# Kerr-Newman, Jung, and the Modified Cosmological Model

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Where physical theory normally seeks to describe an objective natural world, the modified cosmological model (MCM) seeks to describe an observer's interaction with that world. Qualitative similarities between the psychological observer, the MCM, and the Kerr-Newman black hole are presented. We describe some minimal modifications to previously proposed processes in the MCM. Inflation, large-scale CMB fluctuations and the free energy device are discussed.

The physical basis of the Modified Cosmological Model (MCM) is that momentum is always conserved, everywhere, and its mathematical basis is the sphere theorem, previously known as the Poincaré conjecture [1, 2]. The MCM assumes the golden ratio $\Phi$ is an integral part of the theory and that time is governed by the following equation [2].

$$\hat{M}^3|\psi;x^\mu\rangle\hat{\pi} = |\psi;x^\mu_+\rangle\hat{\Phi} + |\psi;x^\mu_-\rangle\hat{i} \tag{1}$$

In reference [3] we showed equation (1) is Einstein's equation for general relativity and it has largely been ignored. On the other hand, the inclusion of $\Phi$ has been attacked as so unwarranted and arbitrary that it invalidates the entire study. However, the golden ratio has been observed directly in quantum magnetism [4] and the entire field of non-commutative geometry – which physics widely respects as a good idea – revolves around a dimensional function governed by the golden ratio [5]. Further, Davies has shown $\Phi$ is some relevant quantity in the thermodynamics of Kerr-Newman black holes [6] and that connection motivates the discussion here.

Also in support of the MCM, its proposed spin mechanism has a maximum integer value of 2. Spin-3 and larger would involve more than one moment of time. Expansion of the spin-0 state space $H$ would involve $t^\star_{i\pm1}$ and that seems intuitively not right. The observer may only observe one moment at a time $t^\star_i$. $H$ is expanded to accommodate spin-2 as follows.

$$H \to H \otimes t^+_{i-1} \otimes t^-_i \otimes t^\star_i \otimes t^+_i \otimes t^-_{i+1} \tag{2}$$

Spin-2 is allowed in the prevailing quantum paradigm but no spin-2 particles have been observed. It may be that spin-2 is forbidden similarly to spin-3 and greater because it involves $t^\pm_{i\mp1}$. In fact, the derivation of MCM gravity as a property of the algebra [3] (alternate derivation given below) may indicate that gravity is not a particulate phenomenon and that spin-2 particles do not exist.

Modern physical theory seeks to describe Nature as existing independent of the observer. However, it is also valid to take the position that Nature is something that occurs solely in the mind of an observer. Hence, the MCM seeks to quantify what the observer does rather than what an objective natural world does. To introduce the first of a few qualitative isomorphisms along those lines, consider figure 1 depicting the prominent features of the Kerr-Newman topology and Jung's psychological model. The observer's mind resides inside the inner horizon and the ring singularity shall represent the subconscience.

