Article 4:Entropy, Superconductivity, and Monopoles

Hopefully, my last article is sufficiently clear enough that I can now reference Alpha Space without having to give a full description. Therefore, I should be able to move on to the question of understanding how Alpha Space intersect and does not intersect with reality. I believe magnetic monopoles fit the bill of deciding when a region of Alpha Space can map into a region of real space. One reason, as talked about early is that as monopoles do not simply decay with time as many fundamental particles do. This opens the possibility that we can understand that monopoles preserve the mapping to Alpha Space once they are generated. A second reason is that since monopoles do not have an upper bound on the amount of energy they can contain; then we can have monopoles that map to large portions of spacetime which have large amounts of energy in them. To recap a point made earlier but also extend it, we can talk about Sam the human as having his own monopole which maps different regions of Alpha Space to his physically real space. This mapping is then what gives Sam the human access to the esoteric ideas of Alpha Space. In my mind, this is how we understand how the brain “knows” how to grow as well as store information. As the monopole ties in an area in Alpha Space it will induce magnetic fields into the relevant region in real space which then produces observable physical outcomes that are connect to esoteric ideals. This extends to understanding mental illness as a person having a monopole which quite literally maps to maddening regions of Alpha Space. This provides a very clear avenue to then treat mental illness as the problem becomes “How do we change a person’s monopole to not map into these dangerous areas?”. This means that a clear theorical understanding of how monopoles are produced and change will provide clear guidance on tackling otherwise intractable biological, physical, and psychological issues. I will need to be clear that while monopoles are stable as stated in current physical theory, to make sense of the logical extension I am doing to monopoles as well as the problems I want to them solve is that there is a hierarchy amongst monopoles about which monopoles higher up on the hierarchy can then eat lower tier monopoles. For those more familiar with particle physics, the entire monopole field is very stable as well as its deformations encoded by a monopole but those deformations can get absorbed by other deformations. E.g. monopoles can eat monopoles. To describe what I mean is that, based on the idea of Alpha Space, we can conclude that the monopoles which connect the platonic, basic mathematical ideals of GR(General Relativity) to reality are extremely high on

the hierarchy and they force other monopoles to either literally center on them or even get eaten. To explain what I mean using empirically examples, the monopole which corresponds to the specific facets of GR which describe the Milkey Way Galaxy forces any monopoles produced in it to then rotate around the center of the Mikey Way. I extend the eating argument to where when one thinks about the monopole associated with a black hole, any other points of matter that enter the even horizon of the black hole get absorbed into that relevant monopole. Extending this idea even further, I postulate that one of the highest ranked monopoles is the monopole which corresponds to the basic Euclidean plane. If this monopole has its ways, it would eventually devour all the other monopoles to where real space only corresponded to the part of Alpha Space concerning the basic Euclidean plane; all other Alpha Space mapping would cease to exist. I refer to this outcome as Einstein's Nightmare. The reason why I do is because when Einstein was formulating GR in the early 1900s he saw how gravity, when extending throughout all of the cosmos, would cause everything to collapse together into a big crunch. Therefore, he added a cosmological constant to his equations balance out the force of gravity and create a static universe. As it turns out, when physicists later measure the cosmological constant it is actually stronger than the force of gravity. Instead of gravity moving things together, things are moving apart due to cosmological constant. This is often referred to as Dark Energy as the fact that galaxies are moving faster away the farther away they are. This implies an amount of energy density that we otherwise cannot observe. Note that Dark Energy does not come from the same physical observations as Dark Matter. The are both "Dark" in current physics because they are fundamental not well known in physics.

Going back to monopole hierarchy, it is a fact that in GR, locally, is Euclidean and that only in extremely physical circumstances are the predictions/effects of GR observed. They include the perihelion of mercury, which in layman's terms is a very slight deviation of mercuries orbit which is not predicted in Newtonian mechanics, black holes, and all the facets of special relativity. Most of the effects of special relativity do not make a difference to physical phenomenon unless the system or thing under question is close to the speed of light. The simple reason we do not observe the strangeness of time dilation and length contraction in our everyday life is that we are simply moving much slower than the speed of light.

