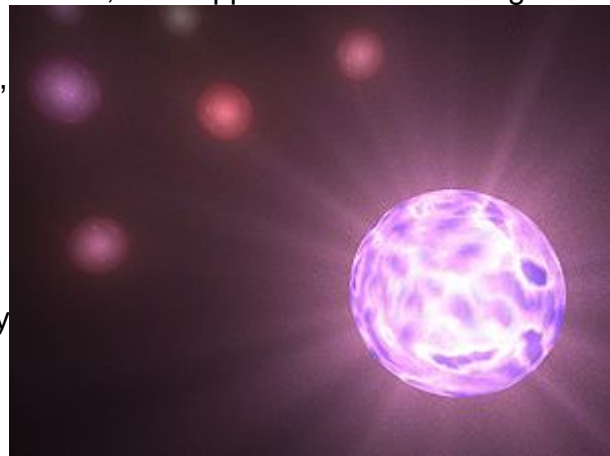


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## THE whole STORY ABOUT ORBS

by David M. Rountree, AES

..Perhaps there is no phenomenon associated with the paranormal that is more controversial than the orb. An orb is typically a circular **“glowing”** anomaly appearing in flash photographs. Whether its photography or video, orbs appear to be balls of light with an apparent size in the image ranging from a pinpoint to a basketball. Orbs often appear to be in motion, leaving a **“comet tail”** or trail behind them.



..Within the paranormal community there are two main schools of thought regarding the cause of orbs in photographs. The collection of photographic pundits see the orb as a fairly clear-cut case of flash reflection off of dust, particles, insects, lens flare or moisture droplets in the air in front of the camera, in other words they are naturalistic. How many times have you heard one of these self assured authorities say, **“all orbs are dust particles”**. I think it is wonderful that people can be so sure without doing any research on the matter.

..The **“spiritualists and novice investigators claim that orbs are all paranormal in nature, or non-naturalistic, being caused by spirits, awareness, ghosts, etc. “Orbs are the manifestation of the spirit..”** Neither side offers much in the way of proof in either direction. I will say that there is a mountain of evidence that demonstrates orbs can be dust, water droplets, etc. On the other side, the evidence that is offered up is more on the lines of **“I believe”** or **“I feel”** or even **“I sense”**. **Neither side could be further from the truth in their position.**

..Why? Simply because neither side knows for 100% for sure, unless they have additional corroborating evidence in either direction, which if they do, they fail to quote. Sure it is easy to say all orbs or dust, because so many of them are. If you are a believer in orbs it is also equally easy to claim they are all real, or maybe manifestations of the spirit. While there are several studies out in the field that are specifically targeting orbs, so far no substantial evidence proving orbs are anything but dust has surfaced. My own journey in seeking the truth in orbs began a long time ago, in the late 1970's when I captured an orb on a 35mm SLR camera with no flash. Since then, I have

followed the path that many claim to follow, but few actually do. ***That path is the scientific method.***

<p><b>..Here is what the scientific method is all about.</b> First you must have a question you desire an answer to. What is it that you are trying to find out? What is it that you are trying to achieve? We are trying to find out what an orb is. Next you must research your topic. Investigate what others have already learned about your question. Gather information that will help you perform your experiments in an effort to <b>prove what an orb really is.</b></p>	<p><b>..Develop a Hypothesis.</b> After thoroughly researching the topic (<b>orbs</b>), you should have some idea about what you think may be causing the phenomena you are studying. This should be an educated guess concerning the outcome of your search for the truth. This is called your hypothesis. Your hypothesis may change as the data becomes available to you, and you learn more about the subject you are studying. You must also state your hypothesis in a way that you can readily measure. <b><i>Remember, you have to prove what you believe.</i></b></p>
	<p><b>..Test Your Hypothesis by Doing an Experiment.</b> Now that you have come up with a hypothesis, you need to develop a procedure for testing whether it is true or false. This involves changing one variable and measuring the impact that this change has on other variables. When you are conducting your experiment, you need to make sure that you are only measuring the impact of a single change. Scientists run experiments more than once to verify that results are consistent. Each time that you perform your experiment is called a run or a trial. It is also important that others are able to replicate the experiment and discover the same outcome.</p>
	<p><b>..Analyze Your Results:</b> At this stage, you want to be organizing and analyzing the data that you have collected during the course of your experiment in order to summarize what your experiment has shown you.</p>
	<p><b>..Draw Your Conclusion.</b> This is your opportunity to explain the meaning of your results. Did your experiment support your hypothesis? Does additional research need to be conducted? How did your experiment address your initial question and purpose?</p>
	<p><b>..Report Your Results and Conclusion.</b> Write a white paper or report. Submit evidence for peer review. Most of the “<b>authorities</b>” on either side of the orb controversy tend to stop and run their mouths after the State Your Hypothesis part of the scientific method. Others quote the fact that since dust can cause an orb, all orbs are dust. While Occam’s razor states that the simplest solution is generally the correct one, this isn’t always the case.</p>

..The “**spiritualists**” on one side claim that orbs are more likely to appear in certain locales, or are attracted to human activities, especially those involving children.

