Exhibit 8   Transcript of *What's Inside a Magnetic Field?*

Youtube restored the original video and it is now listed as private at:

https://www.youtube.com/watch?v=AU1ejXvWF0g

Plaintiff uploaded this video as evidence for trial…

https://www.youtube.com/watch?v=6msF1yLmBJM

Highlighted in blue are the instances of plagiarized terms, phrases, and concepts.

Magnetism Visualized

How can we imagine atoms physically interacting to produce magnetic attraction?

To begin our visualization, we must first review electricity in the atom.

We start with the hydrogen because it is the simplest atom.

Hydrogen has one electron shell which acts as the surface of the atom.

The shape of this shell is loosely based on the radial distribution function of the electron.

The electron shell changes shape with excitation state illustrated by breathing motion.

These quantum jumps become important in future videos for light and photoelectricity.

99.999% of the electron exists within 430 picometers of the nucleus.

The remaining .001 % of the electron shell is illustrated with tiny radial filaments.

The surface of the electron has no limit on how far it can extend.

If we ignore the tails of the electron distribution and quantum jumping, we can use this model to visualize a simple wire.

Consider a basic DC circuit.

The circuit is composed of single file ionized hydrogens.

At its poles the electron shell of each atom is folded into that of its neighbors.

Current is represented by pole to pole transmission of rotation between enmeshed electron shells.

Watch our electricity video linked here for more details.

Here are two identical wires of single file ionized hydrogen.

Their electron shells rotate clockwise and current is downwards, orthogonal to the motion of the shells.

The surface rotation of the electron shells is responsible for the magnetic action of a current-carrying wire.

If we reintroduce only the electron tails that emanate laterally from each wire, it becomes clear that the magnetic action extends radially.

In this view we see that the rotating tails of the electron shells are in contact even though the wires themselves are separated.

The electron density decreases radially from the wire, and so attraction falls in inverse proportion to distance.

The electron shells' lateral action is described by the magnetic field B.

In these wires all atoms rotate in the same direction.

This causes the electron shells to pull together magnetically.

Without the interacting tails it appears the wires attract magnetically without coming into contact.

When we visualize the distribution tails of the electron shells it becomes clear that the atoms are laterally enmeshed.

This helps us see why the two wires' fields are said to combine.

For the remained of this video we will not include these small electron tails.

However, they are always present and serve to explain action at a distance.

What about magnetic repulsion?

Here are two wires whose electron shells rotate in opposite directions.

This means they have inverted directions of current.

It follows that lateral electron shell motion is also reversed.

In this case the wires' magnetic fields oppose one another.

If we force the wires into proximity, the opposing electron shells antagonize one other.

When we release the wires this oppositional clash between each column's electron shells drives them apart.

Now, let's fashion a simple magnet.

If we coil up our single atom wire, we create what is called a solenoid.

The solenoid is the most basic form of an electromagnet.

How does the shape of a solenoid result in cohesive magnetism?

Let's look at what the atoms are doing?

Here, the electron shells rotate into the screen.

The coiled wire forms a composite cylinder whose surfaces rotate cohesively.

The magnetic field B describes this cohesive lateral electron shell motion.

Overall the composite surface appears to flow out from one end and into the other.

As with the single wire, this motion is described by the magnetic field B.

The outlet and inlet of surface motion are called the poles of the electromagnet.

What's happening at the poles?

You can see that the solenoid surface flows into the south pole.

At the north pole the surface flow is opposite and outward.

How do electromagnets interact?

When the coils are stacked north to south, the motion of atomic surfaces is aligned.

The aligned electron shells synergize, and this combined surface motion is reflected in a unified magnetic field.

Now let's invert one of the coils.

When stack north-north or south-south, the surface motion between the coils is oppositional.

This leads to a clashing of electron shells between the coils and the magnetic fields do not combine.

If we release the coils, the opposing motion of the electron shells pushes them apart.

Remember: repulsion and attraction at a distance between magnets is possible because the electron shells of the atoms extend indefinitely.

This visualization of electromagnetism can also be extended to bar magnets.

The primary difference between a solenoid and a bar magnet is the absence of an electric current.

The bar magnets' metal atoms differ from these simple hydrogens in that their electron shells have multiple independent orbital surfaces.

In a bar magnet, unlike the solenoid, the atomic surfaces that participate in bonding and conduction are distinct from the ones that participate in magnetism.

Magnetically relevant electron shells in a bar magnet are organized in a similar spiral pattern to the solenoid.

We are working towards an animation of complex magnetic metals for a future video.

In the meantime, please comment with ideas for improving the model.

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