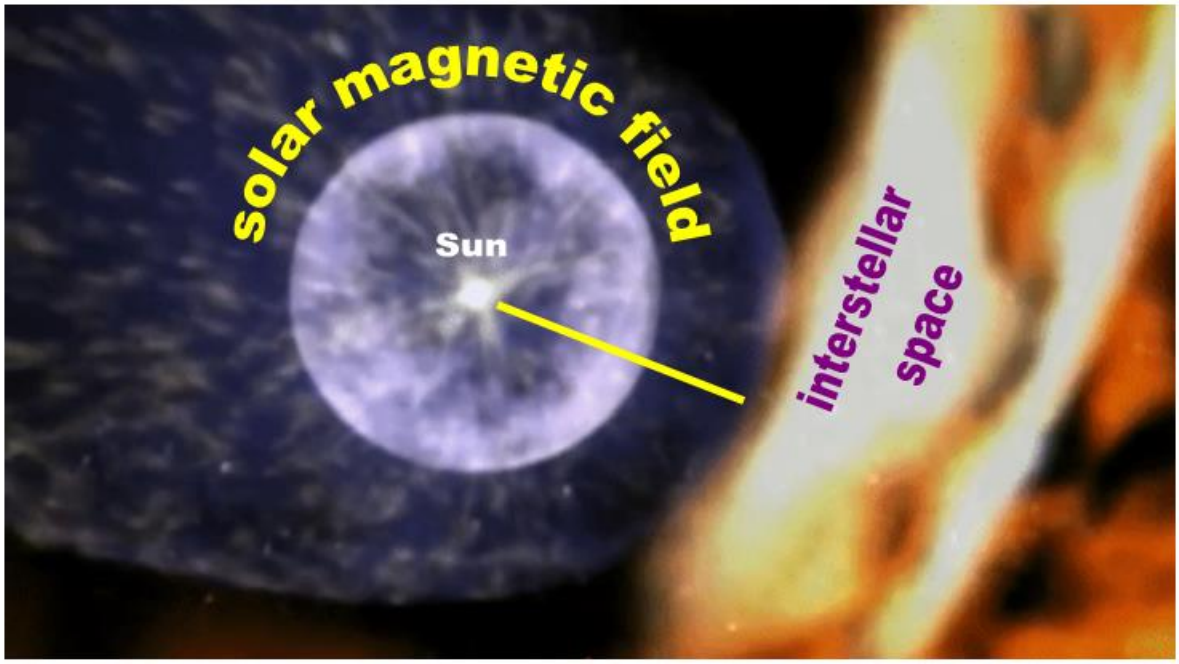
How large is a magnetic field?

Imagine the magnetic field of a simple magnet. The rope model proposes that it is comprised of countless threads that are swinging around their atoms. What is not so obvious is that the magnet occupies a very tiny volume compared to the volume of its magnetic field. As an example, the magnetic field of the Sun extends three to four times the distance to Pluto, all the way to the bow shock where it interfaces with interstellar 'winds' that sweep throughout the galaxy.

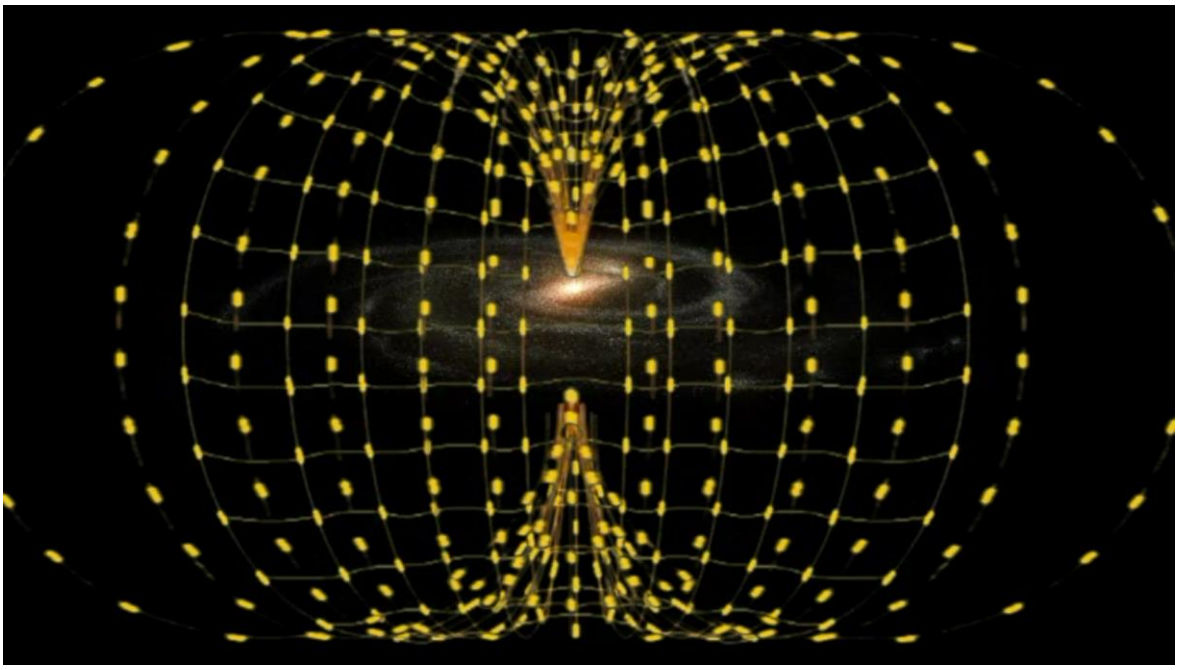
If the solar magnetic field which has its origin in the Sun is three to four times the size of what laymen normally refer to the Solar System (*i.e., the distance from the Sun to Pluto*), imagine the galactic magnetic field (*which every galaxy has*). How far does the magnetic field of the Milky Way extend? Does it touch or superimpose on the magnetic field of the nearest galaxy?

The magnetic field of a galaxy has its origin in the stars that comprise it. A magnetic field has its origin in matter. Each of the billions of stars that form a galaxy contributes segments of the Single Thread to this gargantuan dynamic process. Certainly, galactic magnetic fields extend three or four times as far as their visible diameters and likely interface and interact with those of neighboring galaxies.

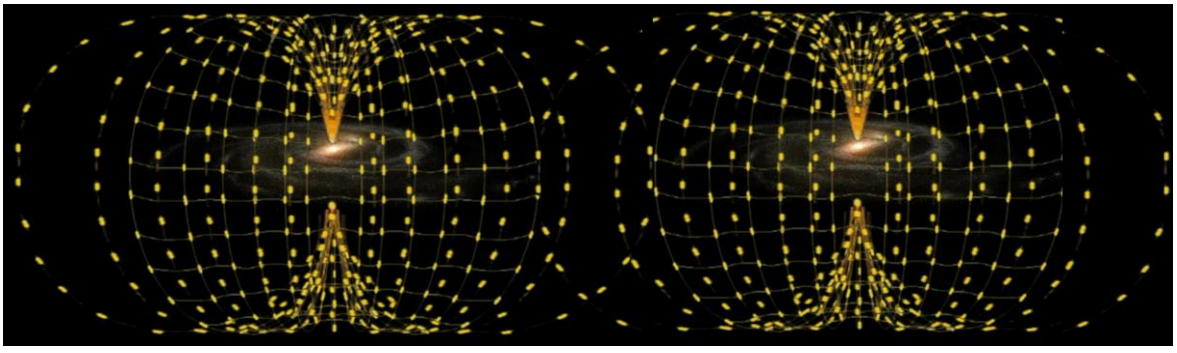
The diameter of the Sun's magnetic field is 3 to 4 times the distance from the Sun to Pluto. It is the Sun's magnetic field that shields the Solar System from the interstellar magnetic field.