The images are captured in graveyards, backyards, attics, and kitchens, as well as bars, convention centers, and city streets; in fact anywhere people may be taking photos you will find an orb. Since orb photos can be taken virtually everywhere, the position of "ghost hunters" and "sensitives" who claim orb photos are more common in allegedly haunted areas is significantly weakened. Orb photos have become so prolific in the field that some "ghost hunting" organizations are no longer accepting submissions of them, or specifying that only "exceptional" examples be presented. There is no other justification for this other than there are "Too Many" orb shots submitted. Other groups do not recognize them as evidence at all. And to be honest, an orb shot without any accompanying evidence is meaningless.

## ..NATURALISTIC Orbs

..Naturalistic orbs are generally the result of using digital cameras with a built-in flash. While photographers with archives of photos (*including myself*) have occasionally captured "orbs" with 35mm film, it is theorized that the increase in orb photos may be directly related to the common availability of digital cameras and associated rise in the number of pictures taken. There is some truth to this. Now, there are over 2700 photographs taken every second around the world, adding up to well over 80 billion new images a year taken on over 3 billion rolls of film, according to estimates published by the United States Department of Commerce. This is film alone, not including digital photography. One can well imagine how many digital photographs were taken a second. **It is estimated that fully one third of those contain anomalies that are orb like in appearance.**

..Additionally there are orbs showing up without any "environmental" explanation i.e. no dust, no rain, no moisture, no snowing, no light reflections, etc. Often they appear to be partially obstructed by obstacles in the scene. While many of them can be explained, a sufficient amount can not. These are the ones that must be investigated further.

Naturally occurring orbs can be caused by:
1. Solid orbs - Dry particulate matter such as dust, pollen, insects, etc.
2. Liquid orbs - Droplets of liquid, usually water, e.g. rain.
3. Foreign material on the camera lens
4. Foreign material within the camera lens
5. Foreign material within the camera body

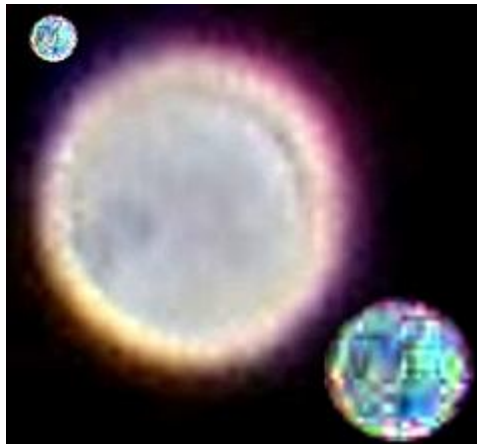
..**What causes a solid orb?** A solid orb, or dust orb, is created because a reflective solid airborne particle, such as a dust particle, is situated near the camera lens and outside the depth of field, in other words out of focus. The pinpoint of light reflected from the dust particle is in focus as accurately as the camera can react to it. The resulting image grows into a circle of confusion that appears like an orb. There are now certain cameras that employ "dust filters" or electronic filters that turn dust reflections into a bright diamond.

**..How is a liquid orb created?** A liquid orb is created because a drop of liquid, most often a rain drop, is situated near the camera lens and outside the depth of field, in other words out of focus. The pinpoint of light captured by the camera behaves exactly like a dust particle. The appearance of the circle of confusion is modified by aberrations such as chromatic aberration or coma. The raindrop must have reached terminal velocity though to maintain a circular shape. I have some photos of water dripping in an old iron mine and they are tear drop shaped because of the short travel distance. I have also photographed an orb floating along the ground at an elevation of between two and 12 inches in this mine, and because the humidity was about 96%, there is no way it could be dust or water vapor. I have never seen water droplets travel sideways in the absence of wind.

**..Non-naturalistic orbs.** “ **Spirit**” orbs are sometimes claimed to exist more densely around certain haunted regions, or to be the spirits of departed loved ones. These types of orbs are sometimes claimed to have faces, sometimes with discernable expressions and sometimes of recognizable persons. As far as I know, there is no evidence to directly link an orb to a dead person. There is a good body of evidence that link orbs to paranormal activity. ***Let’s explore this further.***

## **..IONS Revisited**

**..The brain and consciousness utilizes ions and ionic energy in order to function. If a “ghost” is an extension of consciousness then it makes sense that it would respond to this kind of energy and would be able to possibly use it more effectively. In fact, it is quite possible that ions are potential power source for paranormal activity. We are currently experimenting with Ion Bombardment in order to see if there is a correlation between elevated ion levels and intensity of paranormal activity (see ***Ion Bombardment Experiment***).**



**..Ions are abundantly found in our natural environment and in the atmosphere. Normal fair-weather ion concentrations are typically 200 to 800 negative ions and 250 to 1500 positive ions per cubic centimeter. Indoor levels are generally lower. Interestingly, several hours before a storm, positive ion count will increase dramatically, sometimes exceeding 5000 ions per cubic centimeter (cm<sup>3</sup>). During the storm however, negative ions increase to several thousand while positive ions decrease, often to levels below 500 per cm<sup>3</sup>. A high percentage of positive natural ions are produced by radioactivity and about 40% of these natural air ions come from radioactive minerals in the ground. Each time a radioactive atom decays near the air, it produces 50,000 to 500,000 air ion pairs.**

