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Could Unidentified Aerial Phenomena (UAP) Be from Earth's Dark (Matter) Biosphere? The "Inter-Terrestrial Aliens" Hypothesis (ITH)

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ABSTRACT

There have been many recent discussions in government and an academic paper about plasma-based UAPs (Unidentified Aerial Phenomena), formerly known as UFOs (Unidentified Flying Objects). The US and UK governments have shown increasing concern about these UAPs, primarily due to national security and air safety considerations.

The public generally assumes that these relate to extra-terrestrial aliens. However, the dark plasma hypothesis, proposed by Jay Alfred in 2005 in a popular format and subsequently published in an academic paper entitled *Creation of Minimal Plasma Cell Systems by Self-Organization in Earth's Dark [Matter] Biosphere Leading to the Evolution of Dark Plasma Lifeforms* published in the SJI Journal of Unconventional Theories and Research in 2011 (submitted in 2009), theorizes that *most* of these encounters are with inter-terrestrial aliens from a parallel Earth composed of low-density self-interacting dark (matter) plasma. This plasmasphere is a co-rotating tenuous dark matter planet gravitationally coupled to the Earth. (The latest neutrino oscillations data allow for up to 20 percent of the Earth to be composed of dark matter.)

According to this hypothesis, terrestrial dark plasma lifeforms evolved in this sister planet. The sporadic interactions with what appear to be plasma-based UAPs/UFOs are encounters with these plasma life forms (or "biological UFOs") from advanced civilizations in this parallel Earth. This paper explains how this conclusion was reached, using the author's dark plasma "inter-terrestrial aliens" hypothesis (ITH), a corollary of the dark plasma hypothesis.

Keywords: *Unidentified Aerial Phenomena, UAPs, Unidentified Flying Objects, UFOs, Inter-Terrestrial Aliens Hypothesis, ITH, Dark Plasma Hypothesis, Plasma-Based UAPs, Self-Interacting Dark Plasma, Dark Matter, Dark Earths, Parallel Dark Earths, Dark Biospheres, Dark Matter Lifeforms, Plasma Lifeforms, Biological UFOs, Holograms, self-Interacting Dark Matter, Dark Charge, Dark Electromagnetism, Dark Light, Dark Photons, Dark Protons, Dark Electrons, Dark Electric Fields, Dark Magnetic Fields.*

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CHAPTER ONE
INTRODUCTION

Unidentified Aerial Phenomena (UAPs), formerly known as UFOs (Unidentified Flying Objects), refer to airborne objects or phenomena that cannot be immediately identified or explained by existing scientific or military knowledge. These phenomena have been observed by both civilian and military personnel, often displaying flight characteristics or technological features that defy conventional explanation.

The US and UK governments have shown increasing concern about UAPs, primarily due to national security and air safety considerations. In recent years, credible reports from military pilots and radar data have indicated the presence of objects displaying extraordinary manoeuvrability and speed, sometimes within restricted airspace.

This has prompted official investigations and congressional hearings in the US, as lawmakers seek to ensure that these phenomena do not pose a threat, whether from foreign adversaries using advanced technology or from unknown sources.

The UK government has similarly acknowledged the importance of monitoring and understanding UAPs to safeguard national security and public safety.

The relationship between UAPs and the ideas of aliens or extraterrestrials is complex and controversial. While some hypothesise that UAPs could be evidence of technologically advanced extraterrestrial life visiting Earth, mainstream scientific consensus remains cautious due to a lack of direct, verifiable evidence.

In the broader context, the popular default Extra-Terrestrial Hypothesis (ETH) suggests these phenomena may be the result of alien visitation. However, this explanation faces significant challenges, such as the vast distances between star systems and the implausibility of interstellar travel for ordinary matter vehicles.

Alternative theories, such as the Inter-Terrestrial Hypothesis (ITH), discussed in this paper, proposes that these phenomena could originate from yet-undiscovered forms of matter or parallel Earth-like environments, offering more plausible explanations without requiring extra-terrestrial intervention.

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CHAPTER TWO
EXTRA-TERRESTRIAL HYPOTHESIS (ETH) - THE MOST IMPROBABLE EXPLANATION

➢ *The Four Core Challenges for the ETH*

The conventional Extra-Terrestrial Hypothesis (ETH) has long served as the default explanation for UAPs exhibiting intelligent control, but it suffers from several critical shortcomings that render it increasingly improbable. A rigorous analysis reveals four core challenges:

- The Travel/Proximity Problem: The vast interstellar distances make travel for ordinary matter vehicles a near impossibility within reasonable time-frames. The energy and resource expenditure required for such journeys raises significant questions about their cost-effectiveness and feasibility for any civilization, however advanced.

- The ROI Problem: The return on investment (ROI) for an exponentially intelligent civilization to conduct prolonged, clandestine surveillance of a technologically primitive one is unclear. An advanced species capable of interstellar travel would likely have little to gain from monitoring a civilization that has yet to master even interplanetary travel.

- The Messaging Problem: The content of reported communications, such as warnings about environmental degradation and nuclear holocaust, is inconsistent with an extra-terrestrial origin. An entity from a distant star system would have little vested interest in the ecological stability of a remote planet like Earth.

- The Paranormal Enigma: The ETH cannot naturally explain apparently paranormal phenomena which accompany these sightings. It cannot properly explain why there are so many similarities with Marian apparitions, ghosts and jinns phenomena.

The Inter-Terrestrial Hypothesis (ITH), which is a corollary of the author's larger Dark Plasma Hypothesis, offers a more parsimonious alternative that resolves these issues. It posits that a significant component of dark matter exists in a complex plasma state, capable of forming gravitationally-bound structures, including a "Dark Earth" co-located with our own planet, which may serve as the origin point and launch-pad for these anomalous phenomena. By positing that these phenomena originate from a co-located, gravitationally-coupled Dark Earth, the ITH eliminates the problems of interstellar travel, questionable ROI, inconsistent messaging and dealing with the paranormal.

One of the most persuasive reasons as to why complex plasma lifeforms from a coupled low energy Dark Earth would be more probable than UFOs/UAPs from other star systems, is the near impossibility of ordinary matter vehicles to travel these vast distances within a reasonable time. If we are to believe the hundreds of reported sightings over the years, this is not an isolated trip. The ETH would like us to believe that hundreds of these almost impossible trips are made. Even in the slim chance that this would be possible, it begs the question: would it be cost-effective for exponentially intelligent aliens (who are able to traverse between stars) to do this while incurring such huge costs for even a single trip, not to mention hundreds? What are the benefits to them of visiting a relatively technologically primitive human civilization repeatedly, incur astronomical costs, then disappear only after a few days or hours?

There is no clear reason why they would be monitoring a tiny rock to learn the technology of a civilization which has not even learnt how to traverse and colonize their own Solar System using manned vehicles. However, it is easier for any dark plasma inter-terrestrial alien from a counterpart Dark Earth to visit us. Yet, many still cling onto the belief that the majority of these visitations are from extra-terrestrial aliens from other stellar systems. This is akin to a religious belief which has no scientific basis.

It also makes more sense to consider generally that these are not extra-terrestrials when we consider the messages from UFOs (and also Marian apparitions which are considered similar anomalous events), about imminent disasters and admonitions to take care of the ordinary matter Earth. The survival of a co-located civilization would be directly tied to the stability of our shared gravitational environment, making surveillance and cautionary warnings a logical and necessary act of self-preservation. Why would an alien from another stellar or galactic system be bothered by the destruction of a tiny rock in a distant galaxy or stellar system?

However, it would be understandable if these were from parallel dark matter planets gravitationally coupled to Earth, as proposed by the hypothesis. These are called "Dark Earths" under the hypothesis. They would be concerned about environmental degradation, nuclear holocausts, and the destruction of the ordinary matter Earth, as the dark planets that they are inhabiting are gravitationally coupled to our ordinary matter planet. The destruction of our planet could impact their existence as we share the same gravitational field.

They would therefore naturally be inclined to conduct regular surveillance and sound-out warnings to the less advanced juvenile civilization here, still engaged in petty tribal wars and not able to think beyond the borders of their own country, and to be able to take care of the planet. We will realize from the evidence that most of the encounters with aliens and UFOs are therefore really sporadic encounters with inter-terrestrial beings from Dark Earths (not extra-terrestrials) or primitive ordinary plasma lifeforms from the visible Earth's plasma regions.

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The ETH posits that UFOs/UAPs are spacecraft piloted by intelligent beings from other star systems. However, this model faces major challenges when confronted with the "high strangeness" and paranormal aspects frequently reported in UFO encounters:

- Apparent Violations of Physics: UFOs are often observed to accelerate instantaneously, make right-angle turns at high speed, or dematerialize—behaviors that defy known physics and would destroy any physical craft or biological occupant from our universe.
- Transience and Elusiveness: Many UFOs appear and disappear suddenly, sometimes in front of multiple witnesses, or are visible to some people but not others, suggesting a reality that is not strictly physical or is only partially interacting with our world.
- Interaction with Consciousness: Encounters often involve telepathy, altered states of consciousness, time distortion, or "missing time"—phenomena that are difficult to reconcile with the idea of visiting physical beings in spaceships.
- Poltergeist and "Ghost-like" Effects: Reports include objects moving without cause, electrical disturbances, and other effects more typical of hauntings than of advanced technology.
- Shape-shifting and Holographic Effects: Witnesses sometimes report UFOs or entities changing shape, size, or appearance, or manifesting as balls of light, orbs, or even as animals or people.

ETH cannot easily explain these features without invoking highly speculative technologies (e.g., "warp drives," "cloaking devices," or "psychotronic" weapons) or assuming that aliens are deliberately deceiving us for unknown reasons. This makes ETH increasingly strained as an explanation for the full range of phenomena.

On the other hand, ITH has a natural explanation for paranormal features based on theorized properties of dark plasma. ITH does not require "magic technology" or elaborate deception. The "paranormal" is a natural consequence (based on well-studied plasma dynamics and well-supported theorized properties of self-interacting dark matter) of entities that are local but exist in a parallel or weakly interacting state, interpenetrating our reality.

There is a growing consensus among leading physicists and researchers that a sub-component of dark matter is a new kind of matter – a self-interacting dark plasma (Jay Alfred (2005), Sean Carroll and Lotty Ackerman (2008), Kaplan, Krnjaic, and Rehermann (2009), Matti Heikinheimo and Christian Spethmann (2015), J.D. Clarke and Robert Foot (2015), Nitin Shukla (2018). Among a number of other factors, the electric charge in the dark sectors is theorized to be much weaker than the ordinary electric charge. Furthermore, the proportion of neutral to charged particles in dark sectors is much higher. This acts as a buffer to prevent particle collisions. This makes it difficult for charged particles to bind into atoms. The plasma state in the dark sectors is therefore inevitable.

It is theorized that these entities from the Dark Earths are composed of self-interacting dark plasma. The rapid appearance and disappearance of UAPs/UFOs can be explained by the dark plasma lifeform shifting the plasma frequency higher or lower than the ambient light.

When the plasma frequency is higher, the object reflects light and is shiny and metallic (i.e., in what may be called the "arc" or "glow" mode) – like a metallic vehicle. This can provide it with an invisibility cloak if it reflects the surrounding environment, allowing it to merge visually with the background.

When the plasma frequency is lower, the object refracts light and becomes transparent (i.e., in the "transparent mode.") In other words, it will disappear, although the dark plasma component will still be there if this is a dark plasma lifeform. If the refractive index of the plasma is not exactly one, it will bend the light to produce distorted ovoid-shaped images of the environment which will be seen to be mysteriously moving from one point to another.

When both are at the same frequency, the object becomes a shadowy and dark (i.e., in the "dark" mode), like a stealth vehicle. This is because resonant absorption occurs with the object absorbing the ambient light. (This is based on basic plasma dynamics.)

Sudden changes in directions without destroying the "vehicle" cannot be explained by ETH. However, ITH does face such an issue as these manoeuvres will not put a significant strain on dark plasma lifeforms and their cold plasma envelopes as they are tenuous.

➢ *The Least Probable Aliens*

Nevertheless, if Earth is moving inside the Randall-Reece dark disk [3], we could expect alien lifeforms that occupy the biospheres in the dark disk, who may be from other stellar systems or even galaxies (i.e., extra-terrestrials), to find themselves in

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proximity with Earth's dark biospheres, probably unintentionally. They may be ordinary matter (carbon or plasma-based) or dark matter (plasma, plasmonic or photonic-based) lifeforms.

This may happen at different points during our history and in the future, making such rare sporadic encounters inevitable but rare. Furthermore, as discussed previously by the author [26], it has been noted that clouds of dark matter pass through Earth regularly every ten thousand years in an encounter lasting about fifty years. Hence, there is a very *small probability* that extra-terrestrial alien plasma lifeforms, transported by these clouds, could be encountered on Earth.

In the above scenarios, the aliens do not have exotic vehicles that are moving close to the speed of light or warp drive. They are simply being carried to their destination by the moving astronomical bodies that they are situated in. So, neither the travel/proximity nor the ROI problem arises.

Additionally, primitive or proto ordinary plasma lifeforms from the visible Earth's plasma regions may be visible intermittently in the ordinary matter Earth's plasma environments. These regions include the ionosphere, plasmasphere, and magnetosphere, as well as the Van Allen radiation belts and dusty plasma clouds orbiting the Earth.

The ionosphere can be as 'low' as 50 km (31 mi) from the surface of the Earth. It is where the auroras, which can be easily seen by us, occur. Hence, it will not be impossible for people to get fleeting glimpses of less complex ordinary plasma lifeforms zipping through the ionosphere or hovering in the sky and slowly fading as their plasma frequency and density downshifts.

➢ *Probability Map for Types of UAP/UFO*

The UAPs/UFOs in our skies that exhibit highly intelligent behavior are often manifestations of complex plasma lifeforms from the lowest energy Dark Earth.

However, the most probable objects usually identified as UAPs/UFOs in our skies are ordinary pre or proto plasma lifeforms, or plasma remnants from meteors. Pre lifeforms are not lifeforms; they are precursors to life. Proto lifeforms are in between living and non-living (like viruses), very simple minimal plasma cells.

They do not show highly intelligent behavior, behaving like a test charge in an electric field.

The least probable scenario is that the UAPs/UFOs are ordinary matter extra-terrestrial intelligent lifeforms from other stellar systems.

The table below shows the relative probabilities of each type of plasma object or lifeform in the ordinary matter Earth's atmosphere.

