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Mormonism and the Scientific Persistence of Circles: Aristotle, Spacetime, and One Eternal Round

Elizabeth Nielson

Abstract: The prominence of circles and circular motion has been one present in scientific discussion of the structure of the universe from Aristotle to Einstein. Development through Ptolemy, Copernicus and Kepler created elliptical variations, but in essence, the scientific community has been unable to break free of a certain degree of circular motion that ultimately seems fundamental to the very nature of the universe. Just as the circle featured prominently in Aristotle's cosmology, it remains an integral aspect of reality, though perhaps it is more difficult to pick out in its present forms as planetary ellipses and curved space-time. In this paper I analyze the intellectual tradition surrounding the circle as a reflection of God's eternal nature as discussed in Doctrine and Covenants 3:2. Essentially, I argue that the traditional Mormon conception of "one eternal round" is evidence of the eternal and divine nature of circles, which, the tradition indicates, is an inescapable feature of physical reality, and indicative of God and his purposes.

Heaven-Earth Resonances

In the premodern West, people reflexively assumed that the heavens and the earth mirrored each other. Science was not merely the art of discovery on earth, but it was a means for discovering truths on earth, which could yield insight about the heavens. It was assumed that there was correspondence between macrocosm (the heavens) and microcosm (the earth). Of such a worldview, Margaret Osler writes:

> Individual objects on the earth — minerals, plants, and gems — contain the signature of the heavenly bodies to which they supposedly correspond. An adept who understands the

> correspondence between the macrocosm and the microcosm as well as the symbolic relationships among things in this world, is able to read these signatures.[1]

In short, the universe was taken to be permeated with the stamp of the divine. The nature and will of the divine was thought to inform and reflect itself in the patterns that ordered the operation of nature.[2] Symbolism then, was considered an essential part of interpreting those operations.

Then came the scientific revolution and with it the concept of a mechanical universe. In this mechanical universe, there is no longer purpose. Under the modern worldview, the universe is orderly, but it no longer has inherent religious or metaphysical meaning. With this change, is it possible that we may have lost something? By removing ourselves from a thought world where metaphysical and theological contemplation of the universe is considered acceptable, we limit ourselves to a single-valued understanding of the world around us — an understanding devoid of any layered meaning.

From a Mormon perspective, this worldview does not seem to hold up. While Mormons often pay lip service to the idea that "the book of God's work" (the created world) can yield spiritual insight, just as "the book of God's word" (scripture) does, it is usually only in a limited sense that we mean this. C.S. Lewis astutely clarifies that for our premodern ancestors, the universe "had a built-in significance. And that in two senses; as having "significant form' … and as a manifestation of the wisdom and goodness that created it."[3] When a Mormon says that nature can teach us about God, it is typically only in Lewis's latter sense that he means this, i.e., nature witnesses of a creator. We are predisposed by modern science to venture no further than this general insight. But is this vague tribute to the premodern worldview really what Mormonism espouses? What about Lewis's first sense? Can the *form* of the universe or its components really be significant? Can it yield *specific* insights and truths about God and his nature, not just witness to his existence? Many Mormon prophets were shown the vast expanse of the universe as a starting point for learning spiritual truths. The Mormon temple ceremony reviews the creation of the universe, and then emphasizes learning through symbolism. Moses 6:63 tells us that things on the earth, in the earth, and under the earth have a likeness in the heavens. While the naturalistic worldview of modern science does not incline one to search for heaven-earth resonances, it seems that being Mormon would.

Circles

The Greek philosopher Empedocles is popularly quoted as saying, "The nature of God is a circle of which the center is everywhere and the circumference is nowhere."[4] From the time of the ancient Greeks, the cosmos were assumed to be circular and complete in nature, and in turn, this was assumed to reflect the nature of the divine. The laws and nature of the universe as being fundamentally rooted in circularity[5] (here curved, closed-circuit motion and patterns) was a facet of both religious and scientific thought that would continue throughout the premodern era. Here, of course, it is important to note that in this paper I will use the term "circle" loosely, indicating a route, line, or movement that starts and finishes at the same place — i.e., both circles and ellipses (see endnote 5).