..Another 40% of the natural air ions are the result of radon in the air (**radon produces about 250,000 ion pairs per atom**), and about 20% are the product of cosmic rays (**high-energy protons from distant supernovas**). Indoors, ions live an average of about 30 seconds before touching a surface and shorting to ground. Outdoor ions usually live several minutes more than indoor ions. Negative ions usually come from radioactivity, water falls, the pounding of surf, and evaporating water. Lightning, thunderstorms, and forest fires can contribute positive and negative ions, though these ions are not produced via common everyday conditions.

..Ions are also produced by high-energy events, such as an open flame or a glowing hot object. Hot objects usually emit equal numbers of positive and negative ions. High DC voltage (**over 1000 Volts**), especially when connected to pointed metal edges or needles, will produce ions of the same polarity as the voltage source, which is the basis of home ionizers as well as our experimental bombardment devices. Evaporating water will produce negative ions in the air and as a consequence leave positive charges behind in the water that hasn't yet evaporated. **So if you photograph and orb, and measure a dramatic increase in ionic count, you have your first piece of evidence pointing your orb to a possible paranormal connection.**

## ..STATIC ELECTRICITY Review

..Static electricity involves objects with a net charge; typically charged objects with voltages of sufficient magnitude to produce visible attraction, repulsion, and electrical sparks. Static electricity is a serious problem in the processing of analog recording media, as it can attract dust to sensitive materials. In the case of photography, dust accumulating on lenses and photographic plates degrades the resulting picture (**and can cause naturalistic orbs**). It is also important to remember that the presence of an electric current does not detract from the electrostatic forces or from the sparking, the corona discharge, or other phenomena. All phenomena can exist simultaneously in the same system. Static electricity can activate dust particles into the air, stimulating movement with out air currents. On the other hand, if you photograph an orb, if you have a dramatic increase in static electricity, coupled with increased ion count, you have collected your second piece of evidence pointing your orb to a possible paranormal connection.



..As we continue our investigation, let's say we notice a drop in temperature in the area near the orb manifestation. Unnatural drops in temperature, without drafts or other natural causes, have been linked to paranormal activity. This would be an additional indication your orb is related to paranormal activity. **EMF readings increase, barometric pressure decreases, and finally you measure a burst of alpha, beta or gamma radiation as the environment returns to base readings, then you now have**

**a preponderance of evidence that your orb is paranormal related.** You still have not proven it is a ghost, or a dead person for that matter. You have quantified it as related to a paranormal event. The more evidence you gather, the stronger the case. Are all Orbs dust or foreign particles? Certainly not! Are all orbs signs of a spirit manifestation? Certainly not! But depending on **“the rest of the story”** as Paul Harvey would say the proof is in the pudding, or in our case, additional supporting evidence.

**Do I think orbs are ghosts? No, I think orbs are a field of plasma energy triggered by a paranormal sequence of events. Or maybe it -IS- Uncle Harry... Are we any closer to the answer?**

..I captured my first orb in 1976 using 35mm black and white film, ASA 1000, from a Pentax Spotmatic 500 SLR camera. Since I was using manual focus (**The unit didn't have an auto focus function**) I assumed that I had captured a foreign particle in the near region of the lens. I accepted this explanation as the rational

explanation without doing any research to validate the effect. Over the course of the next ten years, I captured many orb photos at paranormal investigation sites, and dismissed them outright. While the orbs showed up primarily in night shots where a flash was employed, I did capture several daylight orbs without using a flash. Many of these orbs were captured outside, which increases the potential for foreign particle contamination or lens flare to be the primary cause of the phenomena.



..During the late 1980s I had rigged up a **“portable” magnetic anomaly detector**. Essentially it was a modified metal detector mated to an oscilloscope, so it wasn't **“real portable”**. In those days, the oscilloscope I used was roughly the size of an overnight case. This made for limited mobility, but it did allow for me to discover the electro-magnetic nature of paranormal phenomena. I also discovered elevated readings whenever an orb was present. This led me to reassess my belief in the nature of the photographed orbs. **While most orbs I captured were in fact, dust or pollen, a small percentage defied that explanation. They seemed to affect the environment, and dust can not do that!**

..Close examination of the photos revealed the appearance of a complex structure within the orb. Since I wasn't physically seeing the orbs I was photographing, **I formed a hypothesis that certain orbs were essentially plasma, or plasmoidal energy.** Akin to ball lightning, this seemed like a plausible explanation. This would make them photographic only if they were in the presence of an extreme photon bombardment, such is evident in the field of a photo-flash unit. Also around 1990, I physically witnessed an orb with the naked eye. It was three dimensional, and emitted a faint fluorescence, which led me to further postulate that some orbs attract free electrons to

their outer “skins” which in turn increased the fluorescence of the orb. Due to the behavior exhibited by the observable orb, it seemed that once overloaded with electrons, it headed for the closest ground to discharge itself, or it would effectively disappear in thin air from whence it came.