Table 1 Relative Probability of Type and Origin of Aliens

Type	Origin	Probability
Plasma Remnants from Meteors, Ordinary Pre or Proto Plasma Lifeforms	Ordinary Matter Earth's Atmosphere	High
Inter-Terrestrial Dark Plasma Lifeforms	Lowest Energy Dark Earth	Moderate
Extra-Terrestrial Dark Plasma Lifeforms	Other Stellar Systems	Low
Extra-Terrestrial Ordinary Lifeforms	Other Stellar Systems	Very Low

The most important takeaway from the analysis in the above table is that the most probable *intelligent* lifeform in our skies is from the lowest energy Dark Earth.

➢ *ITH and the Fermi Paradox*

The Fermi Paradox asks: "If intelligent life is common in the universe, where is everybody?" Despite decades of searching (e.g., the work done by SETI), we have found no clear evidence of extraterrestrial civilizations—no signals, probes, or artifacts. The ITH provides a solution by pointing out the following:

- We Are Looking in the Wrong Place: ITH suggests that non-human intelligences are not "out there" in distant star systems, but "right here," co-existing with us in parallel realities, hidden biospheres, or as plasma-based life on Earth or in its immediate cosmic neighborhood.
- No Need for Interstellar Travel: If advanced civilizations exist in parallel Earths or as hidden terrestrial life, they have no need to cross interstellar distances, which solves the "travel/proximity problem" and the lack of evidence for interstellar craft.
- Explains the "Great Silence": The absence of radio signals or megastructures is not evidence of absence, but of our limited search paradigm. We are "listening" for the wrong kind of life, in the wrong places, with the wrong assumptions.

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- Contact is Local, Not Distant: The "aliens" are not coming from the stars, but from a reality adjacent to our own, which is why their presence is subtle, sporadic, and often indistinguishable from folklore, myth, or the paranormal.

➢ *Analysing UAPs and UFOs Phenomena*

UAPs and UFOs may be manifestations of plasma lifeforms or phenomena involving both ordinary and dark plasma components. The ITH notes that according to the dark plasma hypothesis, dark plasma lifeforms can reduce the volume of their bodies through magnetic compression. When this happens, the density of the body increases. As a result, there will be more collisions between the dark matter particles in their bodies and ordinary matter particles in the atmosphere.

This displaces and separates the ordinary electrons and ions – in other words pushing them to a plasma state. The hypothesis calls this a "dark ionization process." This generates a cold plasma envelope around the entities which can be detected by current scientific instruments (including radar).

When the ordinary electrons return to their atoms, heat, light, electricity and electromagnetic radiation are generated. This, too, can be detected by scientific instruments. In fact, this is the ordinary plasma remnants that have been identified as UAPs by researchers and the British MOD (Ministry of Defence).

➢ *The Plasma Connection*

In 2024, a peer-reviewed paper, entitled Extraterrestrial Life in the Thermosphere: Plasmas, UAP, Pre-Life, Fourth State of Matter, was submitted to the Journal of Physics by R. Joseph from the Astrobiology Research Centre in California (USA), and his colleagues from other distinguished institutions.

In this paper they reported, "The 'plasmas' observed in the thermosphere engage in behaviors similar to simple multicellular organisms; a phenomenon also observed among plasmas generated experimentally. [Actually, as noted in a previous paper by the author [32, 34] and other publications, plasma lifeforms have structures that resemble unicellular organisms. "Simple multicellular organisms" is a near-approximation.]

They continue, "Plasmas are electromagnetic entities that have cellular characteristics and display distinct behavioral patterns which are affected by their electrical properties; and this causes them to interact and behave individually or collectively. Because plasmas in the thermosphere are attracted to electromagnetic activity and descend into thunderstorms and the lower atmosphere, they likely account for at least some of the numerous reports of UFOs/UAPs over the last several thousand years including the "Foo fighters" observed by German, Japanese, and Allied pilots during WWII, and at least some of UAPs recently reported by jet pilots."

Prior to the above paper, the British Ministry of Defense (MOD) completed a four-year study (1996 to 2000) that looked at data compiled from reports of UAPs received by the MOD prior to that date. The study, published in 2005, concluded that most of these sightings were due to ordinary plasma bodies generated by incompletely burnt-out meteors plunging into the atmosphere during meteor showers, although with certain reservations.

They cautioned, "It is not certain that the radiation/fields are conventional and electromagnetic in nature...any pursuit of this process of identification or elimination is pointless if it turns out that UAP radiation is other than EM [electromagnetic] radiation as we currently understand it" (emphasis added). Indeed, dark plasma lifeforms radiate dark (not ordinary) electromagnetic waves [1].

The author believes that the MOD detection data provides evidence of intelligent dark plasma lifeforms from the lowest energy parallel Dark Earth, designated "Alpha" Dark Earth in the dark plasma hypothesis, which generate ordinary plasma through the dark ionization process. The ordinary cold plasma will outline the shape of the plasma body and be seen momentarily before it dissipates as it approaches the surface of the Earth.

The ordinary plasma generated by dark plasma lifeforms should be distinguished from purely ordinary matter plasma in the atmosphere. (How they can be distinguished is discussed in the "Experiments and Testing" section below.)

The most frequent UAP/UFO phenomena reported relate to purely ordinary plasma. Ordinary matter plasma blobs, which are charged buoyant bodies, would seem similar to microbes as they dart back and forth in the atmosphere. However, they are not lifeforms or products of lifeforms.

The MOD report also notes that there have been some sightings by astronauts of plasma-like structures engaging in complex behaviors, including approaching space shuttles and experimental satellites generating electromagnetic activity; and have described them as "definitely not rigid" and "not a solid metal structure" and "oval shaped like a series of ellipses ." The MOD then highlights an enigma: "And yet, they have metallic coloration according to eyewitness reports by astronauts; possibly silver, which might also account for any reflective properties."

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These apparent anomalies can be easily explained by the changing plasma frequency of plasma bodies against the ambient light. As discussed above, plasma bodies can look dark and shadowy, transparent or shiny and metallic bright, in an instant, just by changing their plasma frequency through density modulations.

- *Electromagnetic Waves and Pulsating Fields*

When dark plasma lifeforms move through their dark plasmasphere (which is coincident with our ordinary matter atmosphere), the dark matter particles in their bodies or vehicles (which are denser than the ambient density of dark matter particles) will collide with a significant force with the ordinary air molecules. Through this dark ionization process, ordinary cold plasma is generated.

This ordinary plasma is what initiates some of the UAP and UFO sightings and effectively cloaks the dark plasma beings and objects. The visible manifestations in the ordinary matter Earth are therefore not of the actual dark plasma lifeform but its cold ordinary plasma envelope. The so-called UAP and UFO sightings are therefore actually the manifestations of the ordinary cold plasma envelopes, which break up and dissipate quite rapidly.

When ordinary plasma is generated for a short duration during the dark ionization process or when dark matter particles (such as axions and dark photons, and their equivalents) convert to ordinary matter particles (such as ordinary photons at radio wave bands) in certain conditions (for e.g., in strong or resonant magnetic fields), they generate electromagnetic waves which can be picked up by radar momentarily and also by radio. (The latter process is called “kinetic mixing” and is discussed in more detail in the “Experiments and Testing” section below.)

Furthermore, the natural oscillations of dark matter particles in the dark plasma can cause collisions with ordinary particles in a periodic fashion, resulting in the density of the ordinary plasma to increase and decrease cyclically, generating a pulsating electromagnetic field. Pulsating electromagnetic fields are dynamic and can penetrate deeper into biological tissues, whereas static fields are constant and limited to surface-level effects.

Ordinary plasma envelopes dissipate as charged particles rapidly recombine due to the strong electric charge in the ordinary matter sector. However, in weakly ionized environments they may be sustained a bit longer. For e.g., in an electrical installation with generators and other electrical equipment, the air will already be slightly ionized or in higher altitudes (on mountain tops and in the atmosphere). Hence, the ordinary plasma envelopes of UAPs and UFOs will be able to linger longer in those environments. This is the cause for many sightings to be around electrical installations and in higher altitudes.

- *Light Phenomena*

As often reported, light is observed radiating from the entire UFO. Common descriptions such as “surrounded with a red glow” and “wrapped in a blue haze” clearly indicate that the source of UFO luminosity is not the object itself but the air around it. During the dark ionization process dark matter particles collide with atoms in the air, ionizing them. This excitation begins with the gas with the lowest ionization energy, i.e. xenon, to gases with higher ionization energies (i.e. the other noble gases followed by oxygen and then nitrogen).

At the lowest excitation levels, therefore, “blue,” “brilliant blue,” and “luminous blue,” associated with xenon, will be generated. While ionized xenon emits a bluish-white light, oxygen glows green to red depending on altitude and energy, and nitrogen radiates blue to violet hues. The colours generated by the different gases may also be combined or seen as a mixture of different colours. Together, they may produce an electric blue and purple glow. (This is also often seen in auroras and high-energy discharges.) This has been reported in many daytime UFO sightings. Ionized neon gas produces a bright orange-red glow. A great percentage of night-time sightings report UFOs that appear as “orange balls of light.” These have been described as “luminous globes,” “glowing orbs,” “spheres of light” or “balls of fire” and are typically orange-yellow or white in colour.

Sometimes the light emitted by a UAP is so intense that its surface is entirely obscured from view. Witnesses may describe this light as equivalent to a “welding torch” or “burning magnesium.” These are ordinary plasma envelopes of UAPs that are in the arc mode. Certain UAPs initially observed on the ground become dazzling just before zooming-off. This indicates that the plasma frequency increases significantly on take-off. In some UFO encounters, black objects are observed. These are plasma envelopes of UFOs in the dark mode. Certain UFOs in the “glow mode” look like ordinary objects and may appear opaque. Due to the veneer of ordinary matter particles (facilitated by the attractive fifth force, as discussed in the introduction), they may also reflect some ordinary light and cast faint shadows. UFO witnesses have reported entire objects that were transparent (with only an outline). This could be explained by plasma in the “transparent mode,” as discussed in the introduction. Depending on the refractive index of the plasma lens that the cold plasma develops, objects seen through the lens may be magnified.

In one sighting, a disc-shaped object flew above a cyclist for five kilometres at a height of six meters. It “was luminous and seemed made of glass,” according to the witness. In the other instance, witnesses in a stalled vehicle saw occupants inside a “brilliant, transparent, mushroom shaped object.” UFOs can therefore be transparent or translucent or appear shadowy, depending on the plasma frequency of the ordinary plasma generated by the dark ionization process. UFOs have also been reported to be in the form of vortices (like a moving cyclone) or vapor. All these forms are compatible with descriptions of plasma and its dynamics.

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A colored radiation or "aura" from UFOs may be seen. This would be composed of ordinary light when the observer uses ordinary sight and "dark light" when using "dark sight." Due to the different sight modalities, different witnesses may give different accounts of the colour and shape of these auras. Most people, however, see only the aura composed of ordinary light (i.e. the "ordinary aura") emitted by the tenuous ordinary plasma which is generated by the dark ionization process.

- *Acoustic Phenomena*

Besides light, the ordinary plasma also generates heat. The microwaves that are generated by the dark ionization process can heat up biological tissues. Thermoelastic waves of acoustic pressure are generated when microwaves heat up soft tissues in the head. These acoustic waves travel by bone conduction to the inner ear to cause buzzing and other sounds that can be heard only inside the head and not by others who are not oriented similarly. In an ordinary bolt of lightning, the temperature is raised in a split second to about 25,000 degrees Celsius causing ionization of most of the atoms in the air and a sudden expansion of the gases generating pressure waves. This manifests as the loud crashing sounds of thunder.

Similarly, a powerful dark ionization process can generate thermal shock waves which can give rise to similar sounds. Rumbling sounds, similar to rolling thunder, have been heard prior to UFO sightings (and Marian apparitions). (This is a different phenomenon from sonic booms which are caused by the motion of the object. Biological UFOs, due to their low mass, produce only weak sonic booms.) During the Marian apparitions at Fatima, several observers noted "a light breeze blowing." Another witnessed, "a breeze strong enough to make him feel cold." These electric or ionic winds are also witnessed prior to UFO sightings. They are caused by the sudden expansion of the volume of air due to the heat and repulsive forces experienced by ionized atoms with similar charge as a result of air ionization caused by the dark ionization process.

- *Smelly Plasma*

The ionization of the air caused by the dark ionization process in the proximity of plasma life forms will generate electrochemical reactions in the air that can be sensed as odors. Plasma life forms or what may be described as "biological UFOs," can therefore be detected by smell. When the ordinary plasma generated by the dark ionization process is in the arc mode, nitrogen can be elevated to a metastable state, producing a persistent soft, white glow. This "activated" nitrogen will readily combine with many other elements unlike ordinary nitrogen. It combines with hydrogen to form ammonia (NH_3) and with oxygen to form nitric oxide (NO). This oxide is stable at high temperatures. However, when below 150 degrees Celsius, it reacts with oxygen to form nitrogen dioxide (NO_2).

The dioxide can also react with other atmospheric gases to form nitrobenzene, an oily toxic substance that is poisonous and smells strongly like the oil of bitter almonds. It does not typically cause hallucinations but may produce brain fog, confusion and coma. Also produced by electrical discharges is ozone which has a sharp, clean, and slightly metallic scent, often described as the smell of electricity or the air after a lightning storm. Some witnesses describe the odor of ball lightning as being similar to nitric oxide or ozone, both of which are byproducts of electrical activity in the atmosphere. Pollutants like ozone or nitrogen dioxide can interact with skin lipids and proteins, potentially catalyzing sulfur oxidation and generating the smell of rotten eggs.

In this connection, the odor of ball lightning has frequently been described in many historical and modern accounts as a strong odor resembling burning sulfur. This is consistent with the smell of sulfur dioxide, which is a gas often produced during high-energy electrical discharges. The smell of rotten eggs is often linked to sulfur or hydrogen sulfide. It is often reported during close-contact events. These can be due to electrochemical reactions resulting from the generation of ordinary plasma through the dark ionization process at close ranges.

Most of the sulfur in the ordinary matter human body is concentrated in the skin, hair, nails, and connective tissues, primarily through sulfur-containing amino acids like cysteine and methionine. While sulfur dioxide is best known as an environmental pollutant, recent research reveals that it can also be produced within the body under certain conditions. In the skin, exposure to electrical stimulation can trigger oxidative stress, leading to the formation of reactive sulfur species. These reactions may involve the oxidation of organosulfur compounds, such as dimethyl sulfide, which can yield sulfur dioxide as a byproduct. Pulsating electromagnetic fields (say, from the cold plasma envelope of a dark plasma lifeform at close range) could hypothetically induce localized redox reactions that liberate sulfur dioxide and the smell of rotten eggs.