The magnetic field of a galaxy extends three or four times the size of its diameter.



The magnetic fields of neighboring galaxies likely superimpose



Mapping a galactic magnetic field

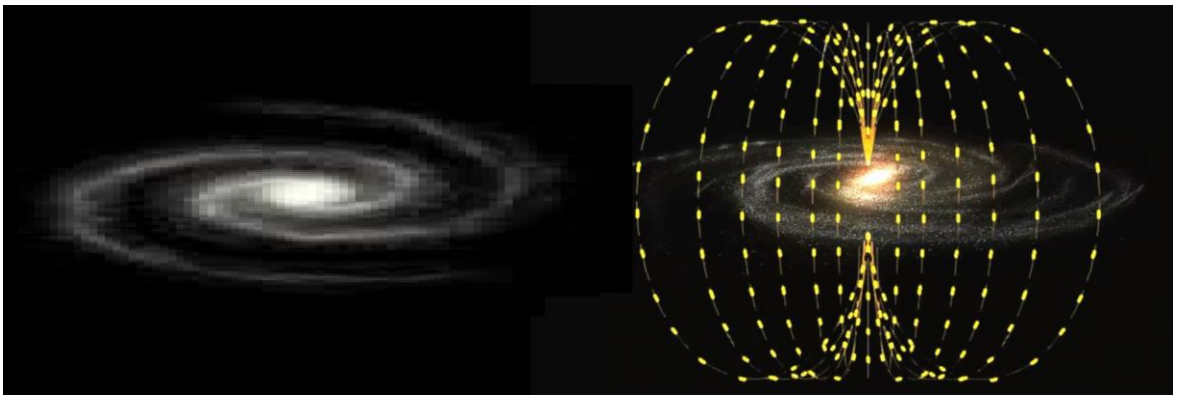
Astronomers have determined that there are regions of the night sky in which a star orbits around nothing that is visible either to the naked human eye or to instruments. They have also documented that the gaseous skin of some stars seem to be sucked out of them by nothing that is visible. Are there ghosts and spirits doing invisible work out there?

Under the Rope Hypothesis, these phenomena share a common cause: *the magnetic field of the galaxy*. It is this powerful invisible medium comprised of countless swinging threads that constantly sweep perpendicular to the galactic equator that have the muscle to toy around with stars.

But before we can understand what's going on, it is worth our while to go the extra mile and map a magnetic field so that we see what a galaxy really looks like. Imagine the threads sweeping downwards around the edges of the galaxy and coming up through its center, creating a donut shape. Those that sprout upwards through the center form the galactic 'jets' that have been extensively documented.

A galaxy is not properly depicted flat like a spinning frisbee. When we factor its tall and wide magnetic field, a galaxy looks more like a rotating carousel.

Galaxy minus magnetic field ***Galaxy plus magnetic field***

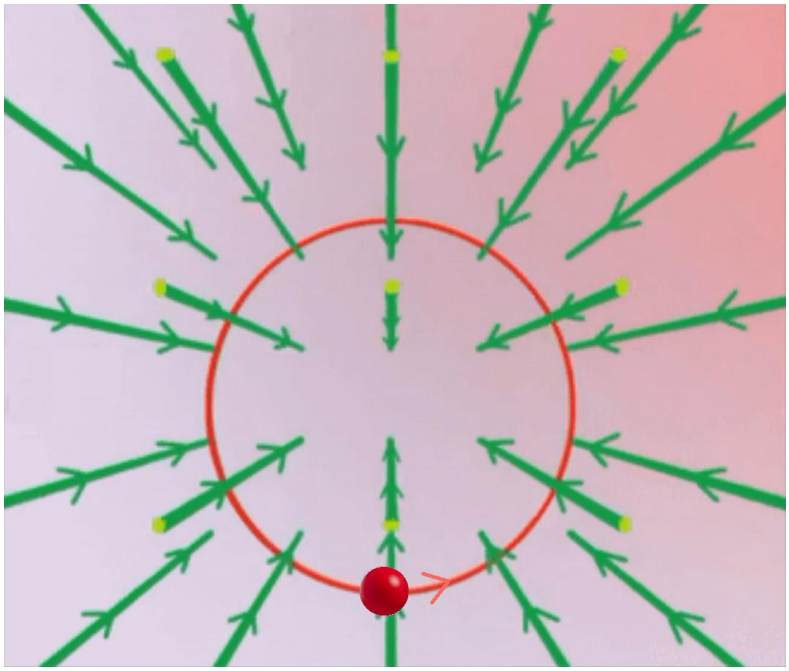


In other words, a galaxy looks less like a frisbee and more like a carousel.

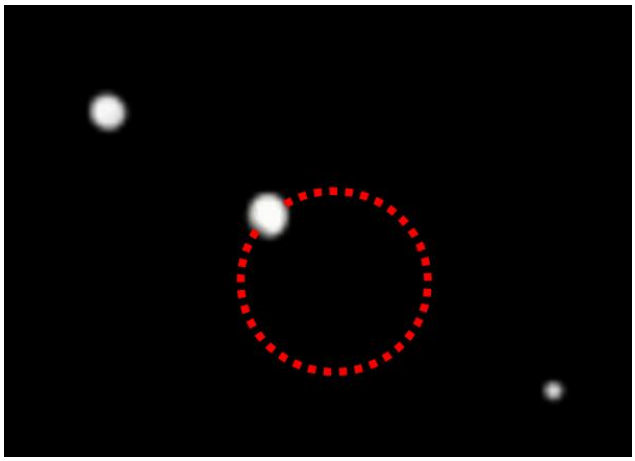
Black holes

Consider what happens to a charged ball when it is placed in a magnetic field. The tiny marble is compelled to spiral. It will orbit around a center that has absolutely nothing in it. The phenomenon is caused by the countless invisible threads that sweep down on the orbiting sphere.

A charged object circles in the environment of a magnetic field



The Rope Hypothesis proposes that this is exactly what happens at the cosmic scale. Gazillions of threads sweep down in a given region within the galaxy. We see a large star that is circling around nothing. In this scheme of things, a star is a tiny spherical magnet embedded within a magnetic field that is sweeping down upon it. The star would likely spiral out of the galaxy if it weren't that the remaining stars gravitationally compel it to remain in the plane of the galactic equator.