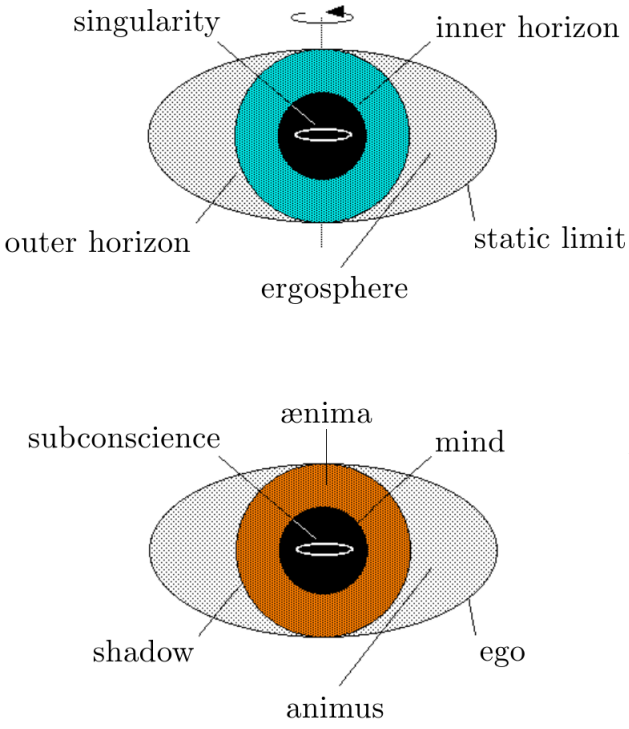


FIG. 1: Above is the charged, rotating Kerr-Newman black hole system. Below is the male Jungian psychological system. The female system is the same with only the position of the ænima and animus reversed.

MCM "singularities" are not strictly singular. An infinite or undefined chronological value at a particular point indicates symplex and motivates the use of finite chirological values there [7]. Therefore, let the Kerr-Newman ring singularity be $\delta_-$-valued [7] so the subconscious mind

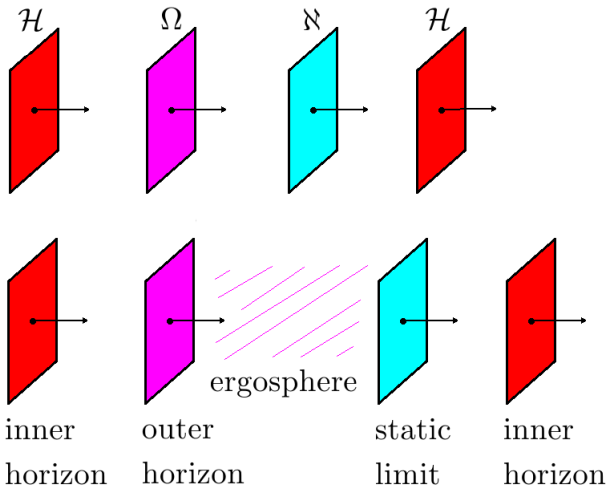


FIG. 2: Qualitative isomorphism between MCM topology and the topology of a Kerr-Newman black hole.

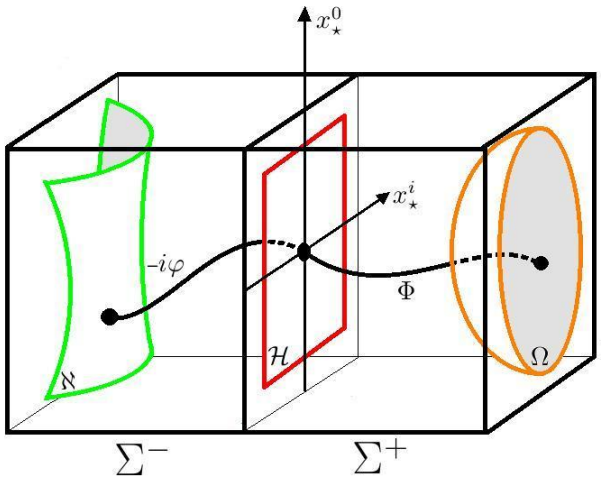


FIG. 3: Partial MCM unit cell.

is not precisely in the present moment with the observer. Rather it is defined on one or more lower levels of ℵ. Likewise, we will assign a $\delta_+$ value to the static limit. As the proper time reaches infinity there, we have reason to assign symplex and switch from ordinary chronological evolution to chirological evolution.

The Schwarzschild Planck star system [8] uses this same topology. Rovelli and Vidotto have proposed that the radius of the Planck star is the boundary beyond which general relativity breaks down due to quantum gravitational effects. We have proposed that general relativity does not strictly hold within the Kerr-Newman inner horizon because it is a psychological space outside of normal spacetime. Specifically, the Planck star is described as a door to the distant future [8] and that hints at the possibility of a stronger correspondence than is mentioned here.