- *Taste Anomalies*

The cold plasma envelopes of purported UFOs can generate pulsating electromagnetic waves (due to plasma oscillations, as discussed in the introduction), including pulsating microwaves. During UFO sightings, witnesses can sometimes experience unusual tastes which are experienced immediately but decay slowly. This can be explained by electrochemistry. Chemicals in saliva break down in the presence of pulsating and alternating currents up to about one thousand hertz and a current of larger than one hundred microamperes (DC or AC). It is estimated that about one percent of witnesses can taste the presence of microwave energy. The presence of metallic teeth fillings and braces may modify the sensation.

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- *Falling Residues*

If the biological UFO zips-off to another location at high speed, the ordinary cold plasma (which usually has a cloudy appearance) will linger on for a short while, giving off very low levels of radiation. If the plasma (generated by the dark ionization process) is made of chemically active gases (for e.g., hydrogen, hydrocarbons, silicates), then dust particles would form directly from chemical processes occurring in the plasma. When the gas atoms and molecules in the ordinary plasma subsequently recombine, together with the dust and water molecules, residues may form and clump to produce what has been described in the literature as "angel hair," ectoplasm or other similar material, which usually dissipates before it reaches the ground. These falling residues have also been observed in Marian apparitions where it is sometimes described as "angel hair."

- *"Solid," Noisy and Reflective Plasma UFOs*

UFOs are also often described as being solid in appearance. The notion that tenuous plasma objects cannot appear to be solid is mistaken. Not only auroras but even hard solid metals are considered to be in the plasma state in science. Electrical discharges, like lightning (which generates ordinary plasma), hit like a ton of bricks, and can generate loud sounds and produce scarring on the ground.

Ball lightning is typically the size of a grapefruit and lasts for a few seconds or minutes, sometimes hovering, even bouncing along the ground. These balls of plasma have been known to leave holes, furrows and scorch marks on the ground. If you think of biological UFOs as expanded versions of ball lighting, the "thud" of apparently solid UFOs on the ground is explained.

The plasma lifeforms that we see because of the dark ionization process are, by definition, denser than the relaxed state of the plasma lifeform. (If they were not denser, they would not be able to initiate the dark ionization process.)

Dark plasma lifeforms are electromagnetic entities. Electromagnetic forces between the particles in the ground are the reason we do not sink into the ground. So, the very feel of the "solid" ground is caused by the interaction of the electromagnetic forces in your body with the electromagnetic forces holding the particles of the ground together. It should therefore not come as a surprise if some plasma bodies seem solid.

Plasma can deflect electromagnetic waves. For e.g., the ionosphere deflects radio and TV waves to the ground. When ordinary plasma is generated by the dark ionization process it can be highly reflective giving the appearance of "solids" to radar. Due to the ionization of the air, and the generation of electromagnetic waves (including infra-red radiation, i.e., heat) the flight paths of bullets may be diverted, giving the impression of encountering a solid.

Additionally, under the ITH and the larger dark plasma hypothesis, we would expect a veneer of ordinary matter particles to be attracted to the dark plasma lifeform (the so-called UAP/UFO). This is facilitated by a hypothetical fifth force, under the dark plasma hypothesis. As discussed in the dark plasma hypothesis, there are astrophysical and experimental evidence that suggest that a short-range attractive (Yukawa-type) force exists. This veneer will enable the dark plasma lifeform to produce sensations of touch and also produce sounds, like footsteps, if it hits the floor.

- *Signature Features of Plasma Lifeforms Seen in UAPs and UFOs*

The signature features of plasma lifeforms, as discussed in previous papers [33, 34] and other publications, have been seen on UFOs and UAPs on numerous occasions. These include plasmoids, vortexes and beams of light.

Based on its analysis, the British MOD (Ministry of Defence) concludes that there are reports of hot spots or bright spots emanating along the axes of UAPs/UFOs, which may have different colours and temperatures. These many-colored hot spots are plasmoids which are also commonly observed in laboratory plasmas. Two filamentary currents may attract or repel each other depending on the direction of currents. If the currents are in the same direction (or oppositely charged particles in different directions), they will be attracted to each other.

Where the attraction is greatest, kinks will form in the filamentary currents. These kinks will retard the flow of charged particles causing them to accumulate and increase the charge density in these kinks. As the charged particles jostle in these kinks, they will collide with ordinary matter atoms which become excited due to the dark ionization process.

As electrons in the ordinary matter atoms fall back to lower energy states or recombine, they will emit ordinary photons which then manifest as brighter visible "hot spots." These have often been identified as "windows" from which bright light was emanating from a culturally embellished "spaceship."

Since these plasmoids are composed of cold or non-thermal plasma, a series of plasmoids along the axis of a cold plasma envelope may have different colors due to the gradations in the temperature. Through the Hall (magnetohydrodynamic) effects, these plasmoids can develop into rotating vortical structures. Rotating vortexes have been seen embedded within UAPs or UFOs. This is a signature feature of plasma bodies.

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Pulsed collimated beams of light from UFOs are also sometimes reported. These are guided by the vortex systems, which are present in dark plasma lifeforms [34], and undergo "lensing effects" as they pass through the curved sheath of the translucent ovoid of the lifeform which focuses the beam that emerges at specific targets. This dark light, if intense enough, emits ordinary plasma through collisions with ordinary matter particles in the air, causing the dark ionization process. This ordinary plasma can be seen by ordinary sight and has been depicted in UFO sightings.

- *Transport Mechanisms*

There are myriads of lifeforms in the Dark Earth from different evolutionary pathways. Hence, just like on Earth, their mode of transport and communication will vary from one plasma lifeform to another. Their default motion would simply be to move by interacting with the electrical and magnetohydrodynamic environment in the lowest energy Dark Earth in a variety of ways.

Some aspects of its basic motion would be similar to the motions of a test charge in an ionized environment. This motion will be inexplicable when superimposed against the visible Earth. In fact, the reason many of the motions reported of UAPs/UFOs are inexplicable is because we assume that they are navigating in our ordinary matter sector. All we are seeing are their cold plasma footprints in the ordinary matter Earth's environment.

There are also more sophisticated directed methods of motion. The dark plasma bodies of biological UFOs and UAPs may move by neutralizing or reversing their electric charge in specific parts of their body and/or redistributing the electric charges in their bodies. In this way, they can use electrical propulsion to move rapidly using Birkeland currents in the Dark Earth, like maglev trains (using magnetic levitation). This is much more sophisticated than how sharks use electric fields, which are generated by ocean currents carrying salt and moving in the magnetic field of the Earth, for orientation and navigation.

They could also suck in particles through their orifices in the direction of the motion and then spew out those particles from orifice located in the opposite direction. The suction generates a drift and the spewing out a thrust. This is similar to how squids move by using water for jet propulsion. They fill their mantle with water through small openings in their head, then eject the water through a funnel called the siphon to generate a thrust. This would be aided by magnetohydrodynamic currents in the plasma ocean or atmosphere. This is similar to how birds use air currents, and fish use ocean currents, to navigate. Additionally, they could use electro-mechanical jet propulsion using electric wind, plasma, or photonic thrusters.

Plasma lifeforms, appearing as UAPs/UFOs, could also ascend or descend by simply changing their density in the fluid-like plasma ocean. There would be side-effects from these movements. To descend, they must increase their density which means they would inadvertently initiate a dark ionization process. If they were near the Earth's surface they would unintentionally appear to ordinary sight. When ascending, they must reduce their density. Hence, they would inadvertently switch off the dark ionization process. They may not actually be aware that their movements are being noticed by inhabitants in the ordinary matter sector.

As noted in previous papers, plasma lifeforms have biological structures that resemble unicellular lifeforms. As such, they would behave like microbial organisms – although they could grow to extremely large sizes in the expansive plasma oceans, much larger than whales. They could to this by ingesting charged and neutral dark matter particles and lowering their densities. If these dark plasma lifeforms generate ordinary plasma (through the dark ionization process) or emit dark photons that convert to ordinary photons (through kinetic mixing), they will be seen by radar and optical instruments. They would then be seen as huge objects majestically gliding across the ordinary matter Earth's atmosphere and be mistaken for "motherships" in a culturally embellished report.

Some plasma lifeforms might resemble those Carl Sagan and Edwin Salpeter theorized in 1976—creatures like hot air balloons living in Jupiter's atmosphere. They suggested "floaters," giant gas bags generating heat and feeding on sunlight, and "hunters," squid-like beings propelled by gas jets, both inspired by marine ecology. Arthur C. Clarke also envisioned similar atmospheric life forms on Jupiter.

When plasma lifeforms move collectively, similar to the behavior observed in birds and fish, they exhibit swarm dynamics. During such collective movement, the cold plasma sheaths surrounding dark plasma entities manifest as colored orbs of light in the sky, typically forming distinct patterns due to natural electromagnetic interactions among these orbs. According to the dark plasma hypothesis, plasma lifeforms are biologically macroscopic, single-celled eukaryotic organisms.

In specific circumstances, such as predatory pursuits or situations involving potential threats, plasma lifeforms, analogous to their conventional biological counterparts, may temporarily aggregate to form superorganisms that resemble multicellular entities. Consequently, phenomena resembling swarms of unidentified aerial vehicles could merge, giving the appearance of a single large 'mothership.'

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- *Communication*

The communication mechanisms that can be used by biological UFOs and UAPs would include the transmission and reception of thought-modulated electromagnetic and acoustic waves in plasma, directed thought-holograms and zipped plasma bubble-drives. These have been discussed in detail by the author in other papers [33].

- *Plasma Holograms*

In 2011, the Japanese company Burton Inc. demonstrated a preliminary system capable of producing moving three-dimensional images in mid-air by generating plasma dots with a laser that ionizes the air at precise locations. This process is referred to as "plasmoid holography" by the author. It involves the creation of plasmoids in the atmosphere using laser technology.

Since 2018, the United States Navy has developed similar capabilities, employing lasers to generate plasma-based 'UFOs' in the atmosphere as decoys intended to confuse adversaries and deflect incoming missiles. The Navy holds patents for technologies that produce mid-air images designed to deceive infrared and other sensor systems.

By directing intense laser pulses to ionize the air, bursts of luminous plasma are created. The Laser Induced Plasma Effects program utilizes individual plasma bursts, and a rapid sequence of such pulses can be modulated to transmit spoken messages or synthesize holographic three-dimensional images. According to the Navy's patent application, "Multiple laser systems may be mounted on the back of an air vehicle, each generating a 'ghost image,' thereby creating the appearance of multiple air vehicles."

Besides lifeforms, in the form of biological UFOs or UAPs, generating ordinary plasma in the ordinary matter Earth's atmosphere, dark plasma holograms may therefore also be projected from the lowest energy Dark Earth. Ethereal plasma holograms of spaceships (resembling what we see on TV and movies) are crystallised in this Dark Earth's plasmasphere from the trillions of dark electromagnetic waves, broadcasted every day from the billions of dark plasma bodies linked to ordinary matter human bodies and modulated by their thoughts.

When these thought-modulated waves are resonant, the dark electromagnetic waves generate constructive interference. Where the waves intersect, they generate plasmoids in the dark plasmasphere which have different densities and temperatures. These give rise to plasmoids with different textures, colors and shapes, which construct the hologram.

When this hologram moves across a patch of the dark plasmasphere which is coincident with a patch of sky in the ordinary matter sector, it initiates the dark ionization process which generates ordinary cold plasma which will be visible through ordinary sight and be able to be picked up by radar.

Holographic projections from the collective consciousness of a community may therefore be imprinted in the plasmasphere and be seen by ordinary sight, if clothed with ordinary cold plasma envelopes. The specific mechanisms for a wide variety of possible dark plasma holograms have been discussed by the author in other papers [33].

- *Abductions*

Based on the evidence, most UFO related "abductions" most likely relate to the lowest energy alpha dark plasma bodies that are linked or coupled to our ordinary matter bodies, and not the ordinary matter body. There are usually no signs on the ordinary matter body of any impacts and no ordinary matter objects left by aliens. Acoustic and electromagnetic telepathy, a common form of communication between dark plasma lifeforms, is frequently associated with these abductions. Dark plasma bodies are electromagnetic entities, not biochemical carbon-based bodies. Hence, it is natural for them to receive and transmit dark electromagnetic waves. (We must refrain from the natural tendency to treat or imagine them as biochemical entities which do not have these abilities.)

A dark plasma lifeform would be able to communicate with a human by emitting dark electromagnetic or acoustic waves to a dark plasma body that is coupled to the ordinary matter body. In a Type 2A encounter (under the Dark Plasma Hypothesis), the message would be first received by the linked dark plasma body and then relayed to the ordinary matter brain through quantum processes in the human brain.

As discussed above, researchers, including Kenneth Ring, have also noted that these "abduction scenarios" have many elements in common with OBE (out-of-body experiences) and NDEs (near-death experiences). According to the author, these relate to dark plasma bodies and can be comprehensively explained through plasma dynamics in dark plasmaspheres.

- *Experiments and Testing - SITI*

New detection strategies can be formulated when we expand the frontier in the search for intelligent life by shifting focus from traditional extraterrestrial targets to the plasma-based intelligence within Dark Earth. Moving forward, this paper proposes integrating protocols and methodologies from SETI with advanced dark matter detection experiments to identify rare, non-standard, or anomalous signals indicative of inter-terrestrial intelligence.

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By broadening the search paradigm and fostering interdisciplinary collaboration, this paper lays out a framework for detecting and communicating with plasma life forms that may share our planetary environment, offering a novel approach to uncovering previously unrecognized forms of non-human intelligence. If plasma life exists in Dark Earths, it may be "hiding in plain sight." It may be detectable only through rare, subtle, or non-standard interactions.

Traditional SETI focuses on detecting electromagnetic signals (for e.g., in radio, and optical frequencies) from distant star systems in the ordinary matter sector. However, if plasma life exists in dark matter biospheres on Earth, then this paper proposes that NASA sets up an additional project called "SITI (Search for Inter-Terrestrial Intelligence)." This project would search for inter-terrestrials in the dark sectors right here on Earth.

Many dark matter experiments on Earth may have unintended benefits in that they are actually feeble and unintentional attempts at SITI. By combining SETI's expertise in signal detection with the sensitivity of dark matter experiments, we can maximize our chances of discovering such life. These are some research and communication protocols we could develop to interact with inter-terrestrial intelligences.

The general detection strategies for SITI project is presented here. SITI should do the following:

- Broaden its search to include local, non-ordinary signals from within or near Earth.
- Develop protocols for "anomalous" signals that do not fit known astrophysical or technological sources, especially those that might be weak, transient, or non-standard (e.g., bursts, modulations, or "dark" electromagnetic phenomena).
- Work together with NASA engineers to create procedures for identifying, measuring, and studying unusual changes in the speed of spacecraft and satellites orbiting Earth and the Moon.
- Identify regions where anomalies cluster. Communicate with these regions using communication channels using kinetic mixing, as specified in the next section below.
- Collaborate intensively with teams conducting dark matter experiments to design new protocols for detecting intelligent dark matter signals as well as to co-analyse data received from what appears to be from sources within the Earth and near-Earth sources. This is further elaborated below.