..Of course it wasn't disappearing per se, merely returning to its non-excited quantum state. This of course led to my first orb experiment, where I used four strobe lights and a controller (**I was working as a lighting designer in those days and had access to a lot of lighting affects**). I went to a home that had reported activity, set a strobe in each corner of the room, synchronized the strobes, and photographed the room with no flash. I captured a wide variety of orbs of different sizes and colors (I was using color film by now, ASA 400 Kodak and was using a Nikon SLR Camera with auto focus), and all appeared to be three-dimensional. I also captured images of what appeared to be orbs moving through walls. I now equated orbs with natural phenomena such as encountered in the Hessdalen Valley in Norway (**currently a research center is located there to study the phenomena**) and believed there was a correlation between orbs and EMF activity. Of course I had no practical way of proving this in 1995. Instrumentation was still not up to the current level of technology. **This would all change in 1999.**

..In the fall of 1999 I acquired an EMF meter, designed to monitor emissions from computer monitors in compliance with federal regulations. This became an invaluable tool for use in the field. I was able to monitor fluctuations in the background EMF and photograph the conditions of a location in conjunction with the spike. This led to associating certain orbs with increases in EMF at a site. In now had evidence that suggested certain orbs were possibly plasma energy, emitting EMF radiation as a byproduct of their existence. This is due, I surmised to electron movement around the “skin” of the orb, creating a wide spectrum of electromagnetic radiation. **Accurate measurements of the orb itself remained elusive.**

..In 2001 I moved up to a digital camera. This opened a huge door of perception, as digital cameras see into the extended light frequencies invisible to the human eye, such as infrared and ultraviolet. Orbs also became associated officially with paranormal activity, and skeptics attacked them as being simply “dust”. Since then, the controversy has continued. Today, Plasma orbs are referred to as Unified Field Plasmoids by many researchers, based on their quantum characteristics. A great deal of research has been done on this phenomenon, all over the world, by many levels of individuals, from Scientists and lay alike.

..The question remains as to the exact relationship between UFP's and the paranormal. Are they a cause, an enabler, or an effect? Future research may tell the rest of the story. **I believe that an orb may be created as a byproduct of the door opening between two parallel universes, allowing matter to exchange, creating an energy surge without having annihilation.**

## ..THE Orb QUESTION REVISITED

..Let's assume for a moment that some orbs are a product of a paranormal event and not dust. Plasma Energy holds promise as being the primary source of paranormal orb activity. Plasmas are conductive assemblies of charged particles, neutrals and fields that exhibit collective effects. Further, plasmas carry electrical currents and generate magnetic fields. Plasmas are the most common form of matter, comprising more than 99% of the visible universe, and permeate the solar system, interstellar and intergalactic environments. Plasmas are essentially a collection of non-aqueous gas-like ions or a gas containing a proportion of charged particles, and is referred to as the fourth state of matter because its properties are quite different from solids, liquids, and gases. **Consequently it would make a lot of sense if some of the orbs appearing in conjunction with paranormal activity were indeed plasma.**

### Plasmas are radically multi-scale in two senses:

- (1) most plasma systems involve electro-dynamic coupling across micro-, meso and macro scale
- (2) plasma systems occur over most of the physically possible ranges in space, energy and density scales.

..However, the full range of possible plasma density, energy (**temperature**) and spatial scales go far beyond our general conception. For example, some space plasmas have been measured to be lower in density than 10 to the power of -10 per cubic meter or  $(10 \times 10^{-10})/m^3$ . On the other extreme, quark-gluon plasmas (**although mediated via the strong force field versus the electromagnetic field**) are extremely dense nuclear states of matter. For temperature (**or energy**), some plasma crystal states produced in the laboratory have temperatures close to absolute zero. In contrast, space plasmas have been measured with thermal temperatures above 200 million degrees Kelvin and cosmic rays (**a type of plasma with very large gyroradii**) are observed at energies well above those produced in any man-made accelerator laboratory.

..So, if an orb or a **UFP (Unified Field Plasmoid)** is in fact plasma, what does that mean, exactly? **Well the implications are enormous!** Could it explain EMF spikes? **Yes indeed!** Can it explain local effect temperature fluctuations? **Absolutely!** In fact, many of the fluctuations that are measured during a paranormal event would be easily explained by the presence of a plasma orb. **So, have we uncovered a possible natural solution to the age old question as to what is a ghost? ...Not so fast!**

..We still have a disturbing problem. Plasma is the fourth state of matter, with solids, liquids, and gases weighing in as the other three. If you heat up any gas enough (**or apply a sufficient amount of any energy,**) you can turn the gas into plasma. The bombardment of energy drives negatively-charged electrons off of



the atoms that make up the gas, and divides the gas into positively charged ions and loose electrons. Plasma for the most part radiates a lot of visible light and heat. The electrons continue to be attracted to the ions, and tend to reattach themselves as soon as the energy or heat diminishes, so plasma is inherently unstable and doesn't last very long on Earth.