Figure 2 illustrates general similitude between the MCM and Kerr-Newman systems. Of course, the MCM is periodic but the Kerr-Newman black hole system is not. Figure 2 imposes periodicity and we attribute that to the embedding of the present moment in a higher dimensional bulk structure. As the singularity is $\delta_-$-valued, the static limit is $\delta_+$-valued and is a gateway to higher levels of ℵ. The inner horizon on the right should be understood to belong to a Kerr-Newman system at the next higher level of ℵ. (Beyond periodicity, another difference is that Kerr-Newman is a $\Lambda = 0$ solution but $\Lambda \neq 0$ is allowed in the MCM and we apply hand-waving to resolve that discrepancy.) If the moments defined on the left and right $\mathcal{H}$'s are labeled $i$ and $i+1$ respectively, the proper time on the left inner horizon is $t_i$ and it is $t_{i+1}$ on the right. From $t_{i+1}$ it is possible to reconstruct the Kerr-Newman geometry of $t_i$ by integrating over the $\delta_-$-valued ring singularity in the $t_{i+1}$ system. Therefore, it is possible to integrate over singularities recursively to recover information stored in any lower level of ℵ.

Any given present moment resides in a higher level of ℵ than its past so the Kerr-Newman systems describing all previous moments are hidden behind the inner horizon corresponding to the present. This implies the information regarding earlier dynamics is preserved as a history inside the observer's mind.

Although the observer's physical body is not point-like, it is normal to describe the location of the observer as a point. In a quantum theory, some point on the Riemann sphere is selected for the observer and nothing else is defined there. Nothing can happen precisely at her location; everything must happen "out there" somewhere away from the observer. This implies that in addition to the Riemann sphere's normal polar null point, another point, the location of the observer, is removed. This guarantees a smooth connection between the past and present. They are each same-dimensional manifolds with 2-spherical symmetries [3] and two points not involved in any dynamics.

The past light cone is a timeless 3D slice of our 4D physical universe. Where the present is a surface in the Kerr-Newman picture (the inner horizon), the physical universe must be a volume so let it be defined between the inner and outer horizons. The vector space of future states Ω lives on a 3-sphere so the outer horizon is not a good place to define it because it is a 2-sphere. Instead, let Ω be defined on the union of the outer horizon and the ergosphere.

In each passing moment of time, the observer releases a connection to the past ℵ, pivots on a connection to the present $\mathcal{H}$, and then connects to the future Ω. Human experience indicates that Alice has some freedom to pick which point in Ω she will connect with. Obviously she cannot will any conceivable future into existence (or can

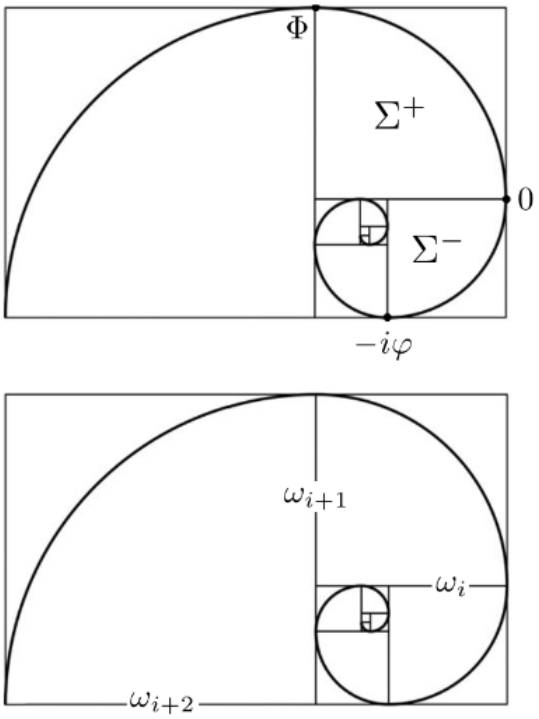


FIG. 4: The MCM unit cell is embedded in a bulk spiral structure.

she?) so her choice must be constrained by a future light cone of sorts. Nevertheless, Alice does have some freedom to pick a point $p$ in $\Omega$.