➢ *Collaborating With Dark Matter Detection Experiments*

Dark matter experiments (e.g., XENON, LUX-ZEPLIN, DAMA/LIBRA, Super-Kamiokande, IceCube) are designed to detect rare interactions between dark matter particles and ordinary matter. These experiments could be adapted or analyzed for identifying biosignatures and other evidence of activity by dark lifeforms:

- Correlations with UAP/UFO events: By cross-referencing times and locations of UAP sightings with detector anomalies, researchers could look for statistical associations.
- Unusual, non-random event patterns: If plasma life in Dark Earths interacts with ordinary matter (even weakly), it might produce bursts, periodicities, or spatial clustering in detector data that differ from expected backgrounds.
- Since the higher density dark plasma lifeforms are clustered in the habitable zones (identified as the CTS region for the lowest energy Dark Earth), the CTS region would show a higher density of dark matter due to the existence of these lifeforms, inconsistent with general cold dark matter predictions (which primarily focus on gravitational influences).

Strictly speaking, this region, as a whole, should emit extremely weak radiation, heat and light that cannot be explained by processes in the ordinary matter Earth alone. These collective emissions by the dark matter lifeforms may be the result of spontaneous and sporadic dark ionization processes.

- Search for "dark electromagnetic" biosignatures: Some dark matter models predict "dark photons" or other weakly interacting particles. If plasma life uses such particles for communication or metabolism, their emissions might be detectable as rare conversion events (e.g., dark photons converting to ordinary photons in strong and/or resonant magnetic fields).
- Shared anomaly databases: SETI and dark matter labs could create a joint database of unexplained events. These could include radio bursts, detector anomalies, unexplained electromagnetic pulses, which would be scrutinized for patterns or coincidences.
- Machine learning for cross-domain anomalies: AI could be trained to search for correlations between "weird" signals in SETI data and unexplained events in dark matter detectors.

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➢ *Experimental Innovations for SITI*

- Signal modulation: Use distinctive, information-rich modulations (e.g., prime number sequences, mathematical constants) to distinguish artificial signals from noise.
- Global collaboration: Integrate SITI. with existing SETI and dark matter networks for real-time data sharing and anomaly analysis.
- Hybrid detectors: Design new instruments sensitive to both ordinary and hypothetical "dark" electromagnetic phenomena (e.g., using resonant cavities, superconducting sensors, or quantum sensors).
- Localized experiments: Place dark matter detectors in locations with frequent UAP/UFO reports or in high-altitude/space environments to maximize the chance of interaction with plasma life.
- Since these plasma lifeforms are composed of dark plasma, i.e., self-interacting dark matter particles with a weak electric charge, we could expect weak dark electromagnetic waves from these lifeforms. More research and understanding of dark electromagnetism are necessary to construct dark (matter) radars or other relevant detectors to detect them. For e.g., if dark radio and microwave photons convert to ordinary radio or microwave photons (through kinetic mixing, as discussed in more detail below), it might open up a way for inter-sector communication and radar detection.

➢ *Theoretical Frameworks and Simulations*

- Modeling plasma life's possible biosignatures and communications: Theorists can simulate how plasma-based life in dark matter might interact with ordinary matter, what signals it could produce, and how these would appear in both SETI and dark matter data.
- Predicting "communication" attempts: If plasma life attempts to communicate, it might use frequencies or particles not covered by traditional SETI. Theoretical work can guide where to look. Based on the mapping in this book, the highest probability of interactions would be in the CTS: the higher regions of the crust, the troposphere and the lower regions of the stratosphere.

➢ *Public and Interdisciplinary Collaboration*

- Citizen science: Encourage the public to report UAP/UFO events with precise timing and location, which can be cross-checked with dark matter detector data.
- Interdisciplinary conferences: Bring together SETI, dark matter physicists, plasma physicists, and consciousness researchers to share findings and brainstorm new detection strategies.

➢ *Summary of SETI-SITI and DM Detector Collaboration Ideas*

Table 2 Summary – SETI-SITI and DM Detector Collaboration Ideas

Approach	SETI Role	Dark Matter Lab Role	Joint Benefit
Broaden search paradigm	Look for local anomalies	Share detector anomalies	Find cross-domain patterns
Data sharing	Provide radio/optical data	Provide particle event data	Correlate events, boost discovery
Hybrid detectors	Develop new sensors	Test for dark EM signals	Detect new methods of communi-cation
Theoretical modeling	Predict signal types	Simulate interaction events	Guide experimental focus
Public engagement	Collect UAP reports	Time-stamp detector events	Increase data, improve correlations

➢ *Specific Investigations Based on Kinetic Mixing*

SETI's current strategy for contacting aliens in other stellar systems involves transmitting and listening for signals across various electromagnetic channels, such as radio, optical, and microwave frequencies. The approach is grounded in the idea that technologically advanced civilizations may use similar means for interstellar communication. SETI projects often focus on sending powerful, well-structured signals toward likely star systems and scanning the sky for unusual or non-random patterns in incoming signals that could indicate an intelligent origin. A similar strategy can be used to contact inter-terrestrials inhabiting Dark Earths, by relying on kinetic mixing.

Kinetic mixing is a theoretical process in which ordinary photons (the carriers of electromagnetic signals, including radio waves) can convert into dark photons (hypothetical carriers of "dark electromagnetism" in the dark sector), and vice versa, in the presence of strong or resonant magnetic fields. This means that a signal sent as ordinary electromagnetic radiation (for e.g., radio, microwave, optical radiation) could, in the right environment, partially convert into dark photons. These dark photons could then

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propagate through the dark sector, potentially to be received by dark plasma lifeforms or technology in the Dark Earths. Conversely, signals generated by dark plasma lifeforms using dark photons could convert back into ordinary photons, making them detectable by our instruments.

Kinetic mixing and related mechanisms make it possible to design a SITI project that uses radio, optical, microwave, and even plasma or neutrino channels to search for intelligent signals from plasma life in Dark Earths. For e.g., if both sides (ordinary and dark sector) have the means to generate and detect photons or dark photons, they could, in principle, exchange information. Radio, optical, and microwave signals could, via kinetic mixing, be used as channels for inter-sector communication. For example, a radio transmission from Earth could convert to a dark radio wave, travel through the dark sector, and be received by a dark plasma lifeform. The reverse is also possible. The information can be encoded in the frequency, amplitude, or phase of the electromagnetic wave, just as in ordinary radio or optical communication. If the conversion process preserves this modulation, complex messages could be sent.

Microwave signals are commonly used in both SETI and radar. Kinetic mixing could allow for the conversion of microwaves to dark microwaves and back, especially in environments with strong electromagnetic fields (e.g., near certain detectors or natural geophysical anomalies). Terahertz waves are less absorbed by the atmosphere and could be used for "deep" communication through both ordinary and dark matter.

Just as radio photons can undergo kinetic mixing, so can photons in the optical or infrared range. This means that laser pulses or modulated light beams could, in principle, be used for inter-sector signaling. If dark plasma life uses "dark light" (dark photons), some of these could convert to ordinary photons in the presence of strong magnetic fields or specific materials, making optical SETI (OSETI) a candidate for SITI experiments. This will allow for optical/infrared communication.

This means dark plasma lifeforms could potentially receive, respond to, or even initiate communication using these converted signals. Conversely, dark radio signals could convert back into ordinary photons, making them detectable by our instruments. This mechanism provides a physical bridge for information transfer between our sector and the dark sector, making SITI a scientifically plausible endeavor.

➢ *Experimental Set-Ups*

- Hybrid detectors: Develop radio, optical, and microwave transmitters and receivers designed to operate in environments (e.g., strong or resonant magnetic fields, superconducting cavities) that maximize the probability of photon to dark photon conversion, making it possible to "listen" for dark sector signals.

- Synchronized transmissions: Co-ordinating transmissions with dark matter detector "listening" windows could increase the chance of detecting responses and correlated anomalies from the dark sector.

- Other Channels Enabled by Similar Mechanisms

✓ Plasma wave communication: In plasma environments (such as the ionosphere or plasmaspheres), both ordinary and dark plasma lifeforms could use magnetohydrodynamic (MHD) waves or Alfvén waves for communication. These could, in theory, couple across sectors via kinetic mixing or shared magnetic fields.

✓ Neutrino communication: Some dark matter models predict interactions between neutrinos and dark sector particles. Neutrino detectors (like IceCube) could be adapted to look for anomalous bursts or modulations that might indicate intelligent signaling from dark plasma life.

✓ Gravitational waves: While extremely weak, advanced civilizations might use modulated gravitational signals, which could, in principle, interact with both ordinary and dark matter.

✓ Fifth-force interactions: If a new short-range force (as hypothesized and discussed earlier for dark matter coupling) exists, it could be used for signaling between sectors, especially at close range or in laboratory settings.

➢ *Summary of Kinetic Mixing Communication Channels*

Table 3 Summary - Communication Channels for SITI

Channel Type	Ordinary Sector Example	Dark Sector Analog	Conversion Mechanism
Radio/Microwave	SETI radio trans-missions	Dark radio waves	Kinetic mixing
Optical/Infrared	Laser pulses, OSETI	Dark light	Kinetic mixing
Neutrino	Neutrino bursts	Dark sector neutrinos	Weak interactions

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Plasma/Acoustic	MHD/Alfvén waves	Dark plasma waves	Magnetic field coupling
Gravitational/Fifth Force	Gravitational wave signals	Dark sector gravity/ Fifth force	Shared spacetime/ fifth force

Dark photons, via kinetic mixing, provide a theoretically sound and technologically plausible bridge for communication between our world and the dark sector. This enables the possibility of the Search for Inter-Terrestrial Intelligence (SITI) using radio, optical, microwave, and plasma wave channels to search for intelligent signals from plasma life in Dark Earths.

- *Detecting Alien Biosignatures and Technosignatures*

Ordinary biosignatures, used to detect lifeforms by SETI, include chemical imbalances, waste gases, and infrared heat. This assumes life leaves ordered, non-random, persistent traces or patterns in its environment. The dark biosignatures rely on the same principle.

Tests by SITI should be designed to distinguish natural phenomena from artificial, engineered signals associated with intelligent lifeforms. This is especially relevant when we consider that the most probable UAPs are non-living plasma bodies or remnants, as presented in Table 1 above. Charged buoyant plasma remnants may mimic intentional action, but they move erratically as they are interacting with electric and magnetic fields.

Intelligent dark plasma lifeforms, on the other hand, would likely leave behind ordered, non-random patterns, for e.g., regular pulsations during the generation of ordinary cold (non-thermal) plasma, electromagnetic fields and waves, heat and light, through the dark ionization process. The biosignatures would likely appear as ordered, low-entropy anomalies in the ordinary matter environment, although generated from the dark plasmasphere. “Hotspots” may indicate biosignatures that recur in the same locations.

Hence, test protocols must demand repeatability (not random noise), localization (not global background), order/low entropy (not chaotic), adaptive modulation (not fixed physical law), multi-site verification, and elimination of natural plasma explanations, before attributing anomalies to intelligent dark plasma lifeforms.

- *Using Dark Ionization Processes*

There is anecdotal evidence of ley lines on the surface of the Earth. Ley lines are theoretical, invisible lines that are believed to connect significant landmarks across the world, often thought to hold “sacred powers” in the metaphysical literature. According to the dark plasma hypothesis, they are generated through the dark ionization process.

Earth’s dark plasmasphere is theorized to contain a grid of dark filamentary currents. Filaments are high density regions in the plasmasphere. When density increases, the collision rate between ordinary matter particles and dark matter particles rise. This generates cold (non-thermal) plasma as described in the dark ionization process (refer to the dark plasma hypothesis in the Appendix below for more details).

The dark filamentary currents would then generate streams of weak cold plasma in the ordinary matter sector – not only on the surface of the Earth but also in the atmosphere and the crust (as the dark plasmasphere interpenetrates the ordinary matter Earth).

If these are detected by SITI, it would be a veritable roadmap of the underlying filamentary currents in Earth’s dark plasmasphere. The environment on the surface of the Earth is only weakly ionized. If there are secondary filamentary currents (containing ordinary cold plasma) generated by the underlying dark currents, we would see slightly higher ionization along the filamentary currents.

Using the relevant scientific visualization instruments, specific test regions could be scanned to produce maps of streams of slightly more ionized air on the surface of the Earth. If the analysis of the pattern of these streams resemble persistent filamentary currents, these would be the projected imprints from Dark Earth.

In places where these currents intersect and pinch, vortexes will be formed. These are normally associated with sacred sites. If dense nodes, arising from the intersections of the filamentary currents, are located in these sites, the collision rates of ordinary and dark matter particles will rise. This will initiate the dark ionization process which generates cold plasma. These sites could therefore contain higher amounts of cold plasma than isolated filaments.

Cold plasma has healing properties. For e.g., beams of ordinary cold plasma today kill bacteria to decontaminate food. Cold plasma is also used in medicine to promote human skin wound healing and can be used to effectively treat various wounds. It would also be able to influence the body’s bioelectric field and inherent electric and magnetic fields to heal. It may due to the presence of this healing cold plasma that these sites have been held to be sacred by the ancients and contemporary religious.

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Scanning and monitoring these sacred sites for higher levels of ionization, compared to the ambient ionization, may reveal subtle processes generated by the dark biosphere. Maps could be made of anomalous infrared radiations coming from these underlying dark filamentary currents and vortices.

In short, SITI adapts SETI's radio/optical verification pipeline but swaps telescopes for electromagnetic sensors, magneto-meters, scanning visualization devices, and frequency analyzers.

- *Using Kinetic Mixing Processes*

The filamentary currents have been theorized by the author to serve as dark electromagnetic highways under the dark plasma hypothesis [33]. Hence, there would be a clustering of dark plasma lifeforms along these filamentary currents. Unusual, exotic radiation from excretory processes by these lifeforms may be detected. If there is "high traffic" along these highways, tests should include listening for unnatural radio/optical signals (via kinetic mixing exchange).

Furthermore, if these streams of cold plasma run though high intensity geomagnetic spots on the ordinary matter Earth, the dark photons or axions could theoretically convert to ordinary photons, which may manifest as infrared radiation and microwaves (as we assume that this would be weak low energy phenomena). These microwaves could cause phenomena similar to those reported during UAP/UFO sightings.

Microwaves produced by the dark ionization process are capable of heating biological tissues. When these microwaves warm soft tissue in the head, they create thermoelastic waves of acoustic pressure. These waves travel through bone conduction to the inner ear, resulting in buzzing and other sounds that are perceived internally—only by the person affected—and are not heard by others nearby.

