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The Entangled Cosmos: an experiment in physical theopoetics

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As an experiment in constructive transdisciplinary relationality, a theology of nonseparable difference here engages a physics of quantum entanglement. The metaphoric potential of “spooky action at a distance” to intensify a cosmology resistant to the dominant individualism and conducive to ethical ecologies of interdependence has only begun to develop across multiple discourses. This essay contemplates the specific unfolding of a theory of nonlocal superpositions by physicists such as Stapp, Bohm and Barad. It does not literalize any God-trope, but rather entangles theology in the mysterious uncertainty of our widest interdependencies. This essay, first presented as a lecture at the American Academy of Religion “Science, Technology and Religion” Group, San Francisco, November 2011, forms the core of a chapter in a book I am currently completing, *The Cloud of the Impossible: Theological Entanglements*.

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1 The Tissue of Entanglements

After much marginal brooding it is a pleasure to contribute more directly to the work of the interdisciplinary science-and-theology collective within the wider field of religion. It is also a peril, luring me out of my theopoetic comfort zones into the dangerous vicinity of science buffs, math nerds and technophiliacs. Of course, risk adds to enjoyment—especially, in this case, if we all share the assumption at least that science and religion are historically entangled at a depth that belies their clean disciplinary separation; and that, if theology is worth doing in this new millennium, it will embrace that entanglement with fresh curiosity. I suspect the reverse is also true, but would not dream of making such a claim. And I certainly cannot presume that entanglement itself, as the startling quantum signifier of a radical relation between minimal material events, may also reveal a relationality enfolding our maximum concerns. That is what I will have to argue.

The maximum has and yet might be called “God.” But the physics of entanglement will not witness to the existence of a classical deity. It may however offer material evidence of a universe so mysteriously entangled as to escape the rival classicisms that pit science and theology against each other in the first place. What I want to share today belongs to the wider and polydoxical investigation of what I call ‘apophatic entanglement’ (from apophasis, ‘unsaying,’ the strategy of so-called negative theology). Theologically it channels a 15th century *docta ignorantia*, the mindful ignorance, by which Nicholas of Cusa minds not only the maximum mystery but the misty unknowns of all our relations.

Let me set the mood with neither science nor religion but a novel. In Jeannette Winterson’s *Gut Symmetries*, the romance of two physicists morphs into a transformingly queer entanglement. Along the way the protagonist realizes the following:

Now, more than ever ... our place in the universe and the place of the universe in us, is proving to be one of active relationship. That is more than a scientist's credo. The separateness of our lives is a sham. Physics, mathematics, music, painting, my politics, my love for you, my work, the star-dust of my body, the spirit that impels it, clocks diurnal, time perpetual, the roll, rough, tender, swamping, liberating, breathing, moving, thinking nature, human nature and the cosmos are patterned together (Winterson 1997).

If the separateness of our lives is a sham, then the work of our civilization to produce us as discrete subjects vying to emulate, master, know, and consume external objects maintains a systemic repression of that “place of the universe in us,” that site of active relationship.

No one puts this better than physicist and feminist theorist Karen Barad, at the climax of *Meeting the Universe Halfway*, her magnificent meditation on quantum entanglement. "If we hold on to the belief that the world is made of individual entities, it is hard to see how even our best, most well-intentioned calculations for right action can avoid tearing holes in the delicate tissue structure of entanglements that the lifeblood of the world runs through" (Barad, 2007).

If those holes are hemorrhaging, might mindfulness of this tissue structure of entanglements feed the lifeblood and strengthen its flow--through, for example, efforts to

address climate change? Or (at least as I first wrote) through the general assembly of Occupy Wall Street? Or (back to theology) the darkly promising racial nonseparability James Cone enunciates at the end of his new *The Cross and the Lynching Tree*—“what happened to blacks also happened to whites”(Cone, 2012)? Unsurprising AAR topics. But what do such ethically charged entanglements have to do with—serious science?

2 Mutuality All the Way Down

Barad, in her 400 page text, is not deploying the metaphor of entanglement casually. And she hears there an “ethical call, an invitation that is written into the very matter of all being and becoming” (Barad, 2007). If that is not a contemplation of a maximum mattering, what is? Perhaps the inscription of such an invitation upon the tissue of all relations will not shock the religious thinkers among her readers. We may presume already a certain all-pervading incarnational call. Over a few decades, relational theology attentive to all mattering, not just to one exceptional incarnation, has developed a multi-branched momentum. It ripples out already from Whitehead’s provocation of a theology of becoming. In the universe of his early quantum thinking, its subjects do not preexist their relations but emerge in interdependence. Relational theology becomes explicit in the feminist rethinking of gender in terms of a web of connective rather than separative selves; and it evolves through the superpositions of multiple social movements in shifting ethnosexual patterns of ecology and postcoloniality. My work, for example, does not nest in the central theology and science dialogue, but in the social ecology of that feminist-process rhizome.