The prominence of circles and circular motion is a persistent theme in scientific writings spanning from Aristotle to Einstein. Under the Aristotelian worldview, uniform circular motion was a fundamental feature of the superlunar cosmos and consequently of the perfection of the gods. These and other Aristotelian ideas would become deeply embedded philosophical traditions in the West and despite undergoing various permutations in accordance with the development of scientific theory, would nonetheless continue to be influential and relevant. In modern times, the groundbreaking field of Einsteinian relativity has resurrected the notion of a circular, curved cosmos. The theory of general relativity has led to new conceptions of space, time, gravity, and their interaction, culminating in a four-dimensional circular or curved spacetime.

Likewise the persistence of circles is a timeless one in the religious sphere. Talk of God as infinite and without beginning or end has often led to representational discussion of God and his qualities as like those of a circle. While in this modern age such dialogue is of course kept strictly separated from similar topics in the scientific world, such was not the case in Aristotle's time, his cosmology being considered inherently religious and vice versa. Interestingly enough, the modern religious world is not devoid of such scientific-religious discussion. Mormon concepts of cosmic circles and their ties to the perfection of God are reminiscent of traditional Aristotelian conceptions of the same. Indeed, the prominence of the Aristotelian tradition's circle developed and remained relevant throughout the advancements of Western science, culminating in the curvature of contemporary Einsteinian spacetime

and receiving a religious context reminiscent of its origins in Mormon theology of the divine nature.

Aristotle on Circles: Uniform Circular Motion

The scientific worldview of Aristotle was the primary and unquestioned one for more than two thousand years. Intricate and ranging across a wide variety of the sciences, the Aristotelian worldview was yet relatively simple in its basic components. Fundamentally, the Aristotelian universe was essentialist and teleological. Within its framework all objects in the universe had natural essences — a sort of inherent nature. Hand in hand with the essentialism of Aristotle's universe was the fact that it was an end-driven system — teleological and purposeful. In illustration, it was this teleology that lent the traditional and clean explanation of falling objects: with the earth as stationary center of the universe as per thought of the time, the natural place of "earthy" or solid objects becomes the center of the universe, and consequently solid objects fall towards this center when dropped. Earth as the central and therefore "heaviest" element was followed sequentially by water, air, and then fire. In this worldview the superlunar region was the realm of the divine and therefore associated with a perfection assumed to be inherently different from anything to be found in the sublunar. Accordingly, the element of the superlunar was an ether different altogether from these other three elements. The ether of the superlunar region was essentially defined by its "natural inclination" to travel circularly, and this explained the movement of celestial bodies such as the moon, planets, and sun, which were thought to revolve around the earth.

Richard DeWitt, a prominent scholar in the history of science, gives an Aristotelian explanation of this phenomenon of the superlunar region. He explains this circular motion as something caused by the intimate connection of the cosmos with the divine:

> Whereas the heavens are a place of almost unchanging perfection, the only sort of *absolute* perfection would be the perfection of the gods. So in something like the way I move out of a desire to be near my wife, the heavenly bodies must move out of a desire to emulate the perfection of the gods. The best way for the heavenly bodies to emulate the perfection of the gods would be through perfect motion, and perfectly circular motion at uniform, unchanging speed, is the most perfect sort of motion.[6]

For Aristotle, then, the source of the continuous and therefore circular motion of the heavenly bodies was something tied up in the mysterious connection of the heavens with the gods.