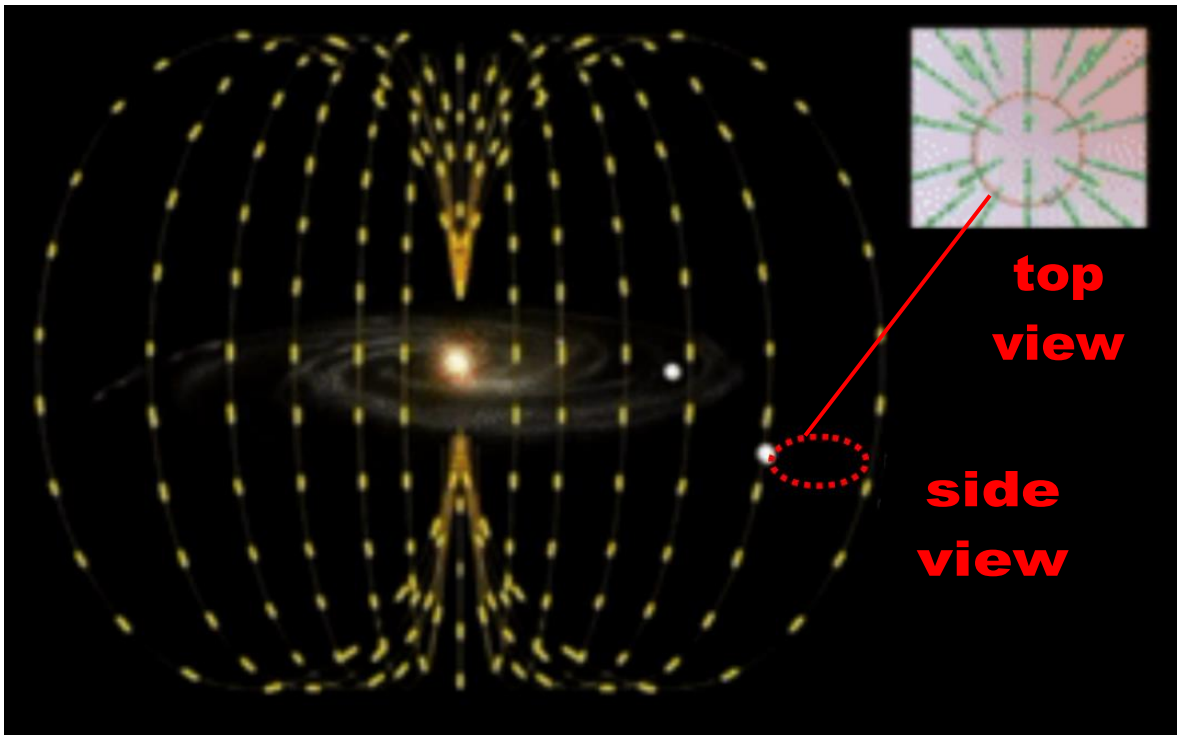


Astronomers see a star orbiting rapidly around a center in which no object is present. They conclude that there must be a black hole in that region. However, a black hole is all mass and no object. Even if a black hole qualified as an object, mass does not qualify as a physical mechanism to explain the anomaly. What entity or medium lies between the star and the alleged black hole?

The Rope Hypothesis proposes that a black hole is a magnetic rather than a gravitational phenomenon.

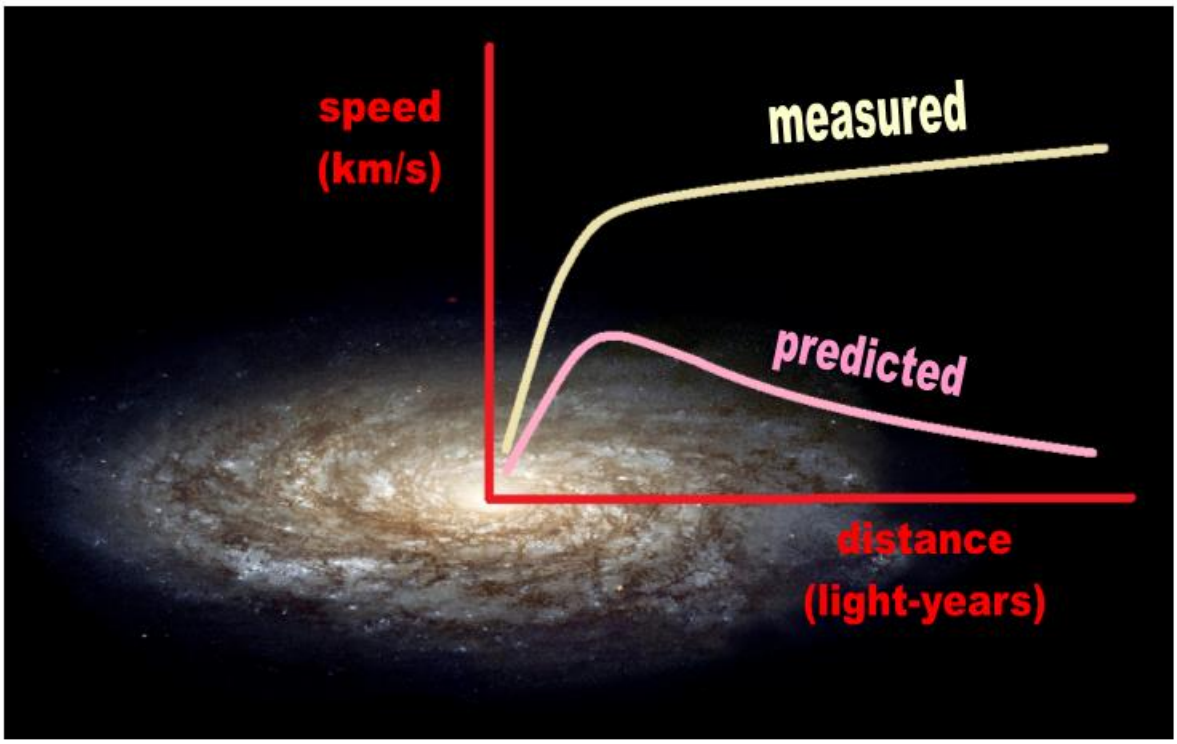
The underlying theory is that all stars are charged celestial objects. All stars have electric and magnetic fields. Therefore, every star wobbles to some degree under the influence of the galactic magnetic field.

However, the galactic field is not perfectly uniform. It sweeps down stronger in some regions and, in some instances, impinges on a highly-charged large star, compelling it to circle around nothing like a charged ball in a magnetic field here on Earth.



Dark Matter

Astronomers have measured the speed of stars around a galaxy and discovered something very peculiar. Stars that are located on the periphery travel just as fast or faster than stars located near the center.

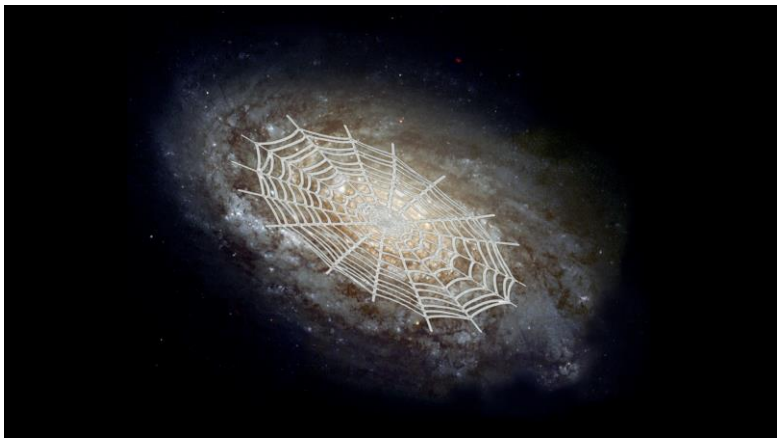


To understand why this is counter-intuitive, think of the Solar System. The planets closer to the Sun travel much faster than planets on the outskirts. Mercury completes its year in 88 Earth *days*. Pluto does it in 248 Earth *years*. Imagine if Pluto were to travel faster than Mercury. That's what happens with stars orbiting a galaxy!

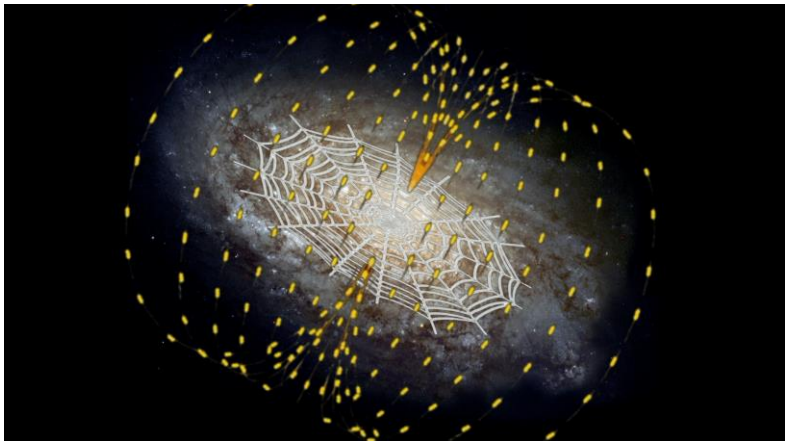
Astronomers are also perplexed to discover that stars on the outskirts don't fly out of the galaxy. If you swing a ball around the end of an elastic band, there is an invisible and therefore mystical centrifugal force that compels the band to stretch outwards. What cosmic physical entity acts as an elastic band to compel a star to be so faithful to its galaxy?