..We do, however, see examples of plasma every day. The sun itself is made out of plasma, being a giant ball of superheated glowing hydrogen. Lightning is an example of the gases in the atmosphere igniting into a streak of plasma as an electric discharge crashes from sky to Earth (**however, the current flows from the earth back up to the source**). Probably the most daunting challenge to the theory is that since plasma is the fourth state of matter after gas, it's extremely hot. Hydrogen plasma, one of the cooler ones, comes in at 4,000 degrees Celsius. **But wait a minute... There is an exception to the rule.**

..A noticeable exception to this rule is that when certain gases are kept under low pressure, like neon tubes or fluorescent light bulbs, they turn into plasma at low voltage and give off quite a bit of light and very little apparent heat. This property disappears when the gas is exposed to atmospheric pressure. Then it is possible that the plasma could be low temperature plasma, if it were encapsulated in a stabilizing magnetic field or other medium, perhaps, exotic matter.

..There is also something known as **coronal discharge**. This can be seen on a humid night as a slight glow around a high tension power line. It occurs when a high energy source, such as the power line, starts turning the air around it into cool plasma. The reason it takes a humid night to bring it out is that dry air itself has too much resistance to become plasma with so little voltage. The gases found in pollution will have the same effect. **This too could possibly be a source.** But the nagging question remains. **Where does it come from?** This is where the paranormal slips conspicuously and uncomfortably back into the equation.

..I believe that our universe, expansive as it is, is merely a microcosm in an endless sea of ever expanding dimensions containing similar universes and flapping branes undulating across an exosphere of unknown substance, existing in past, present and future. I have come to this conclusion from my study of **Quantum mechanics**, and recognize that this is one of many probabilities, that may come into reality by an observer collapsing the field and making it so. When any two of these dimensions merge at a spot and overlap, an anomaly occurs between them allowing the interchange of matter from either side to co-mingle. **This could create the conditions to cause a plasma orb to be created.** This would explain their behavior of blinking into existence for a brief period, then blinking out again.

## ..BALL LIGHTNING

..Then, there is the whole **Ball Lightning question**. Ball lightning is an atmospheric phenomenon, the physical nature of which is still controversial. The term refers to

reports of a luminous object which varies in size from an inch to several yards in diameter. It is often associated with powerful thunderstorms, but unlike lightning flashes arcing between two points, which last a small fraction of a second, ball lightning reportedly has a longer duration, in seconds to several minutes, and travels on a horizontal trajectory. There have been scattered reports of production of a similar phenomenon in the laboratory, specifically at the national lighting research lab at the University of Florida but many scientists question whether it is the same phenomenon. I personally have seen ball lightning-like phenomena, which occurred when linemen working on the electrical lines were attempting to replace a blown fuse on the pole. Their first attempt missed the clips, but the grazing of the connection cause an explosion to occur creating a ball of high potential energy that floated along for several seconds before dematerializing.

..While there over 10,000 reported sightings of naturally occurring ball lightning, it is still regarded by most as nothing more than a myth, fantasy, or hoax (**much like paranormal phenomena**). Reports of the phenomenon were dismissed due to lack of physical evidence, and were often classified in much the same way as UFO sightings. A 1960 paper reported that 5% of the US population reported having witnessed ball lightning. Another study analyzed the reports of over 10,000 sightings.

..**Ball lightning is almost never captured on film, and details of witness accounts vary widely.** Many of the differing properties observed in ball lightning reports conflict with each other, and it is very possible that several different phenomena are being incorrectly grouped together. It is also possible that the few existing photos are fakes. The discharges are most commonly associated with thunderstorm activity, often the result of a lightning flash, but large numbers of encounters have been reported during fair weather with no storms within hundreds of miles. A report from an area of central Africa having a very high incidence of lightning indicated that ball lightning often appeared from a certain hill just before the onset of the rainy season and prior to the arrival of a severe thunder storm.

..**Ball lightning tends to rotate or spin and can possess odd trajectories such as veering off at an angle or rocking from side to side like a leaf falling.** They can also move with or against the wind. Other motions include a tendency to float (**or hover**) in the air and take on a ball-like appearance. Its shape has been described as spherical, ovoid, tear-drop or rod-like with one dimension being much larger than the others. Many are red to yellow in color, sometimes transparent, and some contain radial filaments or sparks. Other colors, such as blue or white occur as well, much like orbs.



..**Sometimes the discharge is described as being attracted to a certain object, and sometimes as moving randomly.** After several seconds the discharge reportedly leaves, disperses, is absorbed into something, or, rarely, vanishes in an explosion. Some accounts

have the balls passing freely through wood or glass or metal, while other accounts report circular holes in the wood or glass or metal. Some report explosions when the balls contact electrical wiring or the vaporization of water when the balls enter water. Some accounts claim the balls are lethal, killing on contact, while other accounts say the opposite.