As stated above, in Aristotle's worldview the universe consisted of two separate and distinct regions: the sublunar and the superlunar. The sublunar region — the realm of humans — was a place of imperfection, starkly contrasting with the perfect and unchanging circular motions of the superlunar. Aristotle truly believed that "this circular motion is necessarily primary. For the perfect is naturally prior to the imperfect, and the circle is a perfect thing. This cannot be said of any straight line."[7] Indeed, this belief in perfect circles and uniform circular motion as constituting fundamental, essential features of the universe would become so deeply held that for the next two thousand years it would be treated as fact — a given of scientific theory. DeWitt points out that much like Newtonian assumptions of absolute space and time (only recently challenged with the rise of relativity) these were "philosophical or conceptual facts" that were so deeply held and fundamental to the prevailing worldview of the time that they were mistaken for empirical facts.[8]

Development: Ptolemy, Copernicus, and Kepler — More Circles and the Ellipse

The centrality of the circle and circular motion to the scientific model of the cosmos was not one that died with the Aristotelian worldview, though it was elaborated upon, amended, and eventually even totally replaced. First in succession was Ptolemy's astronomical system, positing perfectly circular planetary orbits traveling at constant speeds around a stationary earth — an Aristotelian, geocentric model of the cosmos. In the Ptolemaic system, the heavens were intended to be the model of symmetry, perfection, and circularity that Aristotle had posited. However, in contrast to Aristotle, Ptolemy endeavored to take the rough notion of uniform circular motion in planetary orbits and develop it into a precise, mathematical theory. This theory was the first in history to be capable of accurate astronomical prediction and explanation.[9] However, giving a predictive and explanatory theory, while yet preserving Aristotle's perfect circles, required complex features such as epicycles, equant points, and eccentrics.

While the nature of each of these features will not be discussed in detail here, their advantage was significant. Incorporating them gave Ptolemy flexibility to create a wide range of motions by using a system

of layered, interrelated perfect circles. In particular, they allowed him to account for "retrograde motion of the planets" (when planets appear to move backward from their usual motion) — something that Aristotle's theory could not. In general, Ptolemy's system endeavored to preserve the integrity of Aristotelian cosmology based on the principle of perfectly uniform circular motion while rendering such a cosmology useful and predictive. The extra features were tools that simultaneously could allow for uniform circular motion while forcing the system to produce accurate predictions. Where Aristotle's theory had failed to provide predictive power and did not achieve perfect agreement with observations of planetary orbits (in the case of retrograde motion), Ptolemy's theory did, if somewhat artificially.

Next came the Copernican system, which is famous today for its revolutionary heliocentricity. In practice though, the Copernican system remained very true to Ptolemy's Aristotelian background insofar as it retained a position of prominence for the perfect circle and perfectly uniform circular motion, simply applying them to a new, heliocentric universe. While the Copernican system was relatively comparable to the Ptolemaic in terms of predictive power by shifting to a sun-centered universe, Copernicus was able to eliminate Ptolemy's equants and create a somewhat cleaner model in one sense. However, in other ways Copernicus's model was *more* problematic technically. While the model could be considered less artificial (in some ways) in its attempts to preserve both accuracy and a uniform circular foundation, it had a new problem — empirical evidence of the time (and in fact until the nineteenth century) heavily supported a stationary earth over Copernicus's orbiting one.[10]

Interestingly though, the features used in these two systems to both preserve the Aristotelian conceptions of perfect circles and uniform circular motion and to optimize useful predictive and explanatory power are each, in themselves, perfectly circular in nature. Perhaps even more indicative of just how deeply the Aristotelian perfect circle had permeated the philosophical foundation of the scientific community is the fact that even as Copernicus turned from an earth-centered to a sun-centered cosmos, in what by many was considered a radical scandal, he remained unwilling to sacrifice the Aristotelian integrity of his system as far as it concerned the circle and circular motion.