In previous attempts to formulate a coherent idea for describing temporal evolution in the MCM, we proposed that the observer pivots from $\mathcal{H}$ to $\Omega$ to $\aleph$ and back to $\mathcal{H}$ [3]. However, attempts to derive a rigorous geometry for the process (figure 3) did not include a description of how $\Omega$ is connected to $\aleph$ [9]. In the idea proposed here, the future becomes the past when Alice selects a point $p$ in $\Omega$ and thereby defines a 2-spherical section on which the future's past vector space will be defined.

Referring to figure 4, consider the process when there is a pivot around $\Omega$ rather than a reduction within it. Let $\mathcal{H}$ be defined on the cell wall labeled $\omega_i$ and $\Omega$ on $\omega_{i+1}$. After three distinct pivots, the next moment will take place at $\omega_{i+2}$ which seems intuitively not right. However, the new process proposed here is a possible resolution. From $\omega_i$, let Alice pivot about some point $p$ along the spiral segment that lies within $\Sigma^+$. She comes into the present moment at $\omega_i$ by releasing her connection to $\aleph$ in $\Sigma^-$. She pivots about $\omega_i$ and connects to $p$ in $\Sigma^+$. Dimensional reduction occurs allowing us to define a new $\aleph$. Then Alice pivots about the new $\aleph$ and reconnects to $\mathcal{H}$ on the cell wall labeled $\omega_{i+1}$. At that point we label $\Sigma^+$ as $\Sigma^-$ and the process repeats. The three-fold process [3] is condensed to a single cell and seems to be in good order.

Also consider that Alice does not strictly move on one spiral, but rather between two [7]. When she selects $p$, she pivots onto an orthogonal spiral where the discrete grid system passes directly through $p$. This reorientation can be defined as the process by which the future becomes the past. Further, the reestablishment of the grid system at $p$ can be taken as a unitarity preserving boundary condition.

This final process in which the future becomes the past is something that has not been discussed previously. For this, the sphere theorem and its associated methods of Ricci flow are useful. Figure 5 shows the process by which a sphere can be turned inside out. It is exactly by this process that a 5D open de Sitter manifold $\Sigma^+$ smoothly becomes a 5D closed anti-de Sitter manifold $\Sigma^-$. (Recall the past and future are surfaces of constant $\xi^4$ is dS space and AdS space respectively [9].) Due to the azimuthal symmetry of the system, we must assume that the eight-fold bifurcation in figure 5 is not a unique map. If it is possible to invert the sphere through six bifurcation points (as would be intuitively suggested by the structure of the MCM [7]) we arrive at a ready explanation for the lack of any large-scale CMB fluctuations. The space outside the sphere may have fluctuations as large as $2\pi$ but the Ricci flow essentially pushes them through a six-holed colander giving a maximum possible scale of fluctuations at $2\pi/6 = \pi/3$.

We have shown how Alice's $t_\star$ worldline can navigate the quantum spiral grid network and Ricci flow allows us to bring the environment along with her. In the transition process where the spherical $\Sigma^+$ becomes a hyperbolic $\Sigma^-$ there must be some inflection point that marks the halfway point in the transition. It will be at this point that $t_\star$ forms a vertex with $t_+$ and $t_-$. In keeping with the MCM's founding principles [1, 2] we propose $t_+$ and $t_-$ intersect $t_\star$ as depicted in figure 6.

There is a symmetry condition that the projective null spaces of the twistor representations of the $t_+$ and $t_-$ universes are the same. The $t_\star$ worldline passes through that null space. The intersection takes place at the static limit (a symplectic point) so here we have a mechanism by which the information current [7] can interact with the physical universe from beyond the outer horizon. Alice doesn't know happens to $t_+$ and $t_-$ away from the vertex so they can pick up information there and transmit it onto her worldline at the intersection. Asymmetry between $t_+$ and $t_-$ [7] breaks the symmetry of figure 5 and prohibits the large-scale fluctuations.