..Pilots in World War II described an unusual phenomenon for which ball lightning has been suggested as an explanation. The pilots saw small balls of light " **escorting**" bombers, flying alongside their wingtips. Pilots of the time referred to the phenomenon as "**foo fighters**," initially believing that the lights were from enemy planes. However there are other theories as to the identity of the foo fighters. Submariners in WWII gave the most frequent and consistent accounts of small ball lightning in the confined submarine atmosphere. There are repeated accounts of inadvertent production of floating explosive balls when the battery banks were switched in or out, especially if incorrectly switched or when the highly inductive electrical motors were incorrectly connected or disconnected causing an arc. An attempt later to duplicate those balls with a surplus submarine battery resulted in a several failures and an explosion.

..Volcanoes and the atmosphere and the terrain around them have been known to produce ball lightning and other luminous effects, with or without electrical storms. These accounts of course vary greatly. Other witnesses have reported ball lightning appearing over a kitchen stove or wandering down the aisle of an airliner. One report described ball lightning following and engulfing a car, causing the electrical supply to overload and fail. In 1773, two clergy men recalled that they saw a ball of light drop down in their fireplace. Seconds later, it exploded. **History is full of such accounts.**

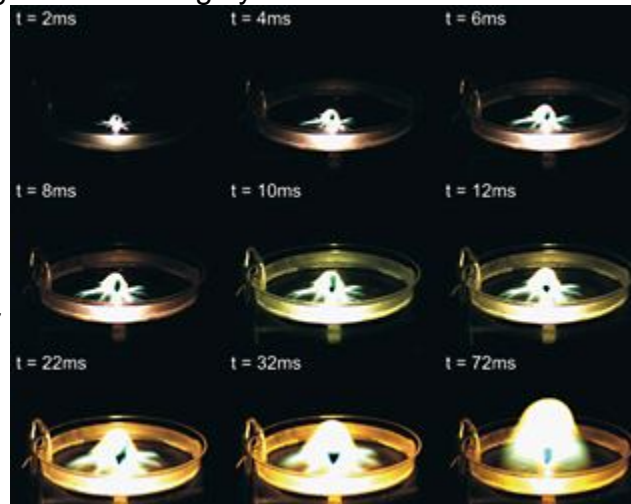
..Ball lightning can split and recombine and can exhibit large amounts of mechanical energy like carving trenches (**e.g. Fitzgerald 1978**) as well as blowing holes into the ground. One of the earliest and most destructive occurrences of what is believed to be ball lightning was reported to have taken place during The Great Thunderstorm at Widcombe-in-the-Moor, Devon, England, on October 21, 1638. Four people were killed outright and around 60 were injured when what appeared to have been ball lightning struck a church.

..A rather famous anecdote from 1753 suggests ball lightning has violent potential. Professor Georg Richmann, of Saint Petersburg, Russia created a kite flying apparatus similar to that built by Benjamin Franklin the previous year. While attending a meeting of the Academy of Sciences, he heard thunder. The Professor ran home with his engraver to capture the event for posterity. While the experiment was underway, ball lightning appeared, collided with Richmann's forehead leaving a large red spot and killing. His shoes were blown open, parts of his clothes singed, and his friend the engraver was knocked unconscious; the doorframe of the room was split, and the door itself torn off its hinges.

..On 30th April 1877, a ball of lightning entered the Golden Temple at Amritsar, India, and exited through a side door. This event was observed by a number of

people, and the incident is inscribed on the front wall of Darshani Deodhi. On August 6, 1994 a ball of lightning went through a closed window in Uppsala, Sweden, leaving a circular hole with a diameter of 5 centimeters. The incident was witnessed by residents in the area, and was recorded by a lightning strike tracking system on the Division for Electricity and Lightning Research at Uppsala University.

..Many of the sources of information on ball lightning often refer to a questionably related phenomenon known as plasma balls. These floating balls of light often accompany a larger ball of fire that occurs when a lit or recently extinguished match or other material is immediately placed in an ordinary kitchen microwave on high power. These experiments are easily reproduced in home appliances and numerous websites exist with instructions on how to recreate it. Home video clips as well as video of public demonstrations of the occurrence have been posted. The experiments usually involve lighting a match and either microwaving it while lit or blowing out the match and then microwaving it immediately. The plasma balls are usually bright and bluish in color, and roll around the ceiling of the microwave chamber. A buzzing sound is characteristically observed while the plasma balls are present. The effect tends to damage the chamber where the plasma ball(s) have appeared, producing dents in the chamber wall or ceiling, as well as leaving burn marks. Some instructions for the experiment describe covering the lit object with an inverted glass jar, which would contain the flame and "plasma balls" so that they wouldn't damage the microwave oven itself.



**Although this phenomenon has been referred to as ball lightning or plasma balls, it is really more of a description of their appearance than what they actually are. It has not been proven that it is actually related to the natural occurrence of ball lightning, or that the balls are made of plasma. No truly scientific explanation currently exists for the phenomenon.**

..Difficult features of the lightning include its persistence and its near-neutral buoyancy in air. A popular hypothesis is that ball lightning is highly ionized plasma contained by self-generated magnetic fields: a plasmoid. This hypothesis is not initially credible. If the gas is highly ionized, and if it is near thermodynamic equilibrium, then it must be very hot. Since it must be in pressure equilibrium with the surrounding air, it will be much lighter and hence float up rapidly. Magnetic fields, if present, might provide the plasmoid's coherence, but will not reduce this buoyancy. In addition, hot plasma cannot persist for long because of recombination and heat conduction. There may, however, be some novel form of plasma for which the above arguments do not fully apply.