The Rope Hypothesis proposes a simple explanation for this phenomenon. All atoms are physically interconnected. This entails, as just discussed, that all stars are physically interconnected. We must, therefore, imagine a galaxy as a rotating spider's web. For further integrity, the galactic magnetic field comprised of countless swinging threads sweeps down its sides and up through its center.

what we see



what we don't see
the rotating spider's web interconnecting ropes



the carousel sweeping magnetic threads

Mission Impossible: interstellar travel

According to the Rope Hypothesis, all atoms are interconnected. This implies that all the atoms comprising our Sun are physically connected to all the stars comprising our Milky Way Galaxy.

Imagine, now, all the EM ropes originating in our Sun extending to all the atoms that comprise our nearest neighbor – Alpha Centauri – located 4.3 light-years away. From the Sun to where its magnetic field interfaces with interstellar space, somewhere between the bow shock and the heliopause, the ropes should describe a pattern that resembles a cone. We refer to this as the *Bird's Beak*. We can expect the same pattern developing with the EM ropes extending from the center of Alpha Centauri all the way to its bow shock or heliopause. In between these two regions *(i.e., between the heliopauses of the Sun and Alpha Centauri)*, the EM ropes are pretty much parallel with a straight line. All the EM ropes come together and form a very long coaxial of sorts. We refer to this region as the '*Linear Regime*'.

The *Linear Region* has enormous consequences for gravity. It suggests that Newton's gravitational equation is circumscribed to a star's *Bird's Beak*.

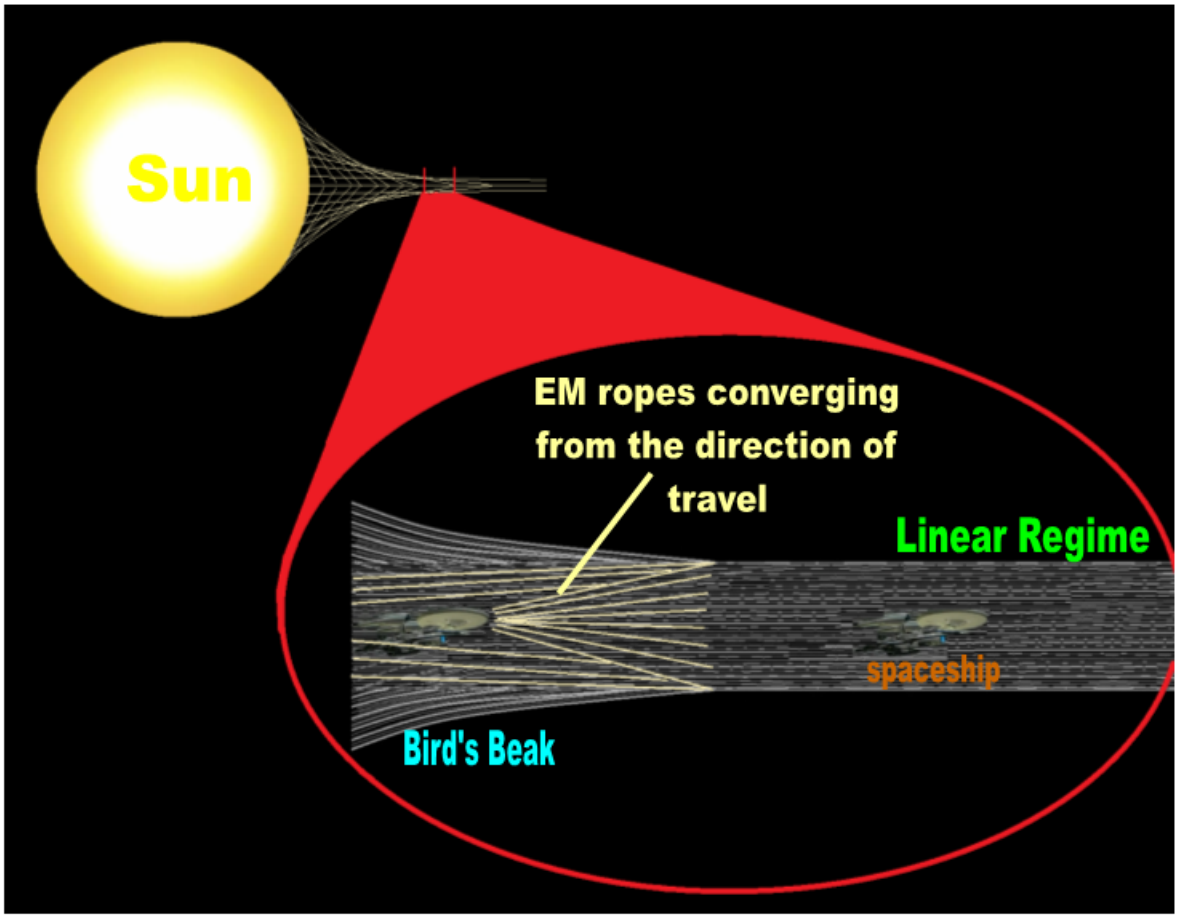
Alpha Centauri (AC) is the nearest star to our Sun. It is located 4.3 light-years away. The EM ropes interconnecting the atoms comprising the Sun and AC form a Bird's Beak pattern very near these stars and converge to form a straight-line coaxial for most of the space in between. The Rope Hypothesis suggests that this 'Linear Regime' is devoid of gravitational acceleration.

We held that gravitational acceleration is the result of EM ropes fanning out as an object approaches another. This works in reverse as well. As Object 1 moves farther away from Object 2, the gravitational attraction between them weakens. Object 1 is now being attracted by another in the direction in which it is drifting. Within the square-of-the-distance region of the Bird's Beak, there are EM ropes tugging from behind *and* from the direction of travel.

This is not the case in the Linear Regime. In the linear region the familiar fanning out effect disappears. The EM ropes will remain straight for several light-years between any two stars. There is no gravitational acceleration in this region. A spaceship attempting to leave the Solar System would have to fight the 'pull' of gravity from the Sun throughout the Bird's Beak region. As it gets farther from the Sun, the gravitational acceleration tugging it from the Sun becomes weaker. But there are also fewer and fewer independent EM ropes tugging it from the direction of travel. When it drifts into the Linear Regime, it is neither tugged from behind nor pulled from in front. It will drift at whatever speed it has at that point. The linear region between any two stars is a gravity-free zone.

Pioneers X and XI began to decelerate about the time they approached or crossed into the Sun's heliopause. The rope model proposes that this deceleration was the result of drifting into the Linear Regime. While the probes where still in the Bird's Beak region, they were still tugged forward by the ropes forming the tip of the Bird's Beak in front of them. This region was still subject to the square of the distance regime. Meanwhile, behind them, the Sun was tugging the probes with ever weaker gravitational acceleration as the EM ropes were gradually converging into a single coaxial. Once the Pioneers entered the Linear Regime, both the Sun and Alpha Centauri had no gravitational acceleration influence over them.

A spaceship approaching the Linear Regime has fewer and fewer EM ropes acting independently behind it and fewer EM ropes pulling it gravitationally in front of it. When it drifts into the Linear Regime, it is neither tugged forward nor pulled backward. The Rope Hypothesis proposes that the Pioneer probes decelerated when they crossed over into the Linear Regime.



Extra credit: Polarization

For those intrepid researchers who understand a little more about light, I have reserved a brief analysis of polarization for the end.

A brief explanation of the mechanism of polarization

There is a material known as *calcspar* ($CaCO_3$) that has its constituent molecules aligned in a grid-like pattern. If you shine a light at a pair of slabs of calcspar that are oriented vertically, light goes through both and reaches the screen behind them. If you rotate the second plate 90º so that it is horizontal to the first one, the beam of light no longer reaches the screen on the other side.