Quite recently relationality signals the site for the discussion of theology and quantum entanglement—as in the new anthology edited by Polkinghorne, *The Trinity and an Entangled World: Relationality in Physical Science and Theology*; and in Kirk Wegter-McNelly’s *Entangled God*, which brings a holistic reading of the physics to bear upon a Trinitarian-relational view of deity, creation, and their entanglement. Wegter-McNelly demonstrates how theology “ought to welcome the liability that comes with searching for points of contact on the edge of what is known rather than at the center of what is familiar” (Wegter-McNelly, 2011). At that edge I find compass in Philip Clayton’s theological guidance of a conversation generated “by questions that science

raises but cannot answer using its own resources.” He would have us take part in the “movement from science to ‘something beyond.’” It is motivated “not by religious experience but by the scientific questions themselves, which lead one to, and beyond, the limits of decidability from a scientific perspective.” Such a theology would “be hypothetical, pluralistic, fluid in its use of empirical conceptual arguments, continually open to revision” (Clayton, 2008). And surely, I would add, curious as to how certain scientists themselves lead- –“beyond.”

Quantum mechanics from the start got knocked beyond the capacity of scientific method. Its minimal bodies were demanding a maximum transformation of the dysrelational western paradigm. Those quanta were threatening to queer the universe from the bottom up. As Heisenberg put it: “The common division of the world into subject and object, inner world and outer world, body and soul is no longer adequate”(cited in Davies, 1983). That is an instance of science raising philosophical questions it cannot answer—but certainly trying.

The early, trembling steps beyond seem still revelatory: "Physical action," wrote Schroedinger, "always is inter-action; it always is mutual" (Schroedinger, 1964). Yet friendly as this mutuality sounds, its quantum jumpiness sent Schroedinger to bed depressed for days. For this instantaneous interactivity was mucking up scientific certainty. “The object I am trying to observe,” writes the Brazilian physicist Marcelo Gleiser in another epoch, “refuses to behave as an object; it won’t stay still”(Gleiser, 2005). The indiscrete quantum has sabotaged the discrete subjects and objects of western science and common sense. As Barad puts it, “The primary ontological unit is [no longer] independent objects with independently determinate boundaries and properties but rather what Bohr terms ‘phenomena.’” She rejects the standard reading of the Copenhagen theory, which construes it as a mere epistemological orthodoxy. Instead she lifts up “the ontological inseparability of agentially intra-acting components.” Not just *interacting*. “Phenomena are the ontological inseparability of intra-acting ‘agencies.’ That is, phenomena are ontological entanglements.” Those agencies include the human observer, her measuring instrument, and the observed quantum. We have to do with more than what Schroedinger called “the entanglement of our knowledge.” As she argues, “complementarity is an ontic (not merely epistemic) principle” (Barad, 2007).

3 Impossible Superpositions

It was Schroedinger who coined the term entanglement in English in 1935, in the essay famously featuring his poor dead and alive cat. He recognized entanglement as “not one but rather *the* characteristic of quantum mechanics, the one that reinforces its entire departure from classical lines of thought...By the interaction, the two representatives have become entangled”(cited in Gilder, 2008). Einstein interpreted its spooky action at a distance as the symptom of the incompleteness of quantum theory. He would try and fail for the rest of his life to exorcize the spook, which after all seemed to violate relativity. In recent decades it seems to have taken on a significance beyond his wildest hauntings. One might say that an element of the apophatic, of the mysteriously unknowable, comes into play around the math of quantum uncertainty. “I can safely say,” wrote Feynman, “that nobody understands quantum mechanics....” (cited in Barad, 2007). He is commenting on the structure of superposition, which he calls “the only mystery.” Superpositions transcend classical or local “positions.” They are formed of the overlapping waves of Bohr’s complementarity, in distinction from the particles that appear as local in their positions. Do they represent our ignorance? Barad argues no, not in the sense of our failure to know some classical object. Rather “superpositions represent ontologically indeterminate states—states with no determinate fact of the matter concerning the property in question” (Barad, 2007). In other words intra-action deconstructs the subject-object reduction and in so doing introduces uncertainty. But this uncertainty is not simply the matter of a lack of knowledge but of an irreducible indeterminacy in things.

We find ourselves in a shift Bruno Latour names as that from “matter of fact” to “matter of concern.” In other words the mystery lies not in unknowability alone, but in the intra-activity that suspends the very notion of a discretely knowable thing. “Superpositions embody quantum indeterminacy” writes Barad (2007). Less technically: you are partly unknown to me. But not only if I have not yet related to you. You remain in part unknowable because I relate to you: neither of us preexists our intra-action. As Wegner McNelly puts it: “most if not all of reality exists in fuzzy, indefinite states called ‘superpositions’ (which affect the course of events but which we never directly observe);

quantum particles spread out like waves when we are not looking them...” (2011). But these wavy states “snap to attention” (B. Greene) as clearly located particles when we observe them. Or at least when a physicist observes; not necessarily when contemplated by a shaman or a poet or a newborn or a William Turner painting his late nonfigurative works, in superposed waves of luminous color: no classical objects.