**..For example**, plasma may be composed of negative and positive ions, rather than electrons and positive ions. In that case, the recombination may be rather slow even at ambient temperature. One such theory involves positively charged hydrogen and negatively charged nitrites (**NO<sub>2</sub><sup>-</sup>**) and nitrates (**NO<sub>3</sub><sup>-</sup>**). In this theory, the role of the ions as seeds for the condensation of water droplets is important. **This may also explain certain orb activity as well.**

**..If ball lightning releases energy stored in chemical form**, its persistence and neutral buoyancy might be more easily understood. The reaction might proceed slowly due to kinetic or geometric constraints, and the reaction could take place near ambient temperature. One of the first detailed theories of this sort involved the oxidation of nanoparticle networks formed when normal lightning strikes on soil. The coherence of the collection of nanoparticles may be enhanced by vortex motion, like that of a smoke ring. **Is ball lightning a known manifestation of an orb?**

**..A proposed explanation for the numerous colors reported for ball lightning is** the following known **gas phase chemoluminescent reaction: NO+O<sup>3</sup> → NO<sup>2</sup>[□]+ O<sup>2</sup>**. Broadband visible light is emitted from the NO<sub>2</sub> as it reverts to a lower energy state. **This explanation is supported by the numerous witness accounts of the presence of ozone.**

**..Recently**, a prominent theory suggests that ball lightning is burning vaporized silicon. When lightning strikes earth's silica-rich soil, the silicon is instantly vaporized, the vapor itself condensing and burning slowly via the oxygen in the surrounding air. A recently published experimental investigation of this effect by evaporating pure silicon with an electric arc reported producing "**luminous balls with lifetime in the order of seconds**". Singer in his monograph, *The Nature of Ball Lightning*, published by Plenum Press critiques several classes of theory. Most theories can match some of the reported properties of ball lightning but not all of them. In addition many of the proposed theories are problematic. Ball lightning theories are distinguished by having the energy either self-contained or with energy being supplied to the ball by an external source. In the latter case much longer life times are possible.

**..The types of theories vary widely. There are electrical discharge theories, spinning electric dipole theory, electro-static Leyden jar theories, nuclear theories, trapped microwave theories, fractal aerogel theories, magnetically-trapped plasma theories, vortex theories, metallic vapor theories, Rydberg matter theories, chemical combustion theories, black hole theories, antimatter theories, optical illusions (e.g. lightning after image on the retina theory etc).**

**..A LITTLE on PLASMA**

**..Ions and electrons in space are usually intimately mixed**, in a "**soup**" containing equal amounts of positive and negative charges. This mixture is called plasma. In many respects it behaves like a gas, but when electric and magnetic forces are present, additional properties come to light, quite unlike those of ordinary gases. The ionosphere

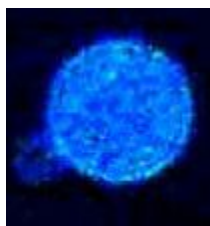
above our heads is plasma. Unlike air, it conducts electricity, and in fact, the ionosphere in the Polar Regions carries large electric currents, such as when the Aurora Borealis occurs. The electric conductivity of the ionosphere, unlike that of metals or seawater, is very much influenced by the Earth's magnetic field. This is very special plasma, because the ionosphere also contains a fairly high number of neutral atmospheric molecules, with which the ions and electrons constantly collide.

..In contrast, collisions are extremely rare in the solar wind. If this were an ordinary gas, or if the Earth lacked a magnetic field, the solar wind would have penetrated all the way to the top of the atmosphere and would then have flowed around the Earth, the way water flows around a rock in a stream. Something like that in fact happens at the planet Venus, which seems to have no magnetic field of its own. At Earth, however, a strong magnetic field confronts the solar wind, forming a much bigger obstacle than the Earth itself. Because the solar wind is plasma, it is forced to detour around the Earth's field, creating a large shielded cavity around the Earth--***the magnetosphere***.

..The explanation of space phenomena thus requires a good understanding of plasma physics. Unfortunately, no laboratory can duplicate the large dimensions and the very low particle collision rates found in space plasmas. The behavior of such plasmas can be sometimes simulated by computers, but ultimately, to figure what actually happens, one needs to send instruments into space and study their observations.

..**Further Reading:** Plasma physics is a difficult, mathematical field, whose study requires a thorough understanding of electromagnetic theory. Some college texts on electricity and magnetism deal with aspects of plasma physics, e.g. chapter 10 of "**Classical Electrodynamics**" by J.D. Jackson.

