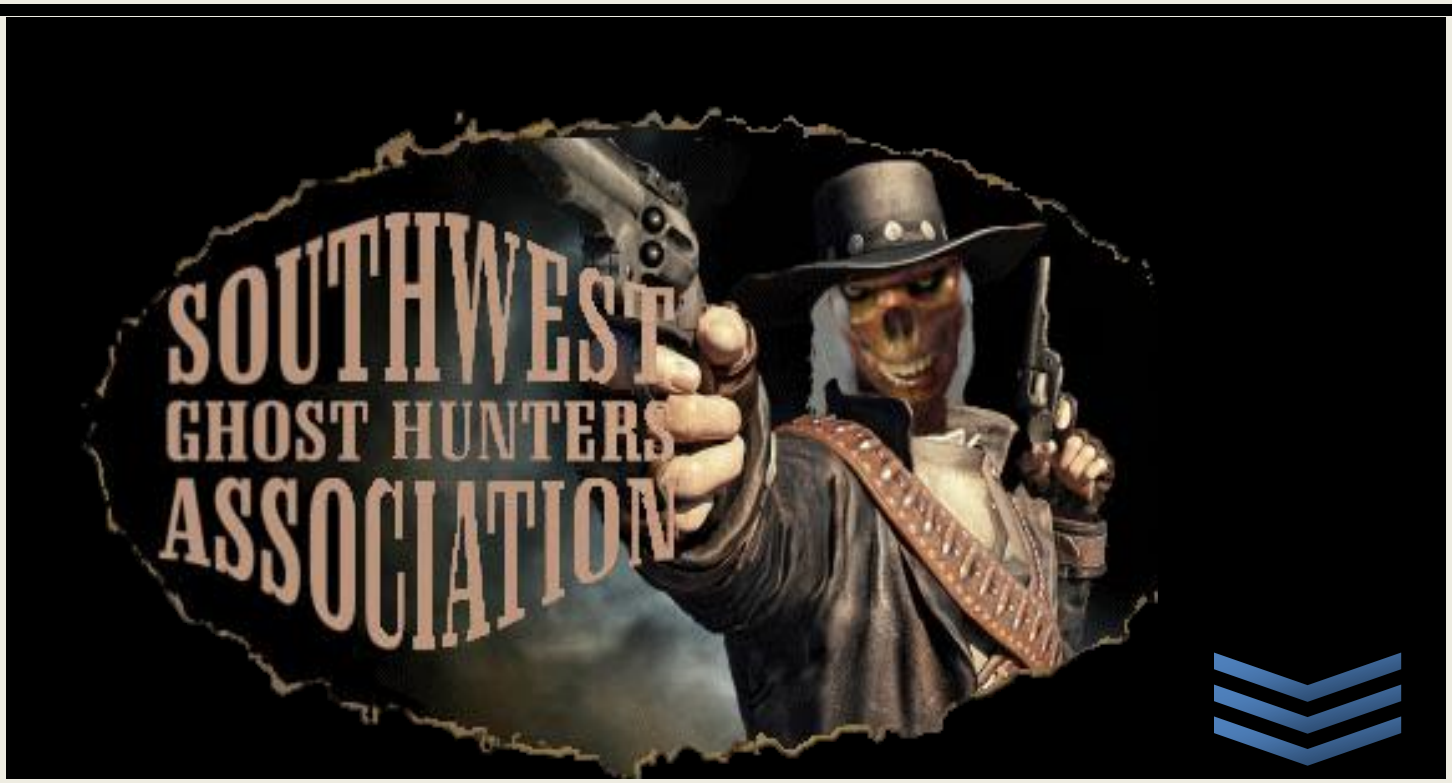

Ghosts and Thermodynamics

Abstract: The first law of thermodynamics is often quoted by paranormal enthusiasts as being a solid scientific concept that the existence of ghosts is possible. In this paper the author demonstrates that that is not so. When the other laws of thermodynamics are applied, all of the energy is accounted for.

This article is an excerpt from “Hunting the Ghost Hunters” by Cody Polston. Used with permission

The Laws of Thermodynamics

Energy exists in many forms, such as heat, light, chemical energy, and electrical energy. Energy is the ability to bring about change or to do work. Thermodynamics is the study of energy.

The most quoted law used by ghost hunters is the first law of thermodynamics. The First Law of Thermodynamics, commonly known as the Law of Conservation of Matter, states that matter/energy cannot be created nor can it be destroyed. The quantity of matter/energy remains the same. It can change from solid to liquid to gas to plasma and back again, but the total amount of matter/energy in the universe remains constant.

Here are some common examples of how paranormal investigators cite this law.