In reference [9] it was shown that $i\Phi^2$ is a natural part of the geometry and is reasonably included in the definition of $G_{\mu\nu}$. In reference [7] $\Phi^2$ is defined as the identity in G-space where the observer connects two spirals. This definition implies that the unit vector associated with the future should be $\hat{\Phi}$ rather than $\hat{\varphi}$. The observer is pivoting from one spiral to the next which implies a succession of $\Phi$ terms and nowhere is $\varphi$ implied. In fact, the origi-

nal selection of $\hat{\varphi}$ rather than $\hat{\Phi}$ was merely to highlight its aesthetic likeness to $\hat{\pi}$ in $\mathbb{C}^3$. When $\hat{\Phi}$ is used, the derivation of general relativity results as follows [3].

$$\begin{aligned} \hat{M}^3|\psi\rangle\hat{\pi} &= i\pi\Phi^4\,|\psi\rangle\hat{\pi} \\ &= i\pi\Phi^3\,|\psi\rangle\hat{\pi} + i\pi\Phi^2\,|\psi\rangle\hat{\pi} \\ &= i\pi^2\Phi^2\,|\psi\rangle\hat{\Phi} + \pi^2\Phi^2\,|\psi\rangle\hat{i} \end{aligned} \tag{3}$$

$$\hat{M} := \partial_t \to \omega = 2\pi f \tag{4}$$

$$\begin{aligned} 8\pi^3 f^3|\psi\rangle\hat{\pi} &= i\pi^2\Phi^2\,|\psi\rangle\hat{\Phi} + \pi^2\Phi^2\,|\psi\rangle\hat{i} \\ 8\pi f^3|\psi\rangle\hat{\pi} &= i\Phi^2\,|\psi\rangle\hat{\varphi} + \Phi^2|\psi\rangle\hat{i} \\ 8\pi f^3\,\psi(x^\mu) &= i\Phi^2\,\psi(x^\mu_+) + \Phi^2\psi(x^\mu_-) \end{aligned} \tag{5}$$

$$\begin{aligned} f^3\,\psi(x^\mu) &\mapsto T_{\mu\nu} \\ i\Phi^2\,\psi(x^\mu_+) &\mapsto G_{\mu\nu} \\ \Phi^2\psi(x^\mu_-) &\mapsto g_{\mu\nu}\Lambda \end{aligned} \tag{6}$$

$$8\pi T_{\mu\nu} = G_{\mu\nu} + g_{\mu\nu}\Lambda \tag{7}$$

Written this way, with $\Phi^2$ appearing in both terms on the right hand side it is possible to factor out $\Phi^2$ and define the quantity on the right hand side as a single complex-valued quantity. General relativity can be interpreted as the relationship between matter-energy in spacetime and curvature-$\Lambda$ in G-space.

In conclusion, Alice's freedom to choose a point in $\Sigma^+$ directly implies a multiverse structure. For each of the uncountably infinite points on the $\Sigma^+$ spiral segment, there is an orthogonal spiral whose grid contains that point. Infinite spirals imply infinite universes.

Possible B-modes in the CMB may be evidence for an eternal inflation model and an associated multiverse. Consider how that may describe the MCM system. Let the flow of time occur when consciousness in the present expands into a vacuum. Time moves forward because the Fibonacci cell in the forward time direction is larger than the other one and thermodynamics dictates that energy densities will tend to decrease. What appears to be static in the present is truly comoving/co-inflating with the observer as she moves from one grid point to the next. This process must be governed by some non-equilibrium statistical mechanics in greater than four dimensions. The effect of such a hyper-dimensional diffusion may be exactly what is considered inflation in the 4D universe. The observer rides some inflationary wavefront in the present moment and observes a post-inflationary universe on her