They could also generate radio waves. In this case, SITI could eavesdrop to hear what the purported intelligent lifeforms are communicating. The objective is to see if there are patterns in the "communications" that have the hallmarks of a language. The tell-tale signs may include persistent ordinary cold plasma filaments behaving like information channels. If these underlying dark currents are being used as transportation channels, they would constitute a technosignature.

According to the "biological blueprints" for these lifeforms, hypothetical "waste heat" in the dark plasma spectrum could convert to form of infrared or microwave emissions in the ordinary matter environment, along the underlying dark filamentary currents. These could be the "metabolic fingerprints" of intelligent dark plasma organisms inhabiting a parallel Dark Earth if the radiation is associated with excretory and other metabolic processes.

Localized disturbances in Earth's magnetic field that correlate with hypothesized high density dark plasma regions, for e.g., along the filamentary currents and vortexes, may manifest as ley lines and sacred sites in the ordinary matter Earth's environment. The low-energy ordinary radiation from these underlying filamentary currents in the dark biosphere may correlate with geomagnetic phenomena and magnetic anomalies on the surface of the ordinary matter Earth as these environments act as catalysts to manifest these radiation. This is because dark photons and axions are theorized to convert to ordinary photons in strong or resonant magnetic fields.

Anomalies that appear as "ghost signals" in geophysical data, would hint at interactions with a Dark Earth substrate.

- *Internal Controls*

To ensure a high level of verification, SITI should deploy multiple sensor modalities (magnetometers, gravimeters, neutrino detectors, heat sensors, and electric probes) across different sites. If these currents do converge on the so-called "sacred sites," these sites may be targeted for further investigation. If anomalous ordinary cold plasma currents or electromagnetic field fluctuations appear in multiple detectors simultaneously, they are less likely to be local noise. This will help to distinguish between genuine dark plasma lifeform activity from mundane electromagnetic interference.

SITI's protocols should alternate between regions of suspected dark plasma density (e.g., the habitable zones of the dark plasma lifeforms, in the CTS region and along filamentary currents and vortexes in the dark plasmasphere) and nearby "control" regions. If anomalies vanish in the control region but persist in the target, it suggests a localized dark plasma intelligence signature.

SITI should examine temporal drift in cold plasma production and oscillations, and electric currents. Natural plasma turbulence is chaotic, but intelligent modulation might show stable, repeating rhythms or persistent structured drift patterns.

SITI should conduct signal structure checks to distinguish chaotic plasma turbulence from ordered, low-entropy structures. Look for repeating motifs, fractal geometries, or "information-dense" waveforms in the slight higher ionized air tracing the underlying dark filamentary currents. Intelligent dark plasma life might encode information in filamentary currents or vortex structures.

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SITI should build catalogs of known natural plasma phenomena at the test sites (auroras, lightning, geomagnetic storms, ionospheric waves). Any anomaly must be tested against these databases to rule out natural causes before considering it a dark plasma technosignature.

- *Summary of Biosignatures*

Table 4 Summary of Biosignatures to Detect

Category	Ordinary Biosignatures (Carbon-Based Life)	Dark Plasma Biosignatures (ITH)
Energy Intake	Oxygen consumption, nutrient uptake	Absorption of high-energy charged dark matter particles & dark photons
Metabolic Waste	Methane, CO_2, infrared heat	Excretion of low-energy dark radiation that could convert to ordinary photons in geomagnetic active regions on the ordinary matter Earth.
Structured Patterns	DNA sequences, rhythmic biological cycles	Ordered plasma oscillations, filamentary currents, low-entropy vortex structures
Environmental Impact	Atmospheric chemical anomalies (O_2 + CH_4 imbalance)	Local depletion of high-energy dark particles, anomalous dark photon scattering
Coupling with Host Planet	Isotopic ratios in rocks, biosphere feedback	Correlations with filamentary currents and vortexes in the dark plasmasphere with ley lines, and cold plasma vortexes underlying "sacred sites" in the ordinary matter Earth.
Persistence & Repeatability	Fossil records, recurring ecological niches	Stable plasma "hotspots," recurring anomalies in dark plasmasphere regions where vortexes are present.
Adaptive Response	Evolutionary changes, ecological adaptation	Changes in the amount and type of ordinary cold plasma, and rate of pulsations, generated by the dark ionization process of dark plasma lifeforms.

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CHAPTER THREE
INTERACTION ZONES AND TIMES

- *CTS Region*

Most interactions between dark plasma lifeforms in Earth's dark biosphere and the ordinary matter Earth occur with dark plasma lifeforms from the lowest energy dark plasmasphere coupled to the visible ordinary matter Earth. According to the dark plasma hypothesis, these usually occur within the CTS region, i.e., the upper crust of the Earth, the troposphere, and the lower part of the stratosphere. This has been identified as habitable zones for dark plasma lifeforms in the lowest energy dark biosphere coupled to the Earth [32].

- *Seasonal Density Modulations*

The detectable interactions with UAPs/UFOs from the CTS will probably peak around the middle of the calendar year due to annual seasonal modulations in dark matter density around Earth. As noted in 2005 by the author, when Earth orbits around the centre of the galaxy, the planet flies through clouds of dark matter particles.

As that happens, millions of weakly interacting dark matter particles would be raining down on Earth. According to the research scientists, there would be an annual modulation or seasonal variation in the amount of dark matter particles raining through the Earth because of the motion of the Earth relative to the Solar System.

Our galaxy is embedded in a much larger cloud of dark matter. The Solar System passes through this massive cloud of dark matter particles as it revolves around the galactic centre. The seasonal variation arises because as the Solar System is moving through the cloud, the Earth is moving around the sun.

In December, the Earth is moving against the direction of the motion of the Solar System as the latter moves around the galactic centre. In June, the earth moves in the same direction as the Solar System as the latter moves around the galactic centre.

This dark matter rain would be experienced seasonally, just like the terrestrial monsoon rains that sweep central Asia every year. In the same way that a cyclist gets wetter when riding into the wind in a rain, than when riding with the wind, any dark matter detector would record more dark matter particles in and around June than around December.

The voluminous records of experiments conducted by DAMA-LIBRA, a dark matter detector, confirm this exactly. According to researchers, the experiment shows a 9.5 sigma evidence for an annual modulation, strongly suggesting that the observed modulation is of a dark matter origin.

It is curious that the Chinese celebrate an ancient festival called the 'Hungry Ghosts' month around August each year. They believe that souls are freed in this month to roam the earth. This belief probably arose from observations that there were more manifestations or sightings of ghosts around this month. The annual modulation or seasonal variations in the volume of dark matter passing through and captured by the earth every year suggests that the ancient Chinese festival may have a deeper scientific significance. The tilt of the earth's axis could influence the peak season for the 'dark matter rain' relative to each country.

The density of the dark matter in the plasmaspheres of Dark Earths is therefore not constant. The above discussions suggests that when the density increases due to seasonal modulations, the probability of sighting the ordinary cold plasma envelopes of dark plasma lifeforms inhabiting Earth's dark biospheres, whether culturally embellished as ghosts, Marian apparitions or UAPs/UFOs, would be higher.

This is not surprising. When the density of dark matter particles in Dark Earth increases the probability of collisions between dark and ordinary particles would be higher, triggering the dark ionization process. This process will generate ordinary cold plasma that may be momentarily visible.

A meta-analysis of current data could be conducted to confirm the frequency of ghost sightings during the year. The peaks in the frequency should be studied to see how strongly they correlate with expected seasonal variations in the density of dark matter particles due to the annual modulation observed by DAMA-LIBRA.

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CHAPTER FOUR
CONCLUSION

➢ *Integration of Evidence and Theoretical Framework*

The ITH (Inter-Terrestrial Aliens Hypothesis) is a comprehensive theoretical framework that brings together astrophysical evidence, laboratory plasma research, and phenomenological observations, challenging traditional extraterrestrial assumptions and advocating for new experimental and observational approaches to uncover inter-terrestrial intelligence.

It proposes that a significant number of Unidentified Aerial Phenomena (UAPs) and Unidentified Flying Objects (UFOs) can be understood as ordinary cold plasma manifestations of dark plasma lifeforms originating from a parallel Dark Earth. These entities interact with our ordinary matter environment through complex and well-studied plasma dynamics and electromagnetic processes.

➢ *Dark Plasma Lifeforms and the Dark Earth Concept*

The exploration of dark plasma lifeforms and their possible communication channels with ordinary matter has revealed a compelling foundation for interpreting phenomena that have long defied conventional explanation, such as UFO encounters and abduction experiences. Central to this perspective is the concept of a Dark Earth—a vast, hidden dark biosphere where plasma-based lifeforms exist. It is from this domain that the entities appearing as UAPs/UFOs are proposed to originate.

➢ *Bridging Physical, Psychological, and Anecdotal Evidence*

By suggesting the existence of dark plasma bodies equipped with unique electromagnetic capabilities, this research offers a bridge between disparate fields: physical evidence, psychological accounts, and anecdotal reports. It delivers a coherent narrative that integrates plasma dynamics, consciousness research, and the existence of diverse biospheres within Earth's dark sector.

➢ *Communication and Interdisciplinary Collaboration*

The hypothesis that dark photons facilitate communication across sectors opens new directions for both theoretical investigation and experimental detection. Recognizing dark plasma lifeforms as inhabitants of a complex dark biosphere broadens the scope for understanding potential alien civilizations and their engagement with the ordinary matter world.

➢ *Implications for Observation, Philosophy, and Life's Diversity*

Acknowledging the presence of advanced civilizations within Earth's dark plasmaspheres, as well as the broader Dark Earth concept, not only expands our conception of life and intelligence but also challenges us to refine both our observational methods and philosophical perspectives. Probing the boundaries between the ordinary and dark sectors, and investigating the vast expanse of the Dark Earth, promise to reshape our understanding of the cosmos and our role within it.

➢ *Diversity and Structure of Earth's Dark Biospheres*

The Dark Earth concept points to the existence of extensive and diverse biospheres of plasma-based lifeforms that coexist with humans. These civilizations may possess advanced technological capabilities but face limitations in traveling between sectors, resulting in sporadic and infrequent interactions.

These aliens would not compete with terrestrial life for resources like sunlight, oxygen, or organic molecules, since their makeup would be unconnected to ordinary matter. Instead, their habitats and energy would depend on electromagnetic resources. Because of this separation, both types of biospheres would generally coexist without interfering with each other, with different layers of a larger reality intersecting but not interacting directly.

However, since they are gravitationally coupled there might be concerns if there were significant disruptions on the ordinary matter Earth. Under the dark plasma hypothesis, conceived in 2005, there could be several dark biospheres i.e., Dark Earths, gravitationally coupled to the ordinary matter Earth.

➢ *Access to Multiple Sectors and Civilizational Diversity*

Access to each Dark Earth within a different sector opens the possibility of contact with another sector or universe and a wide array of alien lifeforms. Given the immense scale of even the lowest energy Dark Earth—comparable in size to Jupiter—and the presence of multiple biospheres in various shells, a vast diversity of UAPs or UFOs is to be expected, including biological UFOs and thought-modulated holograms.

➢ *Redefining Life and Its Potential Forms*

The notion of dark biospheres broadens our understanding of what constitutes life, suggesting that life can emerge in any stable matter system governed by self-organizing principles—not only within environments based on carbon, water, and sunlight. This perspective implies that the universe may host an array of biological forms, with both ordinary and dark biospheres representing distinct yet equally valid expressions of life's organization.

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- *Longevity and Advancement of Dark Biosphere Civilizations*

Civilizations thriving within Earth's dark biospheres are posited to have existed long before the emergence of the human species on ordinary matter Earth. If these entities are intelligent, it is reasonable to infer that they possess highly advanced technologies in communication, transportation, and computing, along with their own governmental structures, societies, cultures, and technologies. They may monitor developments on ordinary matter Earth, but they are as constrained as humans by the challenges of crossing between sectors, resulting in limited and sporadic interventions.

- *Implications for Astrobiology*

Astrobiology has traditionally focused on searching for life in environments favorable to ordinary matter, such as those containing liquid water, carbon-based molecules, and habitable zones around stars. The idea of dark biospheres, however, suggests the necessity of investigating environments composed of non-baryonic matter as well.

Based on the most recent estimates by astrophysicists, dark galaxies outnumber ordinary matter galaxies by many times. This means dark biospheres may be widespread throughout the universe and outnumber ordinary matter biospheres in exoplanets. Astrophysicists are actively exploring techniques for detecting planets made entirely of dark matter in other star systems, and these dark exoplanets are believed to be much larger than those composed of ordinary matter (just as Earth's dark biosphere is much larger than the rocky core). NASA's understanding of "Earth-like planets" may need to be redefined to include the properties of Dark Earths.

Life forms constructed from dark matter could potentially exist throughout galaxies, within planets, or in interstellar space, existing independently of sunlight or typical chemistry. This broader concept of life requires SETI (Search for Extraterrestrial Intelligence) initiatives to consider the possibility of dark civilizations communicating through channels beyond current human understanding. The proposal put forth recommends that SETI collaborates with dark matter detection projects to search for dark matter-based life on Earth itself.

- *Copernican Principle Reinforced*

If both visible and dark biospheres are real, it follows that humans may not be alone in the universe or even on Earth. This prospect, suggesting layered biospheres with separate life forms coexisting without direct interaction, further reinforces the Copernican principle.

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APPENDIX – DARK PLASMA HYPOTHESIS – KEY ASPECTS FOR ITH

➢ *Foundational Concepts*

This section details some aspects of the author's Dark Plasma Hypothesis, proposed in 2005 in a popular format and subsequently published in an academic paper entitled *Creation of Minimal Plasma Cell Systems by Self-Organization in Earth's Dark Biosphere Leading to the Evolution of Dark Plasma Lifeforms* in the Journal of Unconventional Theories and Research. March 17, 2009. The reader is cautioned that it is a very condensed version of the key aspects of the hypothesis. To view more detailed discussions, please view the references section below.

The Inter-Terrestrial Hypothesis (ITH) presented in this paper is a corollary of the much larger Dark Plasma Hypothesis.

➢ *Self-Interacting Dark Matter*

Drawing on insights from leading physicists and recent research, the paper highlights the growing consensus that dark matter may possess its own set of forces and a rich internal structure, analogous to ordinary matter. It discusses the possibility of multiple dark matter components—including heavy "dark protons," light "dark electrons," and other hypothetical particles—that interact through dark electromagnetism.

The author wrote in 2005 (and with slightly updated terminology thereafter), "Since dark matter makes up about 85 percent of all the matter in the universe, it would be simplistic to assume that it would be composed of only one type of particle. There is probably a great diversity of particles included in dark matter." Many physicists have since been expressing similar views.