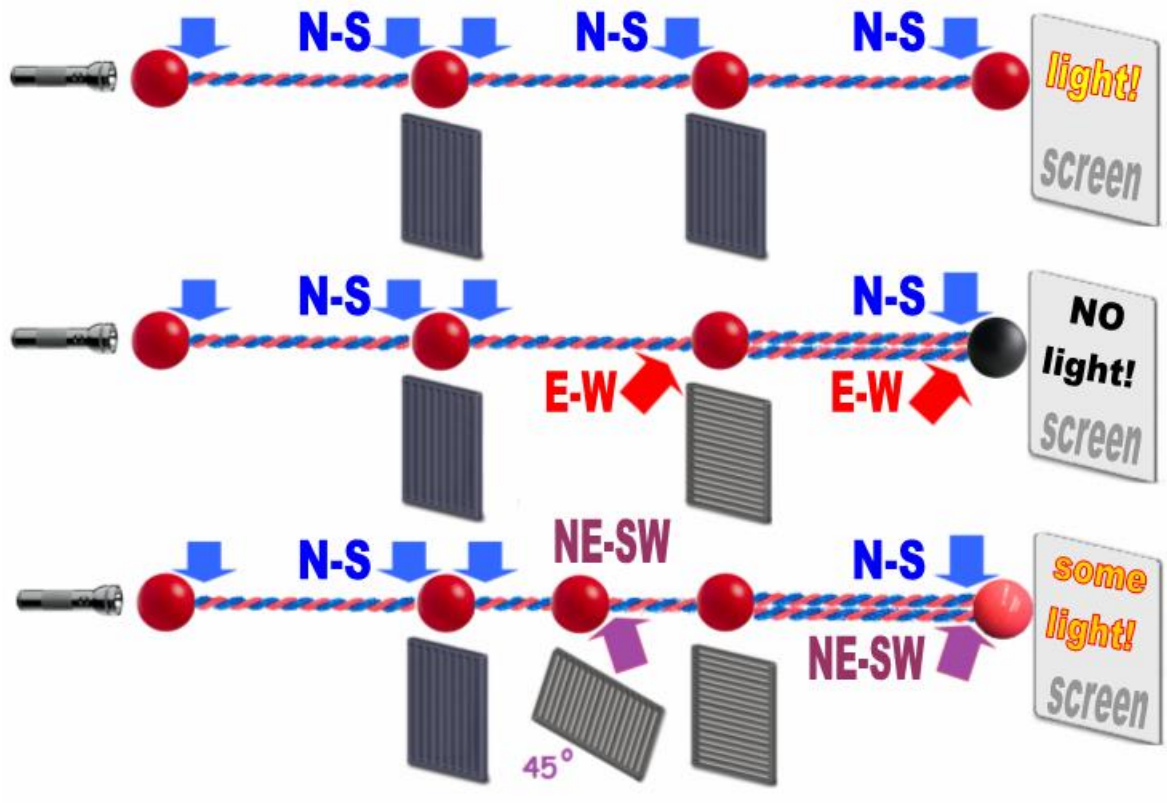
Now place another plate of calcspar between the two and rotate it 45º with respect to the others. The beam is reestablished. Magic!

How does Mother Nature do this incredible trick?

The Rope Hypothesis suggests a couple of different possibilities that may actually act in tandem to produce this enigmatic effect. We begin by stating once again that all molecules between the source, the two calcspar slabs, and the screen are already interconnected by the EM ropes before we turn on the light. Turning on the light merely increases the number of links (frequency) at the expense of the lengths of each link (wavelength).

When we turn on the laser, we stimulate the molecule that makes up the filament (the source). The atoms of this molecule pump at a faster rate and transmit the torsion to the molecule of the first slab via the EM rope. The atoms of this molecule now pump at a faster rate and relay the whirls to the atoms in the second slab which in turn retransmit them to the atoms comprising the screen.

Polarization

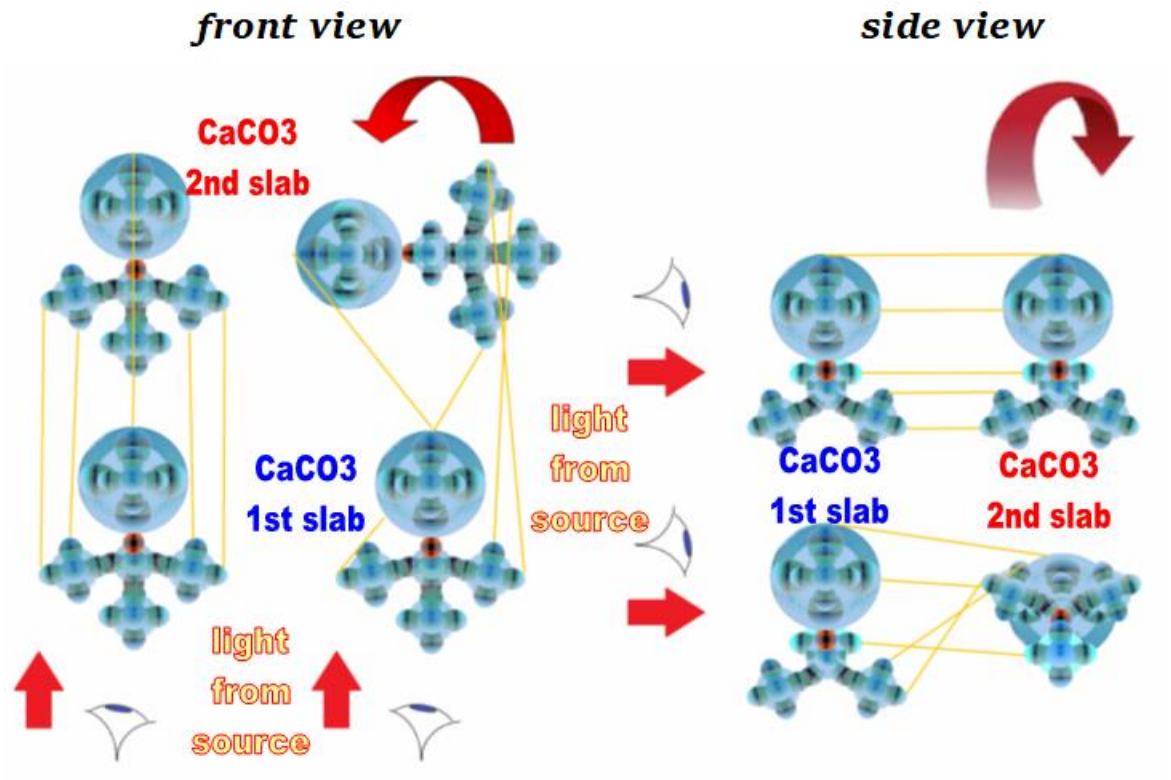


When we rotate the second calcspar slab 90º, the ropes connecting the first slab to the second slab are no longer parallel with the ropes comprising the beam emanating from the source. In other words, the ropes between the second and first calcspar slabs are now at an oblique angle with respect to the ropes that join the source to the first slab. A second effect that is certainly taking place is the twisting of each EM rope that participates in this phenomenon. Let us assume that the link extending from one of the atoms of the source is oriented in the north-south direction. The EM rope impinges on an atom of the first slab also in the north-south direction and once again on an atom of the second slab.

However, when we rotate the second slab at 90º, the link of this rope now converges on that same atom in the east-west direction and destructively interferes with the one along the same axis pointed in the north-south direction.

Placing another calcspar slab between the other two and rotating it at 45º with respect to them reestablishes the beam partially because the EM ropes are brought back closer (*i.e., NorthEast – SouthWest*) to being parallel with the beam from the source.