The next significant astronomical model[11] was also the one that would, when combined with other contemporary scientific developments and discovery (the telescopic observations of Galileo for example),

signal the end of the Aristotelian worldview. This was Kepler's model, with its groundbreaking planetary laws. With their indisputable powers of precision and explanation, these three laws would, despite the resistance of two thousand years of philosophical entrenchment, eventually overthrow the two pillars of Aristotelian astronomy: the perfect circle and uniform circular motion. Indeed, with the overthrow of the Aristotelian scientific worldview, many would argue that the cosmologically fundamental nature of circles and circular motion had come to an end. However, I posit, rather, that two of Kepler's laws were in fact variations on the nature of planetary movement that, while costing the Aristotelian worldview its premier place in the scientific community, nonetheless preserved a model of circular or curved movement.

Under Kepler's first law, the perfect circle of planetary orbits was replaced by the ellipse. An ellipse is a sort of elongated circle — with two central foci, as opposed to one center point. According to Kepler, each planet's orbit held the sun at one of these foci, with the other focus being empty. Kepler's second law of planetary motion overthrew Aristotle's uniform circular motion with a model that swept out equal amounts of area (within the elliptical orbit) in equal amounts of time — essentially a non-uniform orbit with a planet speeding up and slowing down depending on its position. While these shifts from perfect circles and uniform motion to ellipses and non-uniform motion were staggering at the time of their inception (sufficiently so that they were significant hindrances to their initial acceptance) they still remain true to the fundamental principle of curved, *non-perfect* circular motion. This is significant. There still remained, at the center of Kepler's universe, closed-circuit, curved patterns of motion. In fact, it is easily arguable that the venerable notion of uniform planetary motion was abandoned only in the most obvious sense — curvilinear velocity varied, but *areal* velocity remained constant. So while the notion of *unchanging* circular motion had perhaps been lost, the notion of *complete* circular motion remained intact. In addition, it may be helpful to remember that mathematically, the circle, though a different conic section than the ellipse, is in fact an ellipse with zero eccentricity.

Despite these developments of the astronomical model itself however, the question of what *keeps* the heavenly bodies in these orbits (albeit now elliptical ones) remained. For with the loss of Aristotelian essentialism, so was lost the explanation *for* perpetual curved motion — the why, rather than the how. While one answer to this question came with Newtonian physics and gravity (not discussed in this paper), it is here that modern science of the last century contributes in a fascinating way.

General Relativity and the Curvature of Spacetime

In 1916 Einstein published his general theory of relativity. Under General Relativity, motion affects space and time in just the same way that gravitational forces do. In other words, an accelerating reference frame becomes indistinguishable from a strong gravitational field. While the mechanics of this theory and its implications are complex, in essence general relativity causes space and time to take on four dimensions, and the nature of gravity makes a fundamental shift from its Newtonian origins. In Einsteinian relativity, the "mutually attractive gravitational force" of Newtonian physics is replaced with a view that explains "gravitational effects" instead as those of massive objects causing the curvature of four-dimensional spacetime, much like the placing of a heavy object in the center of a trampoline.

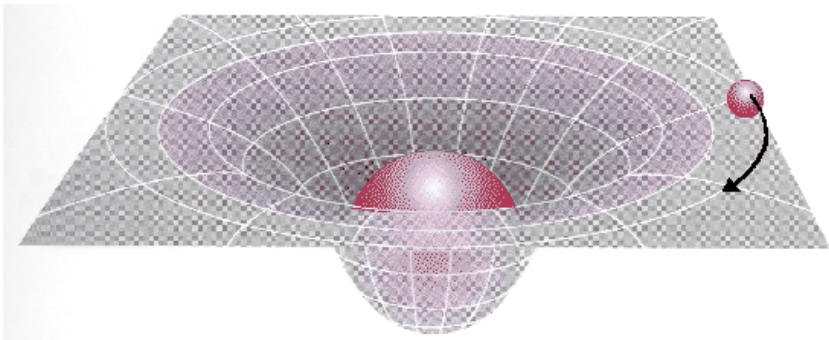

Fig. 1 The Warping of the Geometry of Spacetime Due to Mass (Connell)