I believe that without the effect of Dark Energy and all its meaning, reality would end up becoming simply Euclidean because of the dominance of Euclidean

monopole effecting stealing the connections of all the other monopoles to Alpha and making all those connections just connect to the Euclidean part of Alpha Space. The effect of this Euclidean monopole dominance is that the universe would freeze. The reason being is that Entropy, which is defined as the relevant phase space i.e. a region in Alpha Space, would saturate to the point where they were not be more physical processes which are entropically viable e.g. no more heat transfer. If this is true then Dark energy, and its meaning, is a process which counterbalances the effect of the Euclidean monopole and satisfies the Second Law of Thermodynamics through mapping additional regions of Alpha Space to provide the additional phase space which then allow the “empty” phase spaces for which physical action can then occur. This thinking leads us to a view of reality where we have a life and death process going on. Death in this narrative is when a part of physical reality that becomes entropically saturated and life is then when new parts of Alpha Space are tied in to then increase the available entropy of a physical system.

I now need to explain what the meaning of “entropically saturated”. The classic example to explain entropy is a gas in a box. The gas has become “entropically saturated” when it has reached the walls of the box and it has no more physical space to expand into. If the gas is in a state where it has lots of room to expand into the box then it has a lot of freely available entropy as it will expand throughout the box until it reaches it edges. One can compress the gas into a corner of the box to then restore its freely available entropy. Second Law would still be satisfied with fact that the mechanism which is enacting the entropy restoration to the gas is itself paying an “entropic cost” higher than the restoration of the gas. Therefore, even though the entropy for the gas is decreasing, the entropy of the mechanism is increasing to such an extent that when you add the two systems together the net entropy is increasing thus satisfying the second law.

The reason entropy was invented as concept for understand physical actions is that entropy directly refers to how and which materials will heat up or cool down. The grand point of entropy is that energy will spread out to “maximize” the corresponding phase space. I must use quotes above maximize because as discussed in the story section, different physical materials will have different entropic directions which they will maximize. In other words, a human can be entranced by a good movie and find it entropically favorable to then watch it for two 2 hours but a rock never will. In general sense that material which has

maximize its entropy, e.g. there is no freely available phase space to travel into, then it will be considered inert or cold. For the none scientists, temperature refers to the average kinetic energy of a system that is freely available to be absorbed. However, even if the average kinetic energy of the most common particle in a system is 4000 kelvin, if the particle cannot be absorbed by matter in the system then “temperature” becomes a less useful concept. To cool down a system in this sense meaning saturating its relevant phase space where it can only longer undergo an exchange of energy/momenta.

Now that we have discussed entropy, we can move on to talk about superconductivity, its deep relationship with magnetism, entropy, and how the phenomenon of superconductivity can provide an avenue to tie together but also experimentally test the theorical framework I am proposing. The hope is that by developing a better understanding of superconductivity we will be able to develop devices that can detect monopoles and thus detect mapping to Alpha Space. Thereby, we can objectively test if an AI machine has a well-founded understanding of good and rest assured it is super aligned with its goals.

Superconductivity was first observed in the early 1900s when liquid mercury was cooled down to where its electric resistivity went to literally 0. The temperature at which a material transitions to superconductivity is known as the critical temperature. Later on in 1933 the Meisner effect was articulated where a superconductor not only has no resistivity but also expels all internal magnetic fields. Note that this phenomena means, and one can find numerous videos on YouTube showing this, that if one puts a superconducting material atop a magnet, the superconductor will simply float and stay still due to it repelling the magnetic field lines coming from the magnet underneath the superconductor.

Now, we need to understand that magnetic monopoles are defined, as one of their basic definitions, is as a point charge where magnetic field lines originate from. In the same way protons and electrons and have positive and negative electric fields lines originating from their location, a magnetic monopole will have field lines originating from where it is located in space time. One of the great mysteries of magnetism is that magnets always have a north and south end and no matter one many times one cuts a magnetic material it will always create a new magnetic with a north and south end. In essence, one cannot isolate a “south” end of a magnetic to then find where the magnetic monopole is. In contrast to electrons and protons, magnetic monopoles have never been reliably observed. In fact, monopoles are like the “Big Foot” of particle physics since, as