Illustration of the macro real world of the experiment



We illustrate five rope connections between a molecule (CaCO3) of the first calcspar slab and the one behind it. When the second slab is rotated 90°, so are its constituent molecules. The rope connections between the second and first slabs are no longer parallel to the EM ropes (the beam of light) extending from the source.

Foundations of Physics

Appendix 1

What is science?

The subject matter of this book is science. Therefore, a pertinent question is: *What is science?*

We answer:

Science: rational explanations

It is important to emphasize that this definition makes no provision for traditional activities that most people associate with science such as *observing, measuring, collecting data, running experiments, measuring, calculating, predicting, inventing,* etc. These are investigative tasks that a researcher performs prior to a conference.

Similarly, *presenting evidence, proving, persuading, convincing, converting, recruiting, establishing contacts, forming clubs,* and *rewarding individuals for their discoveries* are activities of an extra-scientific, missionary nature. These proselytizing processes are typically set in motion after a conference.

The definition of *Science* prescribed here is circumscribed to what happens at the conference proper: explaining mechanisms objectively for the sole purpose of understanding.

An explanation is an objective physical interpretation of what caused something to happen. A theorist should be able to make a movie about the mechanism that he proposes. The audience should be able to watch the film, visualize the actors involved, and understand the explanation proposed by the theorist.

Science is restricted to what happens at the conference. A physicist is required to explain a mechanism objectively. The ideal way to do this is for the theorist to make a movie of the mechanism so that the audience can understand it by merely watching the film. All other activities, including presenting evidence, proving, and running experiments, have the sole purpose of influencing the jurors and are treated as extra-scientific.

before the conference	Science at the conference what scientists do…	after the conference
observe study collect data analyze measure calculate formulate equations describe present evidence do experiments prove seek the truth	explain mechanisms objectively define key terms rigorously make films to understand mechanisms just by watching the movie	persuade convince convert recruit believe, know develop technology invent devices award / win prizes censor theories vote for theories rely on authorities testify introduce witnesses

Appendix 2

What is physics?

Science has two branches: Philosophy and Physics. Philosophy attempts to explain purposes and reasons. Its building block is the *concept*. Physics attempts to explain causes and mechanisms. Its building block is the *object*. The scope of this book is limited to Physics.

Imagine that there were no asteroids or planets, no stars or gases, no atoms in the entire Universe. What would there be to observe in such oblivion? What would be moving? What experiments could you carry out? What mechanism would there be to explain?

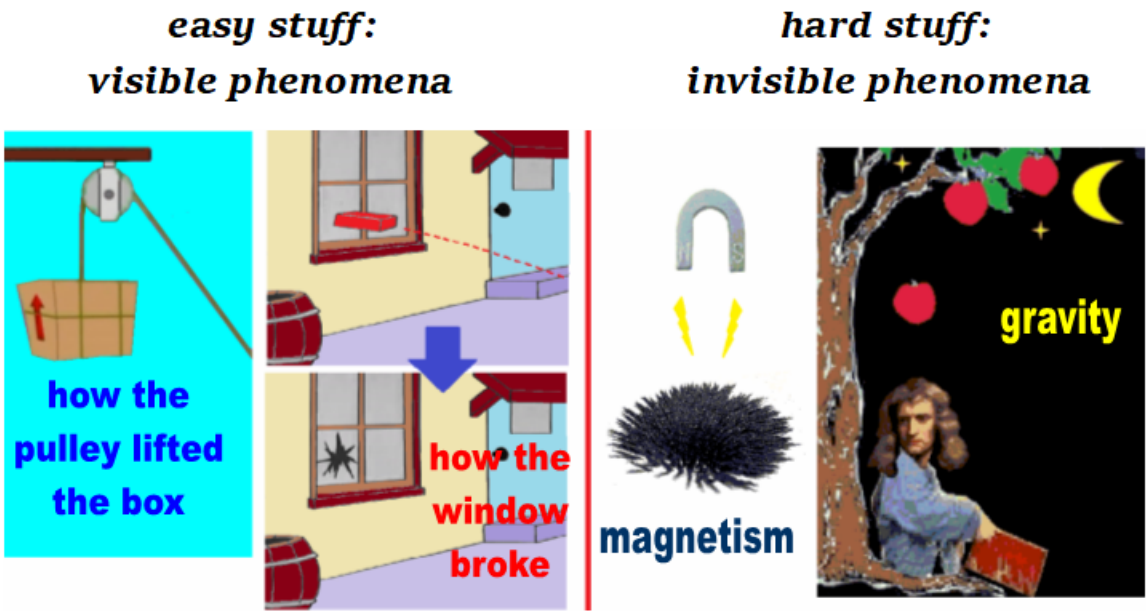
Fortunately, when we look at the night sky, we see galaxies, stars, planets, moons, asteroids, comets and, with more sophisticated instruments, we can also detect the presence of gases, molecules, and other compounds.

But how about the invisible stuff?

Well, here on Earth, we cannot see certain gases such as the air we breathe, but we wave our hand and touch something in that volume of space.

What we can neither touch nor see are whatever agents mediate phenomena such as light, gravity, and magnetism. These unseen mediators nevertheless enjoy a peculiar form of touch that most people never think about and rather take for granted in our familiar 3D world: *one-way touch*. The 'spirit' touches you but you can't touch it. Light touches your eyes. Gravity drags or pushes you to the center of Earth. Magnets attract iron filings from a distance. But you can't touch any of the mediators that play the leading roles in these phenomena! How does Mother Nature do these tricks? How does she hide from our eyes and hands the entities that make our visible and tangible world work?

From the dawn of civilization to contemporary days, humans have been able to figure out the visible phenomena. We readily understand how a brick broke a window or how a rope wound around a pulley lifted a box or how a seesaw rocked up and down at the playground. We need to do no more than look at the actual event or a film of the event in order to comprehend how the phenomenon happened. It is Mother Nature's invisible mechanisms and agents – *light, magnetism, electricity, gravity, the workings of the atom* – that have eluded our grasp.



The question is whether visible mechanisms are qualitatively different than those that aren't.

Let's illustrate this by making the rope invisible in the pulley scenario and the brick invisible in the one with the broken window. How did the box rise? How did the window break? Suddenly, these phenomena are as mysterious and as incomprehensible as magnetism and gravity. And yet, to understand how they occurred merely requires making the rope and the brick visible. It is then that these mechanisms reduce to kindergarten games. In this book, we dismiss the idea that action-at-a-distance phenomena (*invisible phenomena*) occur without the intervention of mediators.

Is making the invisible mediators visible all that we need to do to decipher phenomena such as magnetism and gravity?

If all that remains to be deciphered in Physics is Mother Nature's invisible mechanisms, then the answer to this question may just be *yes*. Once we can 'see' the tenuous threads she uses to move her puppets around, we are finished with Physics. There is no more mystery in Physics after that. At that point, we understand how the Universe works.

Physics: rational explanations of objective mechanisms

Appendix 3

Physics requires an object

A mechanism demands that the actors be objects. We cannot explain or even imagine a mechanism unless we visualize objects in motion. This realization should lead you to consider the most fundamental principle of Physics:

The Golden Principle of Physics

> *"Physics requires an object; you can't rationally explain a mechanism without a mediator."*

The Golden Principle is the starting point, the cornerstone of Physics. So we spell it out to make its implications plain.

1. We can only move objects (*e.g., a car can accelerate, a balloon can expand, a knife can be transferred*). We cannot move concepts. It makes no sense in Physics to say that *mass accelerated* or that *love expanded* or that *energy was transferred*. Such figures of speech are outlawed.
2. We assume invisible phenomena are mediated by objects. (*The previous section provided good examples*).
3. We assume no witnesses are necessary for a mechanism to function or for an object to exist. (*e.g., A star that nobody can see or touch is still an object.*)

4. Conscience and consciousness play no role in objective explanations of mechanisms. (*e.g., A tree that falls in the forest in the absence of witnesses still displaces air and therefore generates sound. This phenomenon is independent of what the individual processed in his brain*).

