

## Physics Integration Lesson 18 – That Which is Seen

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Have you ever had someone say, “I’d believe in God if I could see Him or have empirical evidence that He exists.” In a scientific world, this seems to be a legitimate challenge. Why should I believe in anything that I can’t see, hear or touch? Since the Enlightenment and the time of Descartes, the only thing I can be certain of is that I exist, *cogito ergo sum* (I think, therefore I am.”). All other ‘acceptable’ knowledge is what I can experience directly or what comes second hand through a trusted authority. The problem with this approach is that ‘I’ am always the judge of what is to be trusted. However, truth resides outside my opinion about it. I may not like gravity because it keeps me from following my dreams to float through the sky, but the truth of it makes me live differently.

To the Greeks gravity was a tendency of objects to reach their place. Since the earth was the center of the cosmos, matter wants to reach this center. Since earth is more dense, it is closest to the center; next comes water, air and, finally the least dense, fire. When Newton proposed his universal law of gravity, objects didn’t seek their place, but were coerced there without any physical contact. At first, this spooky ‘action at a distance’ was not broadly accepted across society because it can’t be seen, heard or felt. By the time electromagnetic theory was developed in the mid-nineteenth century, the notion became popular enough to ignite the imagination. If electromagnetic waves could communicate at a distance with no physical wires to send the signal, then maybe people with psychic powers do exist and these powers can be studied scientifically.

Although the power of psychics have been explored for over a century, no empirical evidence exists; however, many charlatans have been exposed. This same approach of exposing frauds has been applied to Christianity. If you can’t make God perform like a pet dog on command, then he must not exist. This sounds sacrilegious, but this is exactly what people do when they ‘put God to the test’ (Luke 4:12) and expect empirical evidence to be demonstrated. So how do we know that God is real and He is actively involved with the world?

No one can see, hear or touch electrons, and yet, we don’t doubt their existence. That was not true over a century ago when they were first discovered, but after this week’s lab you believe you saw electrons. In reality, you saw the effect of electrons. The electron beam left the heated filament, accelerated to a positively charged cylinder and escaped through a slit forming a beam. None of that would be seen except that the designer of the apparatus placed a mercury gas in the tube. As electrons interact with mercury atoms, they are absorbed and their lost energy is emitted as photons of light. You see the light, but not the electron. Even more elusive particles exist in the universe, such as neutrinos. 100 billion pass through each square centimeter of you every second. We would be ignorant of their effect if it were not through specially designed experiments to capture their interaction with the nucleus of an atom.

Electrons interact with mercury atoms through electric forces. Neutrinos interact with atomic nuclei through the weak nuclear force. Cosmologists observe gravitational effects that can only be explained by masses that do not interact electromagnetically. Therefore, they design experiments to find particles of ‘dark matter.’ They cannot see it, but they believe it exists by the effect it has on stars and galaxies. In like manner, we don’t see God directly, but we see Him by the effect he has on the world. The

difference between Him, electrons and neutrinos is that He has a mind and chooses when he will act in ways that are beyond the physical laws He sustains (Colossians 1:16, 17).

1. As believers, Romans 8:16 applies to us. We interact with God in a way that is different than an unbeliever. Without this witness, how are unbelievers to know about God and his plan of salvation? Can God use situations where unbelievers 'put Him to the test?' Explain.
2. How would you move a conversation forward with an unbeliever who wants empirical evidence of God? What things can you say or point out that would prepare them to consider the truth of Scripture and of Christianity?