In 2008, Sean Carroll, from Caltech, and physicist Lotty Ackerman, had noted, "Dark matter constitutes a large majority of the matter density of the universe, and there is no reason to assume a priori that…[it] is any less rich and interesting than that of ordinary matter." He elaborates, "I'm referring to the idea that the dark matter isn't simply a single neutral particle with a negligible rate of interaction in the current universe, but rather a set of one or more kinds of particles with some noticeable forces acting between them."

In 2013, physicist Andrey Katz from CERN, Geneva, Switzerland, concluded, "There is no good reason to assume that all the dark matter in the universe is built out of one type of particle … These new dark matter particles would essentially consist of heavy dark protons and light dark electrons."

Clarke and Foot from the University of Melbourne have also come to the same conclusion. They said in 2015, "It is possible that dark matter has a very rich structure. This is especially natural if dark matter resides in a hidden sector with its own gauge interactions. In particular, dark matter might be multicomponent … and interacts with itself via a massless dark photon."

Physicist Lisa Randall of Harvard University has argued that a significant limitation in prevailing dark matter theories is the prevailing assumption that dark matter consists of only a single particle species. She noted in 2016, "Given the complexity of the standard model of particle physics … it seems very odd to assume that all of dark matter is composed of only one type of particle." So, there would be a variety of particles with different properties, just like in the standard model of particle physics. In 2025, researchers noted that dark matter may be invisible, but by comparing how galaxies move through cosmic gravity wells to the depth of those wells, researchers found that dark matter appears to behave much like ordinary matter, obeying familiar physical laws. Still, the possibility of a hidden fifth force lingers, one that must be very weak to have evaded detection so far.

➢ *Nature of Particles*

The charged dark matter particles would include hypothetical particles beyond the standard model of particle physics. They could include heavy positively charged "dark protons" and much lighter negatively charged "dark electrons." They would interact through dark electromagnetism, mediated by dark photons. The dark electrons could include the extremely light negatively charged supersymmetric particles called "axinos." Potential candidates could also include the more massive, charged supersymmetric particles, called "charginos." Large Q-balls, which may be negatively or positively charged, could also be candidates.

However, until these are detected, all these particles remain speculative in terms of being the right candidates. Nevertheless, they are indicative of particles that may be detected (directly or indirectly) in the future. Some of these "non-standard particles" may even have a dark charge. If dark matter particles had a dark charge, it would explain better anomalies in dark matter detection (e.g. the DAMA experiment) and account for missing small-scale structure in galaxies.

➢ *Dark Charge, Dark Electromagnetism, Dark Light and Dark Photons*

In 2012, astronomers using data from NASA's Hubble Space Telescope observed what appeared to be a clump of dark matter left behind from a collision between massive clusters of galaxies. The result challenged current theories about dark matter that generally predict galaxies should be anchored to it even during the shock of a collision. In this, what has been imaginatively called the *Train Wreck* cluster, the dark matter core separated with very few galaxies. In other words, a lot of the dark matter was left behind – the clusters did not simply pass through each other unhindered.

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Initial detections made of the dark matter behavior in the cluster earlier in 2007 was so unusual that astronomers shrugged them off as unreal and blamed poor data. However, NASA confirmed it five years later. This led to astronomer James Jee, from the University of California (Davis), to conclude that some dark matter may be "sticky" and probably interacted with itself and stayed behind during the encounter. The “stickiness” may be due to weak electric charges in the dark matter particles.

The *Bullet* Cluster also provides some intriguing evidence that supports the possibility of a self-interacting component of dark matter. It is actually a pair of colliding galaxy clusters. Observations reveal that the hot gas (which is ordinary matter) was slowed down and displaced due to electromagnetic interactions during the collision. However, the dark matter of each galaxy cluster passed through each other with minimal interaction. Gravitational lensing shows that most of the mass (i.e., most of the dark matter) is located not where the gas is after the collision. This separation between dark matter and gas suggests that most dark matter is collisionless, meaning it doesn't interact via forces other than gravity.

However, a number of physicists point out that it could include a component of dark matter that is self-interacting due to its behavior. For e.g., Finnish physicist, Matti Heikinheimo from the University of Helsinki, Estonian physicist, Christian Spethmann, and their team, came to that conclusion in 2015. They said, “Observations of the Bullet Cluster suggest that most of the dark matter is collisionless. Nevertheless, there are hints that at least a subdominant component of the dark matter might be self-interacting.”

This component would lag behind slightly or show offsets from the galaxies, unlike the bulk of dark matter which remains aligned with the galaxies. So, while the majority of dark matter in the Bullet Cluster is non-interacting, the self-interacting portion is hypothesized to be a minor subcomponent that exhibits distinct behavior during the collision. There are other studies that indicate that a sub-component of dark matter could be self-interacting due to weak electromagnetic forces in the dark sector.

In a 2008 paper, Sean Carroll, Ackerman and his team at Caltech, proposed that dark matter particles could possess their own “dark charge” and “dark light.” These are the electric charge and light belonging to dark matter particles. In 2013, Carroll said that he had explored a new *dark* electromagnetism, which resembles ordinary electromagnetism but isn’t quite the same. He believes it could have a weaker charge. “I have investigated the idea of dark photons - dark matter being charged under a new ‘dark force’ resembling ordinary electromagnetism. These ideas, it turns out, are fairly compatible with what we know about the dynamics of dark matter in the real universe.”

In her 2016 best-selling book, Randall noted the following: “Just as ordinary matter can experience non-gravitational forces such as electromagnetism, so too might dark matter … restrictions don’t rule out self-interactions as a possibility … they just provide limits on the allowed strength and form.” Randall goes further: “Dark matter might also have some of its own forces and interactions not experienced by our matter … I’ll call the force that is experienced by the interacting dark matter component *dark light*, … this new type of light, which ordinary matter simply doesn’t experience … communicated by an entirely new particle—a dark photon” (emphasis added).

If this is the case, then the often repeated phrase in article after article that “dark matter does not give off light” is a half-truth. It should be corrected to “dark matter does not give off ordinary light.” In his 2005 book, this author noted that “*Dark-light* or super-light is the counterpart of the light that we are familiar with — composed of super photons” (emphasis added). The author had also discussed the existence of dark electromagnetism.

Randall has calculated that the same amount of self-interacting dark matter as ordinary matter is possible in the universe. (Ordinary matter makes up about 15 percent of the matter in the universe.) She says that if about 15 percent of the matter in the universe were self-interacting dark matter, it would agree better with dark matter distributions and structures at the sub-galactic scale. Her team (including Matthew Reece) calls this the “2-component partially interacting dark matter model.” They explain here that dark matter is composed of both relatively inert dark matter and also a dark sector where dark matter interacts with a force “similar to electromagnetism,” just as Carroll did.

Randall elaborates in her 2016 book, “The dominant component interacts only gravitationally and is the conventional cold dark matter that resides in spherical haloes around galaxies and galaxy clusters. The second component interacts gravitationally too, but also through *an additional force very similar to electromagnetism*” (emphasis added).

In 2018, Julian Munoz, a postdoctoral fellow in the Department of Physics and his collaborator, Avi Loeb of the Harvard-Smithsonian Center for Astrophysics (CfA), explored the possibility of charged dark matter particles having a weak electrical charge. Loeb said, “We are constraining the possibility that dark matter particles carry a tiny electrical charge, equal to one-millionth of an electron, through measurable signals from the cosmic dawn. Only small amounts of dark matter with weak electrical charge can both explain the EDGES data and agree with other observations.” If we assume some dark matter has this charge, we will be able to predict dark matter distributions more accurately and derive a theory more consistent with observations at smaller sub-galactic scales.

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➢ *Dark Protons and Electrons*

Physicists are also proposing the existence of dark protons and dark electrons. In 2009, Kaplan, Krnjaic, and Rehermann noted, "Dark matter may even interact via a long-range force, which is still allowed … we assume a dark proton and a dark electron, and that the dark matter abundance comes from a matter–antimatter asymmetry."

Andrey Katz (from Harvard University) and collaborators proposed a model where dark matter consists of heavy "dark protons" and light "dark electrons" that interact via "dark photons"—the carriers of a dark electromagnetic force, published in *Physical Review Letters*.

David Kaplan (Johns Hopkins University) and colleagues also explored the idea of composite dark matter particles. Their research suggests that dark matter might be made of bound states—dark protons and dark electrons—held together by a dark version of the electromagnetic force. This model helps explain certain anomalies in dark matter detection experiments, such as those from the DAMA collaboration in Italy.

➢ *Dark Electric and Magnetic Fields*

If there is a dark electric charge, there should also be dark magnetic fields generated by moving charges in this hidden dark sector. Carroll highlighted this in his popular blog in 2013, "So, there can be dark electric fields, dark magnetic fields …"

➢ *Temperature of Dark Sectors*

The temperature of dark universes or sectors could be different from our ordinary matter universe or sector. Physicist Sean Carroll points out, "If the visible sector and the dark sector are decoupled from each other, they may have different temperatures… After inflation, the two sectors could conceivably reheat to different temperatures, depending on the coupling of the inflaton to the various fields. Even if the temperatures are initially equal, once the two sectors decouple as the universe expands and cools, entropy deposited from frozen-out degrees of freedom in one sector will generally prevent the dark temperature from tracking the visible sector temperature."

According to standard cosmology, the dark sector can be hotter than the ordinary matter sector under certain conditions. After cosmic inflation, the universe undergoes a reheating phase. If the inflaton (the field responsible for inflation) couples more strongly to the dark sector than to the Standard Model particles, the dark sector can start off with a higher temperature than the visible sector.

If the dark sector is weakly coupled with the visible sector, it will not reach thermal equilibrium with the ordinary matter sector. This allows it to maintain a different temperature, potentially hotter, for extended periods. A hotter dark sector affects how dark matter particles freeze out. The freeze-out process determines the relic abundance of dark matter, and a hotter environment can lead to different dynamics and particle densities.

From the author's perspective there is a more important reason why the dark sectors could be hotter than the ordinary matter sector. The author's dark plasma hypothesis is consistent with standard cosmology, which includes eternal inflation theory, which postulates bubble universes with different physical constants, dimensional structures and temperatures within multiverses. The theory is an accepted extension of the big bang theory in standard cosmology. According to this theory, local bubble universes individually nucleate, grow and evolve inside a high energy background. There could be a cascade of nested bubble sectors or universes from higher energy levels to lower energy levels.

In our local multiverse, the author theorizes that all the bubble universes had their own "big bangs." All the universes, with different particles and fundamental forces, before our big bang, would be dark to us and logically would be at higher energy levels (as they cascade down from the higher energy background postulated by eternal inflation theory). This is the same as saying that they had higher temperatures. This would be conducive to sustaining dark plasma environments. A hotter dark sector could leave observable imprints on the cosmic microwave background, structure formation, and gravitational wave signals. It would challenge the assumption that all sectors of the universe shared the same thermal history.

➢ *Propositions*

If leading physicists are proposing that some dark matter could have a weak, dark electric charge, it follows logically that these dark matter particles would generally not form bound states but would be partially or fully ionized. They would form plasmas of dark matter particles, or dark plasma. The author had conceived of dark plasma more than twenty years ago, and published his views in popular format, around 2005. The conceptual seeds for the identification of dark (matter) plasma were sown by the author almost two decades ago. This was a prediction that is now finding increasing support from observational evidence.

➢ *Properties of Self-Interacting Dark Matter that Points to Plasma*

The conclusion that a sub-component of dark matter, usually in the vicinity of ordinary matter, was dark plasma, was arrived at based on various factors, as discussed below.

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- Weaker Charge: Firstly, it has been hypothesized in several theoretical particle physics models that there is a new long-range U(1) gauge field (designated "dark electromagnetism") that couples only to dark matter, not to the Standard Model. The *dark electric charge* of this dark electromagnetism is theorized to be much weaker in dark sectors, compared to the ordinary matter sector. This is estimated to be one-hundredth to one-millionth of the ordinary electric charge. Hence, the electromagnetic force in dark sectors will be significantly weaker, everything else remaining the same. It will not be strong enough to bind charged particles into atomic structures. (However, note that even if a million times weaker than the ordinary electric charge, it will still be 10^{30} times stronger than gravity.)

- Neutral Particles Buffer: Secondly, there are nearly five times more *neutral particles* than charged particles in the dark sectors. Hence, there will be a preponderance of neutral (or pseudo-neutral) dark matter particles that insulate and increase the distance between the electric fields of the charged particles. This weakens the effect of the electric charge further.

- Hence, the force of attraction between oppositely charged particles would be much lower, compared to ordinary matter particles. The buffer provided by the neutral particles would reduce the non-electrostatic interactions between the charged particles, including collisions. (Pseudo-neutral particles are dark matter particles that have such a weak electric charge that they behave as neutral particles in a low density environment.)

- Low Density: Thirdly, the *mass density* of dark matter in and around Earth is much lower than for ordinary matter by many orders of magnitude. The mass and size of self-interacting dark matter particles interpenetrating the visible Earth is extremely low and small, compared to ordinary matter particles. This means the interparticle distance and the mean free path of the particle is much longer, compared to ordinary matter particles. Hence, there will be fewer collisions that results in particle capture to form atoms, compared to ordinary matter particles. This would result in predominantly electrostatic (i.e., Coulomb) interactions between the charged particles, one of the key and most important defining characteristic of what we mean by plasma.

- Temperature of Sector: Fourthly, the *temperature* (and energy) of each successive dark sector is higher than the previous one as we go up the energy ladder, as discussed above. This is allowed by standard cosmology. The strength of the electromagnetic force actually increases near the charge at higher temperatures. However, the very weak electric charge (i.e. one hundredth to one millionth of the ordinary electric charge) more than compensates for this. Additionally, the author theorizes that higher energy dark sectors would have higher vacuum energy densities. This would result in a weaker electromagnetic force (i.e., a lower fine structure constant) under quantum field theory. Overall, therefore, the electromagnetic force would be weaker in dark sectors. The higher temperatures provide additional energy for charged dark matter particles to overcome the binding energies to form atomic structures.

- Different Particle Speeds: Additionally, when non-thermal plasma is produced closer to ordinary matter, atomic structures will not form. Dark protons in non-thermal or cold plasma may have a lower temperature than the dark electrons. If that is the case, then the velocity of dark protons and dark electrons will be different. This naturally separates the two species of particles, making it more difficult for any atomic structures to form.

- Viscosity: Fifthly, even if the dark plasmaspheres were not fully ionized, in a partially ionized plasma, electrostatic forces act on the non-ionized material indirectly through the *viscosity* between the ionized and non-ionized material. In this way, even if one percent of a gas is ionized, the gas as a whole may manifest signature features of plasma. Neutral particles in plasma don't inherently respond to electric or magnetic fields in the way charged particles do. However, under certain conditions, they can become effectively polarized due to the viscosity between the neutral and charged particles. For e.g., when charged particles flow, especially in magnetized plasmas and colloidal mediums, they can drag along the neutral particles due to this viscosity.