Can we do entirely without concepts in Physics? Don't we invoke abstractions such as *distance, position*, and *displacement* to explain a physical interaction?

The issue before us is one step ahead of that. The question is whether there can be distance, position, or displacement without objects. It is from the relationships that observers establish between objects that concepts such as distance, position, and displacement are invented.

And yet, there is an even more fundamental argument that takes precedence over this one. Only objects can be said to move. It is patently absurd in the context of Physics to say that a concept moved (*e.g., moving 'a' mass, transfer energy, carry a force or interaction, dilate time*). When we say that Physics doesn't deal with concepts, we are emphasizing that it is irrational to say in theory that a concept moved.

Physics is about physical interpretations of phenomena. Mechanisms such as gravity and magnetism must be simulated with objects and not with concepts. The typical jargon used in informal and traditional speech has no bearing on Physics.

Appendix 4

What is an object?

If Physics demands an object, the next issue on the agenda is difficult to avoid. We need to define what an object is for this discipline. We can't begin to explain mechanisms until we covered this base.

object: that which has shape

Shape is the only attribute that all objects have in common.

Appendix 5

Not all objects are visible or tangible

At first impression, the definition of *object* would seem to be quite inoffensive. We all knew it, right? Kindergarten stuff!

Actually, this is not the definition that has always been applied or followed. Most people have the cursory notion of ordinary speech in mind: *that which we can touch or see*. We are so used to seeing and touching everyday things that we casually assume that those are the properties that define an object.

Then again, we cannot touch an impossible object such as a *tribar*. We can at best touch the paper or the ink where the image lies. And we certainly cannot see the air we breathe. Therefore, touch and see are not universal attributes of objects whereas shape is. Can you imagine an object that does not have shape?

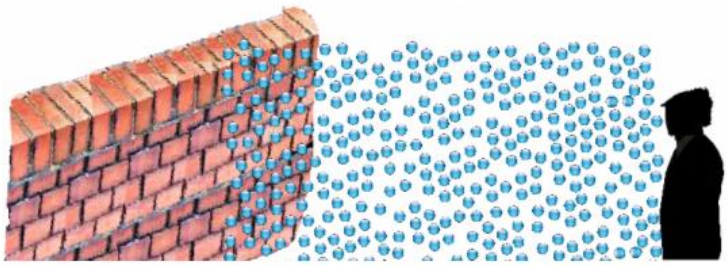
Nevertheless, touch, see, smell, taste, and hearing invariably invoke a second object: *the witness*. This would make the definition of *object* circular. We would have to invoke two objects to define the word *object*.

Just as self-defeating, the definition of *object* would be contingent on the interaction of these objects. The Moon would not be an object until an asteroid struck it. We need to run a test in which the senses of vision or touch are involved before we can call an elephant an object. This is not a definition, but a proof disguised as a definition: an *operational* or *functional* definition.

If we can't see or touch a star on the other side of the Universe, does the word *star* not refer to an object? Is the Moon not an object to the blind man?

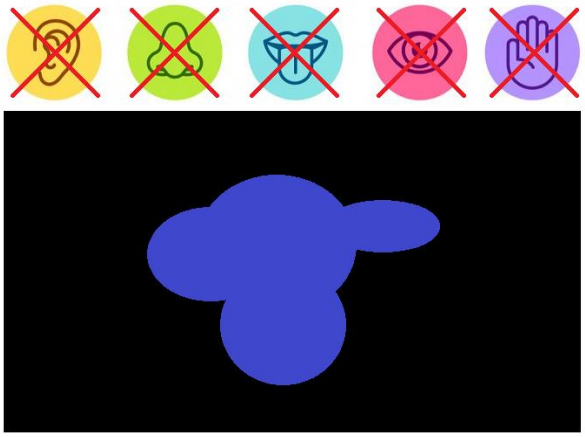
You can touch the paper and the ink, but not a tribar.

…And, fortunately, we cannot see the air, for else that would be the only thing that we would see.



Lastly, the word *object* is a static concept; no motion is involved in its definition. The definition of the word *object* necessarily precedes the definition of *motion*. Only objects can perform actions. Hence, a scientific definition of *object* should embody no verbs, motion, or any of the five senses.

What is not readily apparent is that choosing shape rather than the touch/see criteria leads to radically different conclusions in Physics. This becomes evident when we converge upon the properties of the invisible mediators that Mother Nature uses to do her daily work.



The strategic word 'object' is a static concept. Its definition should not embody any movement or invoke any of the five senses. The only attribute that all objects have is form.

Appendix 6

What is nothing?

If *something* is that which has shape, *nothing* is its antonym: that which doesn't:

nothing: that which has no shape

(synonyms: space, vacuum)

Now we can use these two strategic terms consistently in a dissertation of Physics.

Unfortunately, there is no picture that we can post to illustrate nothing. The reason for this is that *nothing* is a concept.

Appendix 7

Physics is the Science of Existence

The second cornerstone of Physics is the word *exist*. Physics attempts to discover and identify that which exists and to objectively explain actual mechanisms of the world around us.

Indeed, the strategic word *exist* is invoked in practically every paragraph written and in every dissertation given. Therefore, defining *exist* is neither an option nor a trivial exercise in semantics. Physics demands a rigorous definition of this ubiquitous term. We cannot 'do Physics' without it.

To arrive at a scientific definition of the ellusive word *exist*, we must first establish a couple of prerequisites. One of those is the word *definition* itself. A scientific definition is one that can be used consistently, meaning: rationally.

> *definition: a set of criteria that limits the extent or usage of a word*
>
> *distance: separation between two objects*
>
> *location: the set of distances from one object to all others*
>
> *motion (to move): two or more locations of an object*
>
> *exist: an object that has location; physical presence*

It is common in ordinary speech to casually say things such as *'love exists'*. In Physics, on the other hand, existence is a property restricted to objects. The word *exist* cannot be applied to concepts because concepts lack both: boundaries and location. There are no distances between concepts or between concepts and objects.

> *concept: a word that invokes or embodies two objects or two words treated as objects*

A concept is a relation established between two objects by a conscious entity. Out 'there', in the darkness we call *space* or '*the Universe*', concepts do not float around like spirits. There is no such 'thing' as a standalone concept that we can draw on the board by itself. Existence consists solely of objects. It is this '*real world*' that Physics attempts to unravel.

All words in the dictionary can be categorized either as objects or as concepts. There is no third category. A good rule of thumb to quickly place a word in its proper category is that an object has shape whereas a concept doesn't.

An object that exists is one that has location with respect to the remaining matter. We assume that objects do not *acquire* or *lose* location and, therefore, cannot *come into* existence nor *lose* existence. It follows from these notions and definitions that the thread could not have come into existence. What process can you imagine in which *nothing* spontaneously acquires length, width, and height and become *something*?