described before, they are very reliably predicted in the mathematics of current theory but no one has been able to find any consistent experiments producing monopoles. There was one possible measurement of a monopole in the 1980s that used a superconducting coil to then see if any monopoles passed through the coil. The basic idea is that the magnetic field from the monopole, when passing through the coil, would cause the coil to resist the monopole's field and create an electric current that then could be measured. However, even though many such coils around the planet were created to see if a monopole randomly ran through one, there was only one occurrence in a lab at Standford that recorded the expected data. This becomes stranger as they could never generate a false positive to then describe the signal they did observe. Since no good alternative attribution exists, scientists had to default to this idea of inflation to explain the lack of finding many monopoles. In this inflation argument, size of the universe is increased with enough "empty space" to then dilute the amount of monopole per unit of spacetime such that it can explain the lack of observation. I find this to be a horrible answer as it is simply a "well the dog ate all the homework" but we must assume the existence of the dog to explain the lack of homework. Furthermore, it leads to the idea that the one measurement was correct just very, very rare. I find this reasoning to be very tortured and pseudo-scientific as it relies on fundamental devotion to the inflation ideal to then make sense of reality.

Given how I have been using the monopole, and explaining how its physical function with Alpha Space, I believe there are monopole all around us but current physics is using the wrong theory to look for them. In fact, there is a short paper by John Preskill in 1979 explaining how if monopoles were generated using traditional notions of particle generation i.e. at a given temperature A the conditions are then sufficient to generate a particle with mass B then many monopoles should have been produced during the extremely high temperature of the earlier universe soon after the Big Bang. Furthermore, since monopoles are temporally stable, those monopoles from the earlier universe should still be with us today. I believe this logic is correct but, and it even is mentioned in the paper that the logic used excludes the nature of gravity at the quantum scale from consideration. Since monopoles and quantum theories of gravity are fundamentally connected as t'Hooft showed it should not come as a surprise that none have been observed since physicists for decades have been unable to create a theory of quantum gravity they can verify. I tackle the issue of

monopoles from a radically different conceptual perspective where I can make proposals of data collection and empirical verification that most physicists would simply not think of.

If a physicist has a good physical idea, and they want to pursue it, they must find or invent mathematics justifying their idea. I take a different approach as mathematics is simply a useful tool to communicate meaning. Therefore, it is fine to propose a coherent, intellectually rigorous theory which ties together physical phenomena which must be tied together. Furthermore, and I have read the paper talking about these mathematics is that the theory I am proposing will have quite complex mathematics behind it. The issue then will turn to which set of mathematics best matches to the fundamental meaning of the theory I am arguing for. This issue if best decided by data.

To answer the earlier conundrum of monopoles in the earlier universe I believe they were there and what they did is seed the points of spacetime for where planets, stars, galaxies, and black holes would congregate. In essence, I believe at every planet, asteroid, star and galaxy there are monopoles with the wide-ranging masses as predicted in the paper. It is simply that the idea that the monopole would hold energy separately from baryonic matter is the mistake. Again, monopoles are the financier particles, a way thinking about a particle that no particle physicists would do.

Going back to how to measure monopoles, I do believe the Caberra measurement at Standford did detect a monopole but it was also something else, something very rare that would be hard to normally detect. As talked about earlier, if we think of each monopole as being the “ground zero” location of what a planet develops, we might ask if every monopole will necessary congregate matter around it. In effect, are there monopoles that did not trap any matter within its field lines? If there are these “naked” monopoles, then they could be traveling around without having settled into typical position of orbiting a star which orbits a galactic center. These monopoles would be very, very rare in the cosmos. Therefore, Caberra could have caught one of this “naked” monopoles going through his detector. Here we are able to provide a coherent attribution to the Caberra measurement that current theory cannot.

In a prior paragraph we were implicitly talking about very large monopole that could hold the entire mass of a planet. When we talk about smaller monopoles, this is where things get interesting. Remember the cosmological constant earlier