This leads to anisotropic behavior, meaning the neutral particles may start showing directional properties tied to the flow of the plasma. Neutral particles also frequently collide with charged particles and exchange momentum. If the charged particles are subject to electromagnetic forces, they can transfer some of that directional influence on the neutral particles.

- Weakening of Strong (Nuclear) Force: Sixthly, according to supersymmetry theory, the strong force weakens at higher energies. This will make it more challenging to form multi-nucleon atoms.

All these factors, including the weak electric charge, will not eliminate all plasma instabilities, but it will suppress most. It will also enable charge separation (which is essential for biological processes) to be sustained for long periods.

➢ *Growing Body of Research Supports the Dark Plasma Hypothesis*

There's a growing body of research suggesting that self-interacting dark matter (or SIDM) could behave like a plasma. In 2008, physicist Sean Carroll and his team from Caltech came to the same conclusion as the author, based on their own observations, and conjectured, "We can't say with perfect confidence that the dark matter really is effectively non-interacting. If a model like ours is right, and the strength of dark electromagnetism is near the upper bound of its allowed value, there might be very important

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consequences for the evolution of large-scale structure … What we are proposing is that the *dark matter is really a plasma*, and to understand how structure forms, one needs to consider *dark magnetohydrodynamics*" (emphases added). Their model allows for a range of dark coupling strengths. In the weak coupling regime, they explicitly note that dark matter would remain ionized, behaving as a plasma rather than forming bound states (i.e., atoms).

While Kaplan, Krnjaic, and Rehermann explored atomic dark matter in 2009, they also acknowledged that the formation of bound states depends critically on the dark fine-structure constant. If it's small, the dark sector would be plasma-like.

Finnish physicist, Matti Heikinheimo from the University of Helsinki, Estonian physicist, Christian Spethmann, and their team, came to the same conclusion in 2015. Heikinheimo noted, "If a subdominant component of dark matter is charged under an unbroken U(1) gauge group, collective *dark plasma* effects need to be taken into account to understand its dynamics" (emphasis added). He elaborated, "The notion of charged dark matter easily brings to the fore plasma physics. Plasma physics should be the starting point for understanding the phenomenology of charged dark matter."

The team concluded, "The possible observation of *dark matter plasma* is compatible with recently proposed models of a dark disk within our own Galaxy. In these models, the galactic *dark plasma* collapses into a thin disk through radiative cooling. In order for this collapse to occur within the lifetime of the galaxy, a light 'dark electron' is required" (emphasis added). The behavior of dark plasma is therefore held to be compatible with the dark disk idea, theorized by Lisa Randall and her colleagues.

Also in 2015, researchers from the University of Melbourne, J. D. Clarke and Robert Foot, noted, "It is possible that dark matter has a very rich structure. This is especially natural if dark matter resides in a hidden sector with its own (gauge) interactions … In such a framework, it is possible that the *dark matter in the universe exists primarily in a plasma state,* as a macroscopically neutral conductive gas of ions with dark charge, broadly analogous to the state of much of the ordinary matter in the universe" (emphasis added).

They elaborated in 2016, "A particularly non-trivial case is *plasma dark matter*: a multi-component scenario wherein the dark matter is minimally composed of dark electrons and dark protons, with self-interactions mediated by a massless dark photon, and taking the form of a *dark plasma* in spiral galaxies like the Milky Way (emphases added)." Furthermore, it had been reported that an unexpectedly large number of electron "recoils" were detected in the huge vat of liquid xenon in the XENON 1T experiment to detect dark matter. Foot says that *these electron recoils* (as opposed to recoils of the nucleons) *would only occur if dark matter was in a plasma state*.

A 2024–2025 study by Schoeffler, Shukla, and Silva explores how plasma physics principles can be applied to dark matter. They propose that dark matter might be charged under a hidden U(1) gauge symmetry (just like Lotty Ackermann and Sean Carroll, discussed above). This is essentially a dark version of electromagnetism. The same research draws parallels between interpenetrating plasma clouds and colliding dark matter halos. If self-interacting dark matter behaves like plasma, it could form collisionless shocks. These are regions where particles slow down due to collective interactions rather than direct collisions. They said these effects could explain certain offsets observed in the Bullet Cluster.

A 2025 study by Zachary Bogorad from the Stanford Institute for Theoretical Physics, Stanford University, in the US, and his colleagues explored the self-interacting component in the Bullet Cluster. They concluded that it is a fraction of the total dark matter, possibly 10 to 30 percent, and behaved more like plasma, interacting via long-range forces and potentially forming collisionless shocks.

Interestingly, signature features associated with plasma have been observed in dark matter. The 60th Annual Meeting of the APS Division of Plasma Physics in 2018 concluded the following: "Dark matter can behave like a cold collisionless plasma of self-interacting dark matter particles, and exhibit plasma-like instabilities with observational consequences." These observational consequences are the discovery of signature features of plasma that aren't just predicted; they have been observed in gravitational lensing reconstructions. Unlike ordinary plasma, plasma instabilities in dark plasma would be less erratic and chaotic due to the weaker electric charge.

- *Dark Earths*

The dark plasma near Earth is theorized to form dark plasmaspheres, or "Dark Earths." [The author's papers, referenced 30, 31, 32 below, discusses their origin, dimensions, structure, dynamics and habitability]. Dark Earths are dark matter planets, in the form of dark plasmaspheres, that are coupled gravitationally to the ordinary matter Earth and co-rotate with it. The lowest energy Dark Earth is estimated to have the same size as Jupiter. Its dimensional relationship to the rocky Earth is similar to the relationship of Jupiter's gas envelope to its rocky core.

The search for dark matter planets is an active area of research currently. Physicist Yang Bai, from the University of Wisconsin-Madison (USA), and his research colleagues, are searching for dark matter exoplanets outside our Solar System. It is ironic, though, that the dark matter planets that are gravitationally coupled to our ordinary matter visible Earth is being overlooked. Nevertheless,

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the numerous dark matter experiments being conducted on Earth would be unintentional probes into these Dark Earths. The Dark Earths support the evolution of well-defined dark plasma lifeforms [32, 34].

The mass of Earth has been determined to a very high precision using gravitational measurements. However, these measurements are sensitive to the sum of the dark and ordinary matter and hence would not be able to distinguish between the two. (The researchers who took the previous measurements probably would not even be aware that dark matter should be considered.) In a 2023 research paper [11] on "Probing Dark Matter Inside Earth…," researchers noted, "The mass of Earth has been determined to a very high precision using gravitational measurements. These measurements are sensitive to the sum of the DM [dark matter] and baryonic mass [i.e., normal matter] and hence would not be able to distinguish between the two. *Gravitational experiments do not distinguish between normal matter and DM*." (Emphasis added.)

Historically, therefore, the mass estimates of the Earth conflated dark and ordinary matter. This mass conflation obscured the presence of dark matter on Earth. If all the planets and the Sun had significant amounts of relatively dense dark matter within their cores, they would still be complying with Newton's laws of gravity, because their individual (historically recorded) masses would simply include the mass of the dark matter.

Recently, researchers realized that the presence of dark matter inside Earth may be indicated by deviations of the neutrino oscillation probabilities from their expected values. A 2023 analysis of a one-year data set from the IceCube detector rules out the presence of more than 32 percent of the mass of the core or 24 percent of the mass of the Earth to be composed of dark matter at the one sigma level. Atmospheric neutrino oscillations studies at the Super-K experiment rules out more than 21 percent of the mass of the entire Earth being in the form of dark matter at the one sigma level. The mass of dark matter in and around the entire planet may therefore be about 20 percent and in the core about 30 percent. This is highly significant and would be able to support the gravitational influence of a series of tenuous Dark Earths. (This has been more intensively discussed in the author's paper [30])

The phenomena discussed in this paper are proposed to originate primarily from the lowest-energy Dark Earth, classified as "Alpha Dark Earth" in the dark plasma hypothesis. It is estimated to be as large as Jupiter. Despite being much larger it is tenuous and would therefore account for only a fraction of the gravity (as already discussed above). The density is sufficient to host tenuous radiation-like plasma lifeforms. It has habitable zones which intersect with our own, that would allow for occasional inter-sector visitations. (The higher energy Dark Earths and their lifeforms are outside the scope of this paper.)

Different cultures throughout history have interpreted encounters with these plasma lifeforms from the lowest energy Dark Earth through the lens of their belief systems.

- *Plasma Lifeforms – Ordinary and Dark*

Plasma physicist Mituo Uehara and his colleagues suggested in a 2000 paper in the *American Journal of Physics* [15] that plasma physics should be considered part of biological investigation. They believe plasma physics can be useful in the investigation of the physical properties of living biological cells. "Concepts relating to electrical plasma, like 'charge neutrality,' 'Debye length,' and 'double-layer,' are very useful to explain the electrical properties of a cellular membrane," they say.

In a paper written in 2003 [15], Lozneanu and Sanduloviciu from the Plasma Physics Department at the University of Alexandru Ioan Cuza (UAIC) in Romania, reported that they were able to generate (ordinary matter) "plasma cells" in the laboratory, subject to gravity.

When the researchers applied a high voltage to electrodes in argon gas, an arc discharge was generated that flew across the gap between them, like a miniature lightning strike. The neutral gas was converted to a non-thermal (or cold) plasma at the points where the discharge struck. Sanduloviciu says this electric spark caused a high concentration of ions and electrons, resulting in a non-thermal plasma to accumulate at the positively charged electrode (i.e., the anode). This spontaneously organized into *spheres*. Each sphere had a *double layer*, composed of an outer layer of negatively charged electrons and an inner layer of positively charged ions.

The size and the lifespan of the spheres were determined by the amount of energy in the induced spark. After a cascade of growth, the space charge configuration appears as a stable (static) self-confined luminous, nearly spherical, gaseous body attached to the anode. Spheres from a few micrometers up to three centimeters in diameter were grown within this cold plasma. At a critical value of the electrode's potential, the cell is able to detach itself from the electrode and escape into a free-floating independent state. After emerging the cell is able to replicate by splitting into two (analogous to splitting biological cells undergoing mitosis). Under the right conditions they grew bigger, taking up neutral argon atoms and splitting them into ions and electrons to replenish their boundary layers.

The researchers argue that, similar to biological cells, the electrical cell's sheath provides an enclosed internal environment that differs from the external environment. The sheath is able to sustain and control operations such as the acquisition and transformation of energy, the exchange of matter across the system's boundary, and the continual internal transformations of matter. This is reminiscent of the membranes of biochemical cells which have ion channels that exchange energy and matter with the

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external environment. They describe a rhythmic "inhalation" of the nucleus which mimics the breathing process of living systems and results in pulsations. These mimic metabolic processes in biological cells.

The cells can also communicate with other plasma cells. Lozneanu explains the process of communication between the cells as follows, "As mentioned, the [cells], created in plasma by self-organization, also reveal other interesting phenomena such as [the] …exchange of information. This latter behavior is realized by the emission of electromagnetic energy with an appropriate frequency by a [cell] during its steady (viable) state and its resonant absorption by another [cell]." They can communicate and receive information by emitting electromagnetic energy, making other spheres vibrate at a particular frequency. This would give these plasma spheres an ability which would be described as telepathic if we did not know how electromagnetic waves worked.

Lozneanu believes the electrical plasma cell "is potentially able to perform a further biochemical evolution into a living cell." According to the researchers, these plasma spheres were probably the first cells on Earth that arose within electric storms. They believe that the emergence of such spheres is a prerequisite for the evolution of biochemical cells in the early hot Earth, when the planet was enveloped in electrical storms and plasma was prevalent in the atmosphere. Sanduloviciu says, "The cell-like spheres we describe could be at the origin of other forms of life we have not yet considered." These plasma spheres, which may be described as proto or primitive lifeforms, behave like microbes. We may be hesitant to call it "life" only because we are heavily biased towards a carbon-based biochemical basis for life.

This provides a basis for hypothesizing that minimal plasma cells could have developed in Earth's dark biosphere that evolved into plasma lifeforms over billions of years, alongside carbon-based lifeforms. The author has provided a detailed biological blueprint for a plasma lifeform (applicable to both ordinary and dark biospheres) in this book.

The mechanisms described in the next section show how this hypothesized dark plasma lifeforms from this Dark Earth can manifest observably, albeit momentarily, and provide some foundation on the underlying mechanisms that will be required to understand and reinterpret the events that will be discussed later.

- *The Dark Ionization Process*

Electrons in a plasma tend to overshoot their trajectory as they approach the protons to which they are attracted to. As they move back and forth, they produce natural oscillations of the electrons within the plasma. The frequency of the oscillations is called the "plasma frequency." (The term is usually applied to the oscillating frequency of the lighter particles, for e.g., the electron in ordinary matter plasma, in the presence of the heavier particles such as protons or positive ions.) This frequency is proportionate to the number of particles within a given volume, i.e., its particle number density, and strength of the electric charge but inversely related to its mass.

Collisions between dark matter particles and ordinary matter particles on Earth can knock out electrons and protons from atoms, ionizing ordinary matter. In other words, it would generate plasma, with detectable heat, light, radiation and electricity. If a dark plasma lifeform increases its density (i.e., the amount of matter in a given volume) it would raise the collision rate between ordinary and dark matter particles. A usually tenuous dark plasma lifeform could increase its density by simply reducing its volume. This would reduce the interparticle distance (i.e., the mean free path) resulting in an increased number of collisions.

The increased density would increase the plasma frequency, as the frequency is proportionate to the (number) density of particles. An increase in plasma frequency means that the frequency of oscillations increases. The increased motion would cause the number of collisions between particles to increase. Additionally, when there are fluctuations in the density of the particles (i.e., rapid density modulations) in the dark plasma lifeform – just by a plasma lifeform increasing and decreasing its volume rapidly in a pumping action (and ingesting more particles if necessary), the motion and kinetic energy of the particles would increase.

This would increase the number of collisions between particles. Furthermore, extremely fast-moving plasma lifeforms zipping along magnetic field lines in the Dark Earth or using electric wind propulsion (or other modes), as discussed below, will cause their dark matter particles in the lifeform to collide forcefully into ordinary matter particles, causing ionization in ordinary matter atoms.

Under the dark plasma hypothesis, the collisions are effected through the weak nuclear force, through the exchange of Z^0 bosons. We assume that a dark plasma lifeform which, even in its relaxed state, is many orders of magnitude denser than the ambient density of dark matter. When the lifeform significantly reduces its volume prior to the dark ionization process, the density is ramped up even much higher. Hence, the collision rate during the dark ionization process, involving a dark plasma lifeform, is many orders of magnitude higher than in current dark matter detectors.