### ..HOW TO IDENTIFY "a real" orb



..Conceived by Jeff Davis, and designed and built by Erik Smith of the OKCGC, and Becky and Ron Cosgrove of the OKCPRG, **DEVA (Dust Eliminating Video Apparatus)** ***effectively removes ~99% out-of-focus dust contamination from night shot video.*** When dust is closer than the focal point of the camera's lens, it appears out of focus to the camera. When it passes the beam from the infrared light source, it reflects off the dust and it appears to illuminate. This gives the appearance of "**moving orbs**" on video, even though it really is just floating dust. Try it yourself; set up your camera on nightshot and then stir up some dust around it, there will be "**orbs**" everywhere!

..**DEVA 1.0** was first tested at the OKCPRG Research Site on November 2nd, 2002. Since then, it has evolved into a highly stable dust elimination unit. DEVA works by sealing the area in front of the camera lens, ensuring that everything shot on video is past the focal point of the lens. When used with an infrared light source remoted >3 feet from the camera, it removes nearly all dust contamination, and even if dust still gets in the way, it is in focus and looks just like dust, not paranormal

"orbs". Currently, we have run over 50 hours of video without dust contamination. Pre-DEVA, in order to verify video anomalies we had to use dual camera protocol, i.e., two synchronized cameras side by side. After the first few dozen hours of video, we realized that it wasn't necessary anymore, because if properly used, DEVA eliminates all dust from the video equation. Visit [www.GhostGadgets.com](http://www.GhostGadgets.com) for plans on how to build your own DEVA.

**..Synchronous Camera Shoot.** This method is actually easy to do, and as most teams have multiple people with digital cameras, try this. Work with a partner. Point your cameras at the same area. Count to three out loud and both of you take a picture of the same place at once, from two slightly different angles. **If you both get an orb in approximately the same location, BINGO!**

**..The Unified Field Plasma Detector.** Orbs have perplexed the researchers in the field since they were first photographed. I am certain the majority of orbs photographed are the result of particulate matter being captured by the flash in the area within four inches of the camera lens. This has been backed up by the sheer number of photos we have taken that only show one orb in one photo, while another photo of the same area taken at the same time shows NO orb. However, being objective, my resistance to the urge to fall into one camp (**they are all dust**) or the other (**they are all spirits**), instead, staying on the fence is paying off. The arguments between the two camps have ensued and caused multiple conflicts, and attacks on individuals. Instead of actively trying to find the answer, both camps have assumed the "**I am right, you are wrong**" stance. **We here at the S.P.I.R.I.T. Lab have decided to investigate the orb question seriously.**

**..Essentially, neither side has built a substantial case.** We, on the other hand, are seeking the answer one way or another. While we have some evidence indicating a small fraction of the orbs photographed are not dust and may be something quite different, we need to prove what that "quite difference" is. And in the spirit of "**Ghost Busters**" I am building a device to attempt to capture and measure an energy orb, if they do indeed exist and that is what it is. The idea began for me as I watched the movie (**Ghost Busters**) for the gazillionth time and like everyone, laughed at the character's antics. **Then it dawned on me, that if orbs were energy, they could be measured, and if they could be measured, someone would have to figure out how.**

**..If they were a type of plasma, this could be dangerous, as plasma tends to have a tremendous amount of potential and current, enough to cause annihilation. But, if they were some other form of energy reacting to photon bombardment from a flash, or were visible to the eye as some have reported, then they could be measured. The question was, how?**

**..Orbs on video seem to move about, floating in a pattern that would suggest more than air currents. However, could one be captured?** In order to capture one from the air, the air would have to be collected and sampled. I looked around the lab and found my trusty ShopVac. Now I needed a measurement grid. Again, back to the lab. The idea to

use PVC pipe struck me, so I figured I would need a coupling, and a large plastic funnel. I didn't have the stock, so I went to the local Home Depot and bought some 2 and 1/2 inch PVC scraps and couplings.

..I have some aluminum screen (**aluminum is an excellent conductor of electricity, third behind gold and copper**). I covered the opening of a 30 inch piece of PVC pipe with the aluminum screen and then forced it carefully into a coupling. I then took a ten inch length of PVC and fit the other screen over the opening, and forced it into the other side of the coupling. This leaves two grids, isolated from each other, with about a 1/4" gap between the screens. Next, I sawed off the smaller end of the funnel to make a good fit between the funnel and the PVC pipe, on the ten inch side of the coupling. This configuration will give me a collection tube that I can fit the vacuum flex hose to the 30 inch section end, and suck in the air, through the funnel and down the pipe past the measurement grid.

..To measure the potential of whatever we happen to suck in, a voltage meter can be attached to the grids. I have a small digital multimeter I will attach with Velcro® to the tube. I will Velcro® a small hand held oscilloscope to observe any frequency the potential may be at, if any. This way I can measure voltage, current, or frequency. The device is mounted on a tripod, with a video camera focused on the opening to record the entrance of and orb, as well as the meter reaction. To date we have captured 5 orbs that have an unknown potential as they blew the meter upon discharge, requiring over 5 amps of current to do so. **As always, should you choose to duplicate the device and use it, please share your data with us.**