Entanglements, like superpositions, express postclassical phenomena. “The notion of an entanglement is a generalization of a superposition to the case of more than one particle.” (As my spouse avers, it takes two to tangle.) Quantum entanglement in other words is not a matter of independent things combined into one, nor of an external causal impact of one upon another. “Rather the entangled state of A and B is read as a single entity, no matter how far apart is B from A” (Barad, 2007). But if the superposed state of entanglement is as Feynman put it “a phenomenon which is impossible, absolutely impossible to explain in any classical way, and which has in it the heart of quantum mechanics” theologians--accustomed to the impossible-- might take heart.

4 Shut Up and Calculate

Feynman, however, also advised the following: “Do not keep saying to yourself, if you can possibly avoid it, ‘but how can it be like that?’ because you will get down the drain...”(cited in Bub, 2010). A worrisome sort of unknowable—neither uncertainty nor indeterminacy—comes here into play: a no trespassing sign seems to get posted at the edge of the knowable. This is not the knowing ignorance but rather the willful variety. Mystery is superseded by pragmatic prohibition. Don’t ask, don’t tell. Those quanta are too queer.

For this reason the Irish physicist John Bell called his book *Speakable and Unsayable in Quantum Mechanics*. “Physicists are ‘sleepwalkers’ avoiding the profound obscurity of quantum mechanics and the profound incompatibility of the two pillars” (1988). Unsayable here refers to the repression of those who insisted as he did on examining the phenomenon of entanglement, who in other words tried to pick up where Einstein, Podolsky and Rosen had left off, facing the challenge to the very premises of physics. He wrote especially of David Bohm, without whose obstinate pursuit of the unsayable Bell could not have produced his Theorem, called by one

physicist “the most profound discovery of science.” [Stapp] The mathematics of the Bell Theorem made possible the empirical testing of quantum entanglement. In Bohm’s papers Bell says “he had seen the impossible done” (Kaiser, 2011).

The repression of Bohm is a narrative of its own. He was accused of communism by the House Unamerican Activities Committee for refusing to testify against his teacher Oppenheimer; Princeton fired him, and he fled (with a recommendation from Einstein) to teach physics in Brazil. Then it was Oppenheimer, in an ugly irony, who when his theory of nonlocality was discussed in absentia at a Princeton discussion, accused him of “juvenile deviationism,” outraged at the quantum spook being raised. “If we cannot disprove Bohm, we must agree to ignore him (Gilder, 2008).”

No one narrates the repression better than MIT historian of science David Kaiser, in *How the Hippies Saved Physics*. “Especially in the United States the war and its aftermath shaped how generations of new physicists were trained... winnowing the range of acceptable topics ... philosophical inquiry or open-ended speculation of the kind that Bohr, Einstein, Heisenberg and Schrodinger had considered a prerequisite for serious work on quantum theory got shunted aside. ‘Shut up and calculate’ became the new rallying cry”(Kaiser, 2011). The effect was that Bell’s Theorem was ignored for several years. Then some physics Ph.Ds, facing the sudden lack of physics jobs in 1970, found their way —where else--to San Francisco; and began to meet to probe the deeper questions that had lured them into physics to start with and had in graduate school been stifled. The physicist Henry Stapp (who did have a job) hosted these conversations at the Lawrence Berkeley Laboratories. They found entanglement mesmerizing, resonating with eastern thought and research in the “sort of telepathic coupling” that horrified Einstein. The spooky stuff was for them a matter of wonder, not abjection. Kaiser shows how it was their publications that actually brought the Bell Theorem into visibility and led directly to the empirical tests of quantum entanglement (starting in 1972 by Clauser and Freedman, Alain Aspect in ’82).

Turns out in each case local realism has failed and spooky action at a distance has prevailed. If the EPR experiments had set out to prove that “an object over there does not care about what you do to another object over here”, in Brian Green’s words: the “earth shattering result” is that Bell’s theorem led to the contrary result: “an object over

there *does* care about what you do to another object over here” (Greene, 2004). Entangled particles apparently coordinate instantly, precisely and at any distance whatsoever—even across the galaxy. As Greenstein and Zajonc put it, “the experimental tests of Bell’s inequalities ...go so far as to change the very way we should think of physical existence at its most fundamental level....we must think in terms of nonlocality, and/or we must renounce the very idea that individual objects possess discrete attributes” (cited in Barad, 2007). And increasingly experiments are showing that, as a recent article in *Scientific American* put it: “the division between the quantum and classical worlds appears not to be fundamental. It is not just a question of experimental ingenuity...If anything, the general belief [among physicists] is that if a deeper theory ever supersedes quantum physics, it will show the world to be even more counterintuitive than anything we have seen so far” (Vidal, 2011).

5 Mindful Universe

‘Counter-intuitive to whom?’ we students of religion might ask. Suddenly it seems the door is opening to what Bell called for in the ‘60’s: “a radical conceptual revision” (Bell, 1987). I suspect such a revision entangles all of our work in its implications, whether or not we care about physics.

But in case we do