- *Effects of Dark Ionization Process*

The dark ionization process occurs when a plasma lifeform increases or rapidly oscillates its density by increasing and decreasing its volume. When these density modulations occur, the rate of collisions between dark matter particles and ordinary matter particles increases. When these collisions occur, ordinary electrons may be kicked to higher energy states or displaced from the atoms or molecules. When the electrons are displaced, ordinary plasma forms around the dark plasma lifeform.

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At the initial stage, the speed of electrons and protons would be much higher. During collisions, the larger protons (both ordinary and dark) would collide more often because of their larger target area (or cross-section of interaction) than the tiny electrons. This cools down the protons but keeps the electrons hot. Since the mass density of the plasma is primarily contributed by the cold protons, the overall average temperature will be much cooler. Hence, the process generates an envelope of short-lived, ordinary cold (or nonthermal) plasma around it that could be momentarily visible.

Cold or non-thermal plasma is a plasma composed of more than one species of particles, for e.g., electrons and protons. Unlike the "hot" plasma (in nuclear fusion laboratories, the Sun or the stars,) it is not generated by increasing the temperature. It is generated by direct collisions between particles. Examples of cold plasma include the auroras (which are produced through the collisions of particles) and the plasma in fluorescent lamps which can be cool to the touch.

When the electrons at higher energy states and the electrons that are displaced return to lower energy states in the atom or recombine, energy is released. This process will generate ordinary heat, light, radiation (which could include radio and infrared waves), electromagnetic fields and electricity, as follows:

- Heat: While the plasma is "cold" overall, particle interactions still generate detectable thermal energy (infrared radiation) and microwaves at the lower end of the ordinary electromagnetic spectrum.

- Light: The ordinary plasma envelope emits ordinary photons, making the entity visible as a luminous, glowing or shadowy form momentarily. (See below for what determines the form.)
- Radiation: The process can emit a broad spectrum of radiation, including radio, infrared and microwaves when the plasma is low energy. On rare occasions it may also emit ultraviolet light or X-rays that can be damaging to human tissues.

- Electromagnetic fields: The motion of particles in the plasma will generate electromagnetic fields. The natural oscillations of dark matter particles in the dark plasma will cause collisions with ordinary particles in a periodic fashion, resulting in the density of the ordinary plasma to increase and decrease cyclically, generating a *pulsating* electromagnetic field and radiating *pulsating* electromagnetic waves.

- Electricity: The displacement of ordinary electrons during ionization generates weak currents and localized electrical fields.

➢ *Visibility of Cold Plasma Envelope*

For an electromagnetic wave from the environment to pass through a plasma body, its plasma frequency must be greater than the frequency of the plasma body.

If the plasma frequency is higher than the ambient light in the plasmasphere, it will reflect ambient light, making the plasma body become like a *reflective mirror* and shine brightly like a metallic object. When the frequency is very high, the brightness will be intense - this would be described as the "arc mode." When the frequency is very moderate, the brightness will be gentle - this would be described as the "glow mode." If it reflects the environment it will act like an invisibility cloak. If it is a plasma envelope around an ovoid (the default shape of a plasma lifeform in Earth's gravity) it will bend the light to produce a distorted ovoid-shaped image of the environment which will be seen to be mysteriously moving from one point to another.

If the plasma frequency is less, the plasma will become like a *refractive lens* and be transparent to the light (in other words, it will disappear). This can be described as the "transparent mode." If the refractive index of the plasma is not one, it will bend the light to produce a distorted ovoid-shaped image of the environment which will be seen to be mysteriously moving from one point to another. Objects seen through the lens may be magnified.

If the plasma frequency is the same as the frequency of the electromagnetic wave, the two frequencies become resonant with each other and the light is absorbed. This results in a transfer of energy from the electromagnetic wave to the plasma body. This is called "resonant absorption." When a material absorbs light, it becomes dark. Hence, the plasma body will become dark and shadowy while absorbing energy from the electromagnetic waves in the environment. This would be described as the "dark mode" of the plasma.

The plasma frequency therefore acts as a gate. When it is raised, the plasma body is opaque and shiny (i.e., in an arc or glow mode) . When it is lowered, it will let the light in and seem to disappear as it becomes transparent (i.e., the transparent mode). When it is in between, i.e., the same frequency as the ambient light, it will be in the dark mode.

When a cold plasma envelope is produced around a dark plasma lifeform (through the dark ionization process), it will only become visible to observers if its density and plasma frequency is higher than the frequency of the ambient light in the ordinary matter sector. The density and frequency of the envelope can be increased by a plasma lifeform simply by ramping up the dark ionization process. Initially, the cold plasma envelope will be transparent; then as the density, plasma frequency, density modulations

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or velocity of the lifeform increases, it will become black and shadowy. Subsequently, when the variables are increased further, it will start to glow and when increased even further, it will start to shine brightly. If it wants to disappear, it just reduces its speed, density and/or plasma frequency, and/or density modulations. In this scenario, it will gradually lose its brightness, become dark and then disappear.

However, even when it disappears from view, it may still be there. Conversely, if the dark plasma lifeform zips away at an accelerated speed (which small plasma lifeforms often do), the cold plasma envelope may be left behind as a plasma cloud. In this case, an apparent UAP or UFO may be sighted but the dark plasma lifeform is actually not there. The MOD study, published in 2005, and discussed below, concluded that most UAP sightings were due to ordinary plasma bodies generated by incompletely burnt-out meteors plunging into the atmosphere during meteor showers. Some of these leftover shells of plasma may be generated by dark plasma lifeforms, not meteors.

The persistence of the visible or detectable ordinary cold plasma envelope around dark plasma lifeforms is also dependent on environmental conditions; it dissipates rapidly at sea level but can linger longer in the more highly ionized atmosphere at higher altitudes. The ordinary cold plasma generated by dark plasma lifeforms from the Dark Earth would generally manifest only momentarily.

When the cold plasma envelope is in arc or glow mode, it will reflect the radio waves from a radar and can be detected. When it is in transparent mode, the radio waves will pass through it, and the radar will not detect it in a direct way. However, if the refractive index of the plasma lens (as discussed above) is less than 1, the radio wave will be refracted at an angle. If there is another object ahead and the radio wave is reflected, it will do so at an angle that will not be the same as when the wave is directly reflected by the object. In the dark mode the radar's radio waves will be absorbed. If there is an object ahead it will not reflect the radio wave. This anomaly would suggest that the radio wave was absorbed by some object lying between the radar station and the object.

- *Kinetic Mixing*

According to theoretical physics, dark matter particles like axions can convert to ordinary photons in strong (not stronger than an MRI machine) and weak but resonant magnetic fields. Dark photons can convert to ordinary photons and back, analogous to the well-studied and observed behavior of neutrino oscillations, in which neutrinos oscillate between different types or flavors of neutrinos. Dark photons and axions may also interact. This opens up another route through what may be called an "axion-dark photon" portal, through which ordinary photons can be produced. These processes are examples of "kinetic mixing." This provides another means (apart from the dark ionization process) for a dark plasma entity to become visible or be detected by instruments without necessarily generating a full envelope of ordinary plasma. This process could account for phenomena captured on film but not seen by the naked eye when taking the image, as the camera sensor slowly accumulates the converted ordinary photons over time.

- *New Yukawa-Type Fundamental Force*

There is both astrophysical evidence, as well as experimental data, which suggests the existence of a new short-ranged attractive fifth force that could mediate between ordinary and dark matter particles. It is attractive to neutrons and electrons over the range of a single atom.

- *Astrophysical Evidence*

Many astrophysicists note that there must be a currently unidentified force that will allow dark matter to interact with ordinary matter other than gravity and the weak nuclear force. Antonio Boveia, a physics professor at Ohio State University (Columbus), searches for dark matter and other new particles and forces with the ATLAS experiment at the Large Hadron Collider in Geneva, Switzerland. He believes that, besides gravity, ordinary and dark matter can interact through dark bosons. (Bosons are force-carrying particles.) He theorized in 2018, "There must be a means for the visible universe and the dark universe to communicate with each other…A force requires a force carrier or boson. The electromagnetic force is carried by the photon, the weak nuclear force by so-called vector bosons, and so on. Interactions between dark matter and normal matter should be no different: They could happen by exchanging dark bosons." Hence, the existence of a dark vector boson was hypothesized by him.

In an article in Astronomy & Astrophysics Letters in 2020, scientists at the Instituto de Astrofísica de Canarias (IAC)/University of La Laguna (ULL) and of the National University of the North-West of the Province of Buenos Aires (Junín, Argentina) have shown that dark matter in galaxies follows a "maximum entropy" distribution. To reach this state, the dark matter would have had to collide with itself, just as gas molecules do, to reach an equilibrium in which its density, pressure, and temperature are related. The equilibrium indicates that the dark matter particles have transferred energy with itself and/or with ordinary matter. However, researchers say they don't know how the dark matter reached this type of equilibrium. "The fact that equilibrium has been reached in such a brief time, compared with the age of the Universe, could be the result of a type of interaction between dark matter and normal matter in addition to gravity," suggests Ignacio Trujillo, an IAC researcher. He says, "The exact nature of this mechanism needs to be explored."

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➢ *Experimental Evidence*

Particle physicist have now stumbled on what could be the particle mediating the fifth force – a vector boson as earlier hypothesized. A particle called the "X17" was proposed by Attila Krasznahorkay and the ATOMKI group in Hungary at the Institute for Nuclear Research at the Hungarian Academy of Sciences. This was after repeated anomalies were observed in nuclear decays which suggested a new boson around 17 megaelectron volts (outside the standard model of particle physics). (A boson is a particle that mediates a fundamental force.) This short-range fifth force is expected to be able to link dark and ordinary matter particles. This force is hypothesized to be an attractive force with respect to neutrons and electrons. The Hungarian researchers published a paper in Physical Review Letters, one of the most prestigious journals in physics.

In 2015–2016, scientists fired protons at lithium-7 atoms, which caused them to briefly form an unstable version of beryllium-8. As this unstable beryllium broke apart, it released pairs of electrons and their antimatter counterparts, positrons. Surprisingly, more of these pairs showed up at a specific angle than expected. This odd pattern hinted that a new, unknown particle, possibly a lightweight boson weighing about 17 MeV, might have briefly existed during the decay. Follow-up experiments in 2019 to 2025 observed similar anomalies in helium-4 and carbon-12 nuclear transitions, reinforcing the hypothesis of a consistent particle mass near 17 MeV. These anomalies were interpreted as the creation and decay of a light boson, named X17.

Jonathan Feng, a professor of physics and astronomy at the University of California at Irvine and his team followed up the Hungarian team's work for years. His research group published a paper on the heels of the Hungarians' 2016 work, laying out a theory to observe what Krasznahorkay's experimental team had seen. Meanwhile, nuclear physicists around the world set to work looking for errors in the Hungarians' work and have come up empty-handed over the past few years. "Some very well-known nuclear physicists have done that exercise," Feng said. The numbers seemed to add up, and no one could find ways their equipment was calibrated incorrectly. The only way to explain X17 was a hitherto undetected "fifth force."

Theoretical work by Feng et al. in 2016 proposed that X17 is a vector boson mediating a new fundamental interaction. It couples weakly to protons but more strongly to neutrons and electrons. This selective coupling avoids constraints from existing experiments and explains the observed anomalies. It is a short-range force: With a mass of about 17 MeV, the force mediated by X17 would have a range of about 10 femtometers, similar to nuclear forces over an approximate range of a single atom. Since X17 interacts weakly with ordinary matter and could couple to dark sector particles, it's a candidate for mediating interactions between dark matter and visible matter. Feng noted, "X17 could be a particle, which connects our visible world with the dark matter." Feng says that the Hungarian team's 2019 experimental results showed that there was only a one-in-a-trillion chance that the results were caused by anything other than the X17 particle, and the new fifth force.

➢ *Implications on Collisions*

Many dark matter experiments rely on collisions between dark matter and ordinary matter particles to cause nuclear recoils that would confirm the existence of the dark matter particles. These are usually WIMP-based dark matter models that rely on the weak force. This assumes that dark matter particles (such as neutralinos and sterile neutrinos) interact with atomic nuclei via the weak force's Z^0 boson exchange. This is a neutral current interaction: no charge is transferred, but momentum is. The result is a nuclear recoil—a tiny "kick" to the nucleus, which can produce ionization. These are not "collisions" in the classical sense, but quantum scattering events with extremely low cross-sections ($\sim 10^{-46}$ cm² or smaller).

If X17 exists and couples to both dark matter and neutrons, it could create a Yukawa-type attractive potential between dark and ordinary matter that would enhance local clustering or scattering cross-sections and enable non-weak interactions in detectors. This would provide an additional new portal between the visible and dark sectors (apart from that provided by the weak force) in facilitating the dark ionization process, as discussed above. This attractive force will make the dark ionization process more efficient. The interactions will still be rare in the laboratory because the ambient dark matter density is extremely low. However, plasma lifeforms that reduce their volume prior to the dark ionization process will be many orders of magnitude denser than in the laboratory environment. The collision rates between ordinary and dark matter particles, compared to in a laboratory, would therefore be much higher.

➢ *Implications on Coupling with Ordinary Matter*

This fifth force will allow dense ordinary matter bodies to attract layers of different dark matter particles (from different sectors and at different energy levels) that accumulate over time in the shape of the ordinary matter bodies or objects. Conversely, the fifth force will enable dark plasma bodies to attract ordinary matter particles at close ranges. For e.g., we could expect compact and dense dark plasma lifeforms to attract ordinary matter particles when they in close proximity. The X17 boson, mediating the fifth force, acts like a short-range "plasma glue," binding dark plasma to ordinary baryonic structures without electromagnetic coupling.

Dark plasma bodies in Dark Earths are extremely tenuous compared to ordinary matter bodies. Hence, the accumulation of light ordinary matter particles around the dark plasma body would be expected to be tenuous. These are therefore expected to produce only a thin veneer of ordinary matter particles over the dark plasma lifeform. The dark plasma lifeform, or parts of its body, may therefore become visible to ordinary human sight momentarily before disappearing, through the reflection of ordinary photons.

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This process is not the primary process through which these lifeforms become momentarily visible. The primary process is still the dark ionization process.

This veneer of ordinary matter particles will allow the dark plasma lifeform to create sensations of touch when it contacts a human body. It can also generate low level sounds when it impacts hard surfaces. The veneer may also reflect some ordinary light and cause faint shadows to be cast.

- *Other Interactions*

There are other more exotic interactions allowed under a variety of theoretical models in particle physics. These will not be discussed as they go beyond the scope of this paper.