As this happens, the shortest path between two points becomes a curved line. These "straight lines" in curved space are called geodesics and cause the bending of starlight and other observable phenomenon. Thus, the movement of the planets is found to be inertial motion in a straight line, rather than the effect of some sort of "mutually attractive force" — the line simply happens to be in a curved space that creates a roughly closed-circuit ellipse.[12] These sorts of circular motions in the cosmos are not limited to planetary orbits but extend from the rotation of planets on their axes to the circular motions of the Milky Way galaxy itself. In regard to the fundamental nature of circularity in the universe, Einstein himself concluded:

> The results of calculation indicate that if matter be distributed uniformly, the universe would necessarily be spherical (or

> elliptical). Since in reality the detailed distribution of matter is not uniform, the real universe will deviate in individual parts from the spherical, i.e., the universe will be quasi-spherical.[13]

One Eternal Round: Mormon Perspectives on the Centrality of the Circle

Mormon scripture explicitly describes the nature of God as being fundamentally, if metaphorically, circular: "For God doth not walk in crooked paths, neither doth he turn to the right hand nor to the left, neither doth he vary from that which he hath said, therefore his paths are straight, and his course is one eternal round".[14]

However, the theme of circles and circularity has been a part of traditional Christian discussion of the eternal nature of God since the Middle Ages. Medieval theologian Nicholas of Cusa studied the circle for theological insight. In an argument stunningly similar to that of curved spacetime rendering the universe fundamentally circular, he posits the nature of God as being fundamentally circular. According to Nicholas of Cusa, God's path is an infinite circle, which means that any finite segment of the circle must be a straight line (otherwise the segment would produce a finite circle). Thus God is both finite and infinite, both rectilinear and circular in the manner of achieving his ends.[15] We might say (echoing D&C 3:2) that he varies neither to the right nor to the left, but his course is one eternal round.

Again, in D&C 35:1, Mormon scripture highlights this same truth: "Listen to the voice of the Lord your God, even Alpha and Omega, the beginning and the end, whose course is one eternal round, the same today as yesterday, and forever."[16] Here, we get a sense of the eternal nature of God and of its fitting symbolism in the circle and circular motion. Indeed, this emphasis on the perfection of the circle, and its consequent association with the divine, is reminiscent of Aristotle. The circle, with neither beginning nor end, of which any point is both the first and the last, could just as well be dubbed Alpha and Omega.

The book of Abraham in the Pearl of Great Price also brings to light interesting aspects of the circularity of the Latter-day Saint cosmos, especially as presented visually in Facsimile 2:

Fig. 2 A Facsimile from the Book of Abraham No. 2

Here the universe is presented in an almost Aristotelian-looking two-dimensional circularity, but we see that a possible reason for such is the ultimately trumping center of God and his dwelling place. That is, we see a parallel to the curvature of spacetime. Here, in a religious application of Einstein's relativity, the trumping significance (and/or mass) of God bends space and time around him, creating the "straight" paths of eternity, namely, the geodesic. In fact, prominent Latter-day Saint scholar Hugh Nibley speaks of this facsimile and its connections to the cosmos when he tells us, "it is *round*, the universal concept of completeness"[17] and "brings the cosmos down to earth."[18]

Nibley stimulates an interesting discussion with his provocative suggestion that "the placing of the hypocephalus (Facsimile 2) between earth and heaven (Facsimiles 1 and 3) points to its function as a link between the two."[19] What sort of link could this be? Under the Aristotelian worldview, to speak of a link between the sublunar and the superlunar regions, i.e., between earth and heaven, was a short-lived discussion.