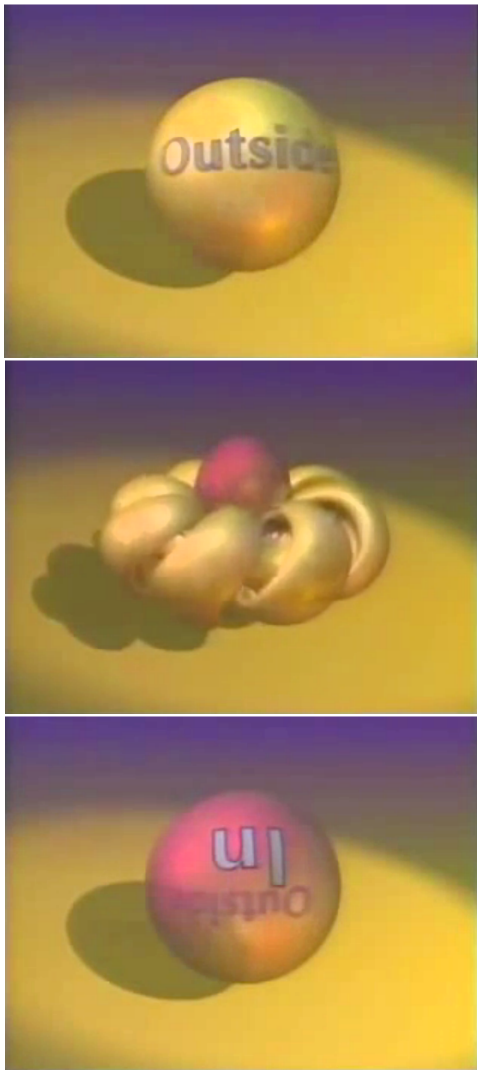

FIG. 5: An illustration of the process by which a hyperbolic space can be smoothly deformed into a spherical space and vice versa. From *How to Turn a Sphere Inside Out* on YouTube.

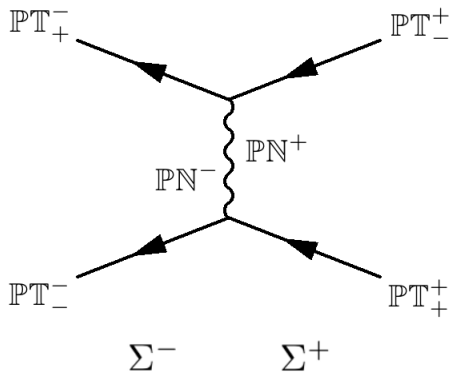


FIG. 6: An intuitive proposal for how the $t_\pm$ worldlines can intersect the observer on $t_\star$.

past light cone. Eternal inflation is directly built into the model.

Lastly, we call attention to a specific property of the ergosphere through which the observer passes in transit from one moment to the next. Noting that the black hole discussed here is not a finite volume, but a gateway to an infinite succession of other levels of ℵ, consider the following passage from *Ergosphere* on Wikipedia.

> "The ergosphere is a region located outside a rotating black hole. Its name is derived from the Greek word *ergon*, which means work. It received this name because it is theoretically possible to extract energy and mass from the black hole in this region."

Arguments against the possibility of a free energy device operating somewhere within the universe are based on the assumption that the universe as a whole is a closed system. Prigogine has shown that for certain kinds of open systems, energy inputs and outputs are not constrained to be strictly equal [11]. With this in mind, note the MCM universe is an open system. Therefore, the free energy device should not be dismissed until special consideration is given.

We have already proposed that the mechanical precession of a spinning wheel is a manifestation of processes unfolding beyond the 4D physical universe [3]. Specifically, there is a discontinuity arising from the different boundary conditions that connect the present to the past and future. If it is true that $\Sigma^{\pm}$ exert an effect across our universe in a regular way, it may possible to construct a wheel that will spin due to the passage of time. This wheel or a similar over-unity device has a large potential for utility and merits collaborative study.


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