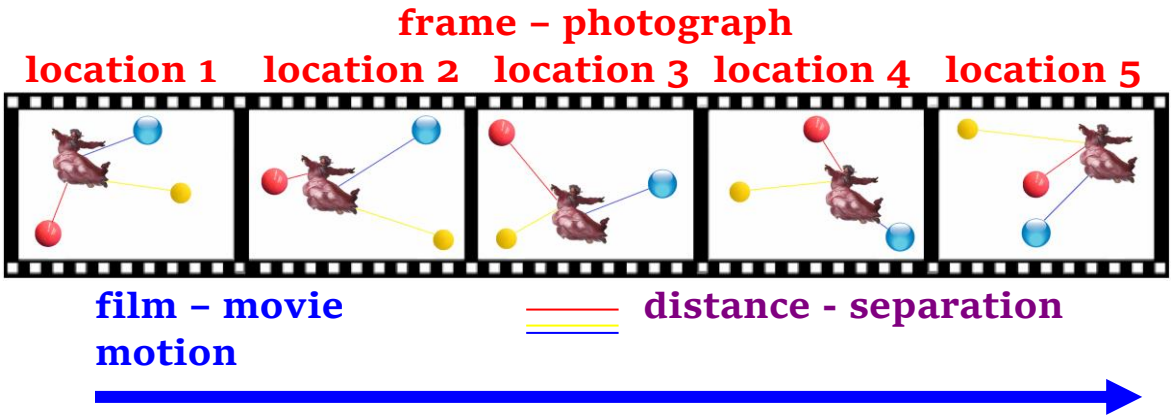
Conversely, it also follows that the thread cannot make itself disappear. By what process can *something* spontaneously lose length, width, and height and become *nothing*. It goes without saying that the difficulty consists of doing it in a single frame of the Universal Film.

Appendix 8

Motion vs. time

Location is a static concept that recognizes no movement nor past nor future. An object only has location vis-à-vis the remaining objects that exist. Motion, on the other hand, is a dynamic concept.

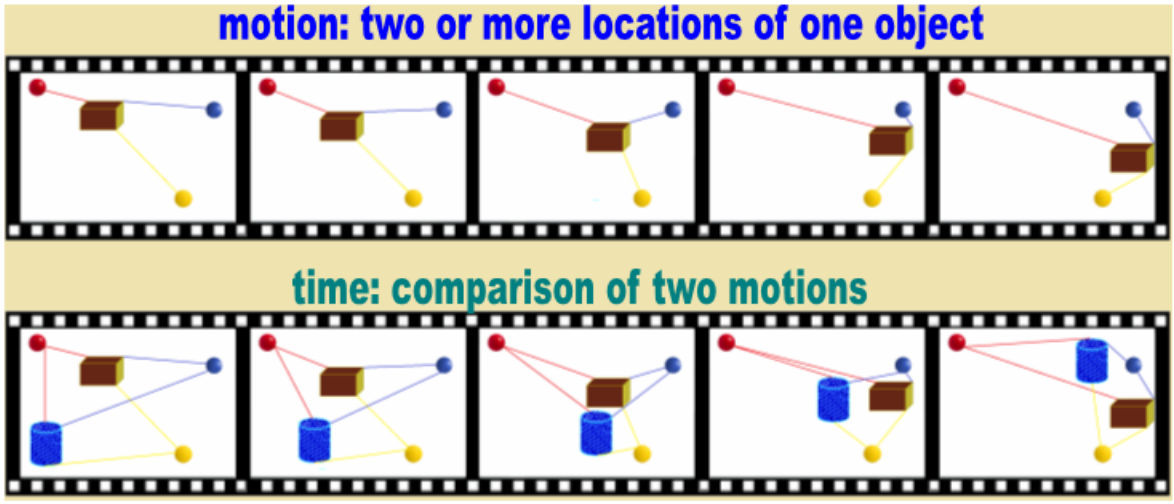
It helps to understand the concepts of *location* and *motion* by imagining the Universe as a movie. Let's refer to this film as the *Universal Movie*. Each frame in the movie represents a single location. It is at the next frame of the Universal Movie that it 'occupies' a new location. We refer to the set of these two frames as *motion*.



Time is not a synonym of *motion*. Move, an object moves by definition if it occupies two locations. It is unnecessary and, in fact, incorrect to add *'at different times'* in the definition of motion.

time: a comparison of two motions

Time differs from motion in that it involves two objects and memory. Time requires a recording device to remember the previous locations of both moving objects and to compare them against their final resting points. Motion, in contrast, involves the locations of a single object. And unlike time, motion does not require an observer.



A typical question many raise in the context of universal motion is: Why do atoms pump in the first place?

One answer is that the matter of the Universe did not ‘pop into existence’ at some point in the past. Matter has always been there. This follows from the fact that an atom cannot self destruct and morph into nothing (i.e., space, vacuum).

Conversely, nothing cannot spontaneously turn into something with or without an unspecified entity X as a suposition.

Like matter, motion cannot be conceptualized to come into existence or to have a starting point. Matter has always been in motion and always will be. What mechanism would induce matter to begin to move or to stop moving entirely?

Can you perchance imagine a frozen universe consisting of inert stars, asteroids, gases, and atoms spontaneously moving without a cause?

The answer is that the theories of Unmoved Mover and First Cause have trouble avoiding endless iterations.

Appendix 9

Push & Pull

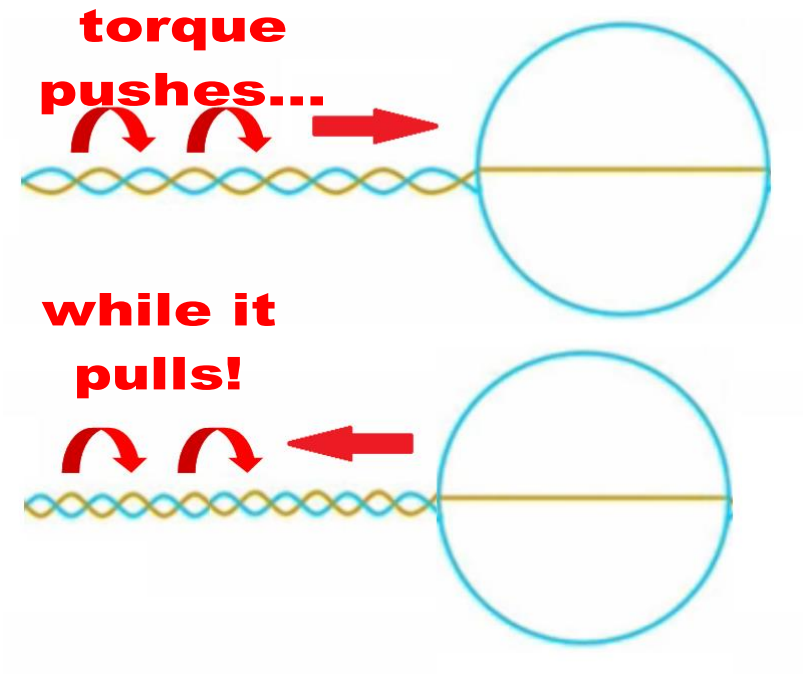
Discrete objects can only push. They lack a physical manner in which to pull on things. You cannot pull with stones.

However, even elongated objects such as ropes, chains, wires, fibers, strings, threads, and the like are said to be push mechanisms as well. The rope with which you pull on a donkey is said to push on the back of its neck. And the claw of the hammer used for extracting nails from a piece of wood actually pushes on the head of the nail. Even adhesives appear to push. At the molecular level the atoms establish bonds that can easily be interpreted as atom pushing on atom in the direction from which you pull. Therefore, it is pertinent to clarify that the EM rope may be the only genuine mechanism of pull imaginable.

Let's review the model. The EM rope forks out at the boundary of the atom. One thread goes straight to the center of the atom while the other one coils around. In other words, the atom is not a separate entity. It is made of the same threads as the rope. The EM rope can only pull from the direction in which it forks into that atom. The atom is not pushed towards that rope from some force coming from behind as with the donkey and the hammer.

This brings up a unique feature of the EM rope. Torsion stimulates the atom by giving its surface a nudge (push). But torsion also tends to tug that atom in the direction from which the EM rope is converging (pull). It is suggested that the atom owes its vibrations to this constant actuating.

An EM rope can only pull on an atom from the direction in which it forks into that atom. It can do so because the atom is made of the same threads that make up the rope. Torsion has a unique feature in which it can push and pull simultaneously!



Glossary of the Foundations of Physics

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motion: two or more locations of an object

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