In his model of the cosmos, the difference between heaven and earth could not be greater because they manifest the difference between perfection and imperfection. Aristotle himself said that "we may infer with confidence that there is something beyond the bodies that are about us on this earth, different and separate from them; and that the superior glory of its nature is proportionate to its distance from this world of ours."[20] However, the development of scientific thought on the matter, as traced in its progression from Aristotle to Ptolemy, Copernicus, Kepler, and finally Einstein, has led to a homogenization of the universe — no longer is the superlunar region considered separate and distinct in its physical laws and essential nature. Under this concept, then, comes potential meaning for Nibley's suggestion of cosmological models as a link between heaven and earth — they teach us what sort of universe we inhabit. Zelia Nuttal, a scholar of ancient religion, suggests (quoted in *One Eternal Round*) that the facsimile's model is thus "an image of the nocturnal heaven *as it is* of a vast terrestrial state … established as a reproduction upon earth of the harmonious order and fixed laws which apparently govern the heavens."[21] Such models teach us that the heavens, the realm of God, are just like earth, the realm of mankind. Here, for the first time, we see suggestions of Mormon doctrines of deification — if God's realm is just like ours, intuitively the next conceptual step is that on some fundamental level, God is just like us.[22]

Viewed through a religious lens, the connection of the circle with both science and the divine can no longer be considered an accident but becomes rather a teaching tool on the nature of the universe and our place in it. This fundamental connection between the cosmos and the divine is further embedded in the very *language* of circles. A thesaurus will cite synonyms of "circle" that immediately bring to mind the astronomical: ring, sphere, cycle, halo, orbit, revolution. More neutral entries include "round" and "wheel," and those with theological connotations range from "crown," "halo," and "wreath," to "compass." Though many will argue about whether the fundamental philosophical concept of the circle in science comes prior to the concept in religion, or vice versa, the fact remains that regardless of which may be prior, our very language speaks to an intimate connection of the circle with both the universe and the divine.

By examining the persistence of circles throughout the development of Western science, we see that there seems to be something eternal in their connection to the cosmos. From the Aristotelian tradition through the modern advancements of Einstein's spacetime, the circle

as something fundamental to the universe has, despite undergoing permutation, refused to be removed from the scientific dialogue. With the context of Mormon doctrine, I suggest a return to the implications originally applied by Aristotle — there is something intrinsically eternal and divine about the circle that inextricably ties it to the nature of our universe. In other words, hearkening back to a premodern worldview, the circle is a heaven-earth resonance.

Final Thoughts

C.S. Lewis says that "nature gives most of her evidence in answer to the questions we ask her."[23] The plague of the modern religionist is that we are conditioned by our scientific worldview to no longer ask spiritual questions of nature. While my argument for the heaven-earth resonance of circles may ultimately be a flawed reach for parallels and may not even accurately reflect the divine, it is my attempt to resurrect the thought world of Moses 6:63. That is, the thought world of our premodern ancestors — the thought world where the natural universe around us has meaning and purpose — can teach us spiritual truths. Dan Burton and David Grandy write of a "multi-storied universe" in their book, *Magic, Mystery, and Science*:

> Today any criticism of astrology [or, I would contend, heaven-earth resonances] employs the straightforward, confident language of science, … the assumption being that reality is a single linear story made up of precise, single-valued meanings. Ideally, those meanings are mathematical values, which is to say they lack metaphysical or spiritual import. … however, [others] sometimes protest that the world is multi-storied and that science selectively captures just one story and then exalts it to the exclusion of all the others.[24]

Looking for heaven-earth resonances is not to discount the scientific findings of our time. Rather it is to look beyond those findings for further meaning. It is to believe in more commerce between heaven and earth.

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Endnotes

1 Margaret J. Osler, *Reconfiguring the World: Nature, God, and Human Understanding from the Middle Ages to Early Modern Europe* (Baltimore: Johns Hopkins UP, 2010), 32.

2 Dan Burton & David Grandy, *Magic, Mystery, and Science* (Bloomington & Indianapolis: Indiana UP, 2004), 88.

3 C.S. Lewis., *The Discarded Image* (London: Cambridge UP, 1964), 204.

4 Simplicius, "On the Heavens; Frag. B35," in *On Aristotle's Physics, 31–34*, trans. J.O. Urmson (Ithaca, NY: Cornell University Press, 2002), 528-530.