and how it is generating monopoles to create enough entropy to balance out the monopole eating of the Euclidian monopole? This process is happening across spacetime constantly. Furthermore, since there are monopoles everywhere, for a superconductor to be in an eigenstate such that the stronger monopoles do not perturb it out of its superconducting state, it must reach an organization where it satisfies the field lines originating from these monopoles. To fuller satisfy these field lines and conduct electricity perfecting without the material itself absorbing the material needs this entropic phase space to be maxed out. In effect, when I talked about the universe become frozen due to the Euclidean monopole devouring everything, I really meant turning everything into a superconducting state of matter. To explain what 0 resistivity means is that when a current goes through the material there is no loss of energy in the current. In copper wire there is some intrinsic resistance, i.e. there is an entropic favorability pathway where some of the energy in the current to go into the wire rather than just passing through. This then the wire heats up as it absorbs the energy from the current. Superconductor do not absorb energy from the current thus they do not heat up from the current. However, since the Second Law of Thermodynamics exists which is attaching additional parts of Alpha Space to real space as encapsulated in the cosmological constant, then each superconductor will be perturbed from the field lines of the newly generated monopoles, move out of an eigenstate, have their entropy increase, and then no longer be superconductors. In this theorical paradigm, every superconductor will need a cooling mechanism to indefinitely maintain its superconducting state. What a cooling mechanism means in this case is that the newly generated monopoles are absorbed into the material which is cooling the superconductor instead of the superconducting material doing it. Note that here the definition of the Meisner effect is being fully maintained as, again, one of the basic definition of a superconductor is the repulsion of magnetic fields. Therefore, as new monopoles and their magnetic fields are created this cooling mechanism is necessary to fulfill the definition of the Meisner effect.

I should note how this theorical frame work ties with the current theorical frame around superconductors. Note that explaining superconducting in high temperature superconductor, often called non-conventional superconductors, is one that is not well explained in current theory. However, for the “conventional” superconductor i.e. the materials where the properties of superconductivity where first observed, the theory explaining is called BCS. Jorge Hirsch at UCSD

has done wonderful work to explain the issues with BCS in explaining non-conventional superconductors. However, where my framework and BCS agree is in the basic assumption of what are called Cooper-pairs. Cooper-pairs are electrons whose spins have become correlated in such a way to cancel out and the normal resistivity electron create through their spins in materials then goes away. Now I must explain what spin is.

Electron spin is one of the concepts in physics which can be notorious to explain as it is about angular momentum when the classical definition of angular momentum fails. It relies on some very esoteric mathematics, which go beyond the purpose of this article to explain. However, I believe that the mathematics are undercomplete, especially as the meaning of spin will need to be revised once it is widely understood how we live in a universe filled with monopoles. The good news is that I can explain spin with its empirical definition. The empirical definition of spin comes from a device called a Stern-Gerlach apparatus, SG for short. A SG is two magnetic plates oppositive from each other but constructed with a special geometry as to have an inhomogeneous magnetic field between the two plates. Then one sends a particle to be deflected by the magnetic field of the two plates and one has a detector where the material then lands on where a person can then read the results of how the particle was deflected by the two plates. The first particles used were silver atoms heated up to then go through the apparatus. Initially, when the experiment was conceived, scientists expected that for each small change in the magnetic field between the plates there would be a small change in the location where the silver atom would hit the detector. Instead, what they found was that, even though the magnetic field is inhomogeneous, is that the silver atoms either deflected up h/2 or down h/2 the axis of the magnetic field. In effect, in expecting a spectrum of outcomes, the experiment only produced two outcomes. Even if one changes the axis of the SG, say initially one measured along the x-axis and then change to the y-axis with a new set of atoms, one will get the same result. The main point I want to draw here is the presence of an inhomogeneous magnetic field playing a key role. Since my frame work relies on the presence of many monopoles which would naturally produce inhomogeneous magnetic fields everywhere then there should be electron spin everywhere. However, as per the Misner effect, when the magnetic fields are expelled or “zeroed out” of a material then the there is no inhomogeneous magnetic field to produce electron spin. Therefore, I fully agree

with BCS about how electron spin does not exist within a superconducting region.

Before I can put this all together, I need to explain one more piece which is the vacuum energy e.g. the cosmological constant. This is another one of the deepest mysteries of modern physics and has often been called “the worst prediction in modern physics”. This comes about because there are two ways to experimentally measure the same thing but from two different theorical frameworks. In GR, one can calculate the vacuum energy but figuring out how much energy density is needed to maintain a flat universe, what is often called the critical density, and for now let us call that result A. One can then use the tenets of particle physics and calculate the energy of the so-called small unit of distance called the Planck Length and get result B. When one does B/A then one finds that the prediction of particles physics is 10^120 larger than the one found through the GR method. The lesson of this story is that there exist massive disagreements between these frameworks about how much energy should exist in effectively “empty” space (note that I put “empty” in quotation as given the framework I am arguing for, “empty space” should be defined as superconducting region of spacetime). In addition, particle physics has a different but similar issue in that relies on the addition of waves from a continuum to then calculate accurate probabilities. The issue here is the continuum argument since it allows for an infinite number of small waves. Where each wave, even if it is very small and can only carry an extremely small amount of energy, there are still an infinite number of them so it still results in an infinite amount of energy-density. Since energy is mass and mass then dictate gravity, we should then black holes everywhere. As the physicist Sean Carol has expressed, one can simply assume a cut off where waves below X are considered not real and thus do not generate black holes everywhere. However, he notes how this is an ad-hoc band-aid solution without a good theorical basis.