"The first law of thermodynamics states that energy can neither be created nor destroyed but remains constant within a system. It can move on and be converted from one form or another, but that energy will never disappear—instead, it will merely disperse into other elements. Movement is the result of this exchange of excitable energy as it passes between one substance and another. Knowing this implies two things: the energy that made us who we are existed prior to our infusion within the body, and when the body dies, it will move on into some other substance outside of the human body."

"The scientist who scoffs at the thermodynamic support of an afterlife is (ironically) not looking at it from a logical perspective in my opinion. That argument insinuates that our intelligence and personality is released as nothing more than "dumb" heat in post mortem, and that alone leads to an entirely different argument, one that is philosophical. How can simple heat such as the heat from a candle flame think, feel, manipulate its environment... etc..."

"It makes no difference if it's thermal energy or some other form of energy on an entirely different plane. The first law of thermodynamics is supposed to apply to ALL energy and matter - it's never "created nor destroyed", merely converted into another form. Since we agree that this "soul" must contain energy, it too should be bound by this law. Thus, death is not the end of this energy within, but merely a "change of clothes". By definition this energy must survive in some form."

"If consciousness is energy, then I suppose you don't need proof that it survives death, because proof already exists: the First Law of Thermodynamics - energy is neither created nor destroyed, though it's hard to take much comfort from this."

Based on the examples above, one can quickly determine what the ghost hunters are reaching for. By citing the first law, they are convinced that the "energy" of life must continue in some

form or another. Yet amidst this scientific sounding babble, ghost hunters have conveniently over looked the second law.

The Second Law of Thermodynamics states that "in all energy exchanges, if no energy enters or leaves the system, the potential energy of the state will always be less than that of the initial state." This is also commonly referred to as entropy.

While quantity remains the same (First Law), the quality of matter/energy deteriorates gradually over time. How so? Usable energy is inevitably used for productivity, growth and repair. In the process, usable energy is converted into unusable energy. Thus, usable energy is irretrievably lost in the form of unusable energy.

"**Entropy**" is defined as a measure of unusable energy within a closed or isolated system (the universe for example). As usable energy decreases and unusable energy increases, "entropy" increases. Entropy is also a gauge of randomness or chaos within a closed system. As usable energy is irretrievably lost, disorganization, randomness and chaos increase. A wound alarm clock will run until the potential energy in the spring is converted, and not again until energy is reapplied to rewind the spring. A car that has run out of gas will not run again until you refuel the car. In living systems, the potential energy is locked in carbohydrates and is converted into kinetic energy. An organism will not receive any more energy until it is input again. In the process of energy transfer, some energy will dissipate as heat.

The flow of energy maintains order and life. Entropy wins when organisms cease to take in energy and die. Time in science is defined as the direction of entropy. One can generalize further. Thanks to the mathematical relation between *disorder* and *probability*, it is possible to speak of evolution toward an increase in entropy by using one or the other of two statements: "left to itself, an isolated system tends toward a state of maximum disorder" or "left to itself, an isolated system tends toward a state of higher probability."

Physicist Sir Arthur Eddington wrote that the second law of thermodynamics

. . . holds the supreme position among the laws of Nature. If someone points out to you that your pet theory of the universe is in disagreement with Maxwell's equations — then so much the worse for Maxwell's equations. If it is found to be contradicted by observation — well, these experimentalists do bungle things sometimes. But if the theory is found to be against the Second Law of Thermodynamics, I can give you no hope: there is nothing for it but to collapse in the deepest humiliation.

The two principal laws of thermodynamics apply only to closed systems, that is, entities with which there can be no exchange of energy, information, or material. The universe in its totality

might be considered a closed system of this type; this would allow the two laws to be applied to it.

The third law of thermodynamics, or the asymptotic law, states that all processes slow down as they operate closer to the thermodynamic equilibrium making it difficult to reach that equilibrium in practice. This law suggests that the powerful and fast changes which are typical of technology and characteristic of living forms of organization are bound to occur only at levels far removed from thermodynamic equilibrium.

Since we are talking about living systems, **Negentropy** must also be discussed**.** Negentropy is reverse entropy. It means things becoming more in order. Life is considered to be negentropic because it takes things in less order, like dead food, and turns it into things in more order, like cells in the body, tissues, and organs. In doing so, it gives off heat. The outside or skin of an organism is always at maximum entropy because it is removing heat.

A fully living system must be capable of energy conversion in such a way as to accumulate negentropy, that is, it must produce a less probable, less random organization of matter and must cause the increase of available energy in the local system rather than the decrease demanded in closed systems by the second law of thermodynamics.

So what happens at death? Thermal energy is conducted into the matter around the body while the chemical energy is slowly dispersed as the body decomposes. Bacteria utilize molecules from the body for their own existence. The matter and energy that we were made of still exists, just in some other form or at some other location. No energy is destroyed. It has simply changed form and can all be accounted for.

Science has clearly shown that the First Law of Thermodynamics applies to all matter and energy, regardless of the conditions involved.