5 Used here of course in the physical, not philosophical or argumentative sense. Throughout the course of this paper I will use the terms "circle," "circular," and "circularity" to refer to the circles *and* ellipses that constitute the closed-circuit conic sections (i.e., not the parabola and hyperbola). While not entirely accurate linguistically, I have not found a satisfying alternative to express the general category of the continuous conic section. When referring to a circle proper, I will hereafter use the term "perfect circle," "perfectly circular," or "perfect circularity." While such a characterization combining the perfect circle and the ellipse may seem problematic to some, it may prove helpful to remember that mathematically, the circle, though a different conic section than the ellipse, is in fact an ellipse with zero eccentricity.

6 Richard DeWitt, *Worldviews: An Introduction to the History and Philosophy of Science* (Chichester, UK: Wiley-Blackwell, 2010), 109.

7 Aristotle, *The Basic Works of Aristotle*, ed. Richard McKeon (New York: Random House, 1941), 269a19.

8 DeWitt, *Worldviews,* 34.

9 DeWitt, *Worldviews,* 114.

10 The most significant problem with positing a heliocentric universe at this time was the failure to empirically detect stellar parallax, or the shifting of the stars that would be necessary and expected in such a universe. This was not accomplished until a sufficiently powerful telescope was developed c. 1838, and prior to this time the immense distance to the stars that required such a powerful telescope was not considered scientifically plausible.

11 Insofar as it represented only a return to geocentricity under the same mathematical model of the Copernican system, the Tychonic cosmological model will not be discussed in this paper.

12 DeWitt, *Worldviews,* 230-232. It is important to note that with general relativity, Einstein also proved the precession of the perihelion of Mercury, in which Mercury's planetary orbit does not start and end in the exact same place for every rotation around the sun, but varies slightly each time. This anomalous variation may seem problematic for my definition of a circle as "a route, line, or movement that starts and finishes at the same place." However, the orbit nevertheless remains, in essentials, elliptical and I do not believe that this slight variation poses a serious problem for the purposes of this paper's discussion and analogy.

13 Albert Einstein, *Relativity: The Special and General Theory,* trans. Robert W. Lawson (New York: Pi, 2005), 144.

14 Doctrine and Covenants 3:2

15 Nicholas of Cusa, *On Learned Ignorance,* trans. Jasper Hawkins (Minneapolis: Arthur J. Banning Press, 1981), 35-51. http://www1.umn.edu/ships/galileo/library/cusa2.pdf

16 See also Book of Mormon — 1 Nephi 10:9, Alma 37:12

17 Hugh Nibley, *One Eternal Round* (Salt Lake City: Deseret Book, 2009), 195.

18 Nibley, *One Eternal Round,* 196.

19 Nibley, *One Eternal Round,* 588.

20 Aristotle, *The Basic Works of Aristotle*, 269b15.

21 Nibley, *One Eternal Round*, 198 (emphasis added).

22 The doctrine of deification shows plainly that to posit circularity as both a feature of the universe and of the divine, is not to suggest that *all* aspects of Mormon theology reflect circularity. While discussion of such is outside the scope of this paper, non-circular, "linear" progression is also a fundamental aspect of Mormon theology and its conception of the divine.

23 Lewis, *The Discarded Image*, 223.

24 Burton & Grandy, *Magic, Mystery, and Science*, 111.

Images

1 Simon Connell, "In General Relativity, the Warping of the Geometry of Space-time Due to Mass Distributions Accounts for the Effects of 'gravitational Attraction,'" Particle Solids Interactions Group, School of Physics, University of the Witwatersrand, accessed December 10, 2014, http://psi.phys.wits.ac.za/teaching/Connell/phys284/2005/lecture-01/lecture_01/node17.html#warp.

2 "A Facsimile from the Book of Abraham No. 2," The Church of Jesus Christ of Latter-day Saints, accessed December 10, 2014, https://www.lds.org/scriptures/pgp/abr/fac-2?lang=eng.