The beauty of my framework is that since we can understand spacetime and entropy i.e. Alpha Space being tied to monopoles we can then get rid of this theorical artifact through understand that all these smaller waves are attached to regions of Alpha Space whose monopoles are impossible to generate. In effect, the demands of the magnetic monopole field shield us from all of the theoretical infinite energy of Alpha Space. This is a good thing. One of the things I found unexpectedly beautiful about this framework is that in typical physics experiments and processes, especially fusion and fission reactions, one uses

magnetic fields to shield the outside environment from the reaction occurring. I have found a conceptual framework which effectively boosts this idea to cover the entire universe.

Now to tie all these things together. As monopoles are created, they have additional attachments to Alpha Space which increases the entropy of a system. Depending on which parts of Alpha Space the monopoles attach to, the directions in which the entropy can increase can very massively i.e. the meaning behind them can change. When then we try to describe why a person does something, and it well known by us humans they do it from say some event happened that angered a person, we can consider how a monopole was created in the person's brain that connects to the anger part of Alpha Space. One way to understand how monopoles are generated is to understand how superconductors heat up since the heating of superconductors corresponds to the generation of additional monopoles to then perturb the superconducting material out of an eigenstate. If different types of superconductors are only perturbed by monopoles, if we have very small, perhaps temporary superconductors in the brain which will only be perturbed by monopoles attached the anger part of Alpha Space we have a full logical loop to understand what is going on physically without having to discount observed behavior as coming from "illusory" or fundamentally mysterious things. For AI, this means that if we can determine which monopole attaches to the platonic ideas of good, build a detector for it, we could then go to the hardware of the AI system and scan it with the detector and see if we find a "good" monopole there.

Addendum- If the prior parts of the article were not clear enough for explaining entropy, I have added an interesting example in the paragraph below. Entropy is powerful logical concept to use for the simple reason is that if a physical exchange requires more entropy than is available one can then conclude it is not possible for that physical exchange or action to occur. Entropy allows us to determine which possibilities we can exclude a being wrong.

Now I believe there is a very basic and fundamental relationship between storytelling and entropy. Good story are ones that keep people interest and are not boring. Boring stories are ones without any conflict. For a story to keep a person's interest and attention, which is directly tied to physical essences in the body i.e. it takes energy to maintain attention, when from an entropy perspective, for a person to watch/read a story they need to be entropically favored to then spend the time to read. Even in fundamental human activities,

like reading make believe stories, the Second Law of thermodynamics is in effect and needs to be respect. Stories that keep people interest are ones where people do not know details of it and/or have elements of mystery to. In effect, stories where one cannot predict the end are more likely to grab maintain a person's attention. In entropy terms, a story which is entropically favored to a person is one where the story will guide the person into new regions of phase e.g. Alpha Space. A story which is unlikely to grab and maintain a person's attention is one that already maps to a phase space a person's mind has mapped no new phase space to spread into. In effect, the story is predictable for the person in question. I am aware that I am making large generalizations here as some people like some particular stories more than others and some people can watch the same show hundreds of times and never get bored by it. I would still answer those questions that same way though with particular reference to each person's brain. In effect, those stories, or things which a person never tires of correspond to regions of Alpha Space which will never saturate e.g. are always open. That would be because there exist particularities in the persons brain anatomy, structure, monopole that never saturates in the relevant phase space that is different from the vast majority of people. In the case of addictive materials, the same principle would apply where addictive material always provides entropically favorable interactions with the brain. I should note there is the possibility that addictive materials could correspond to regions of Alpha Space that contain the platonic essence of obsession. The greater point here is that as good stories are ones with conflict in them so does that principle apply to the universe as a hole when its physics are viewed through an entropy lens. These ideas will be important later once we try to apply these ideas of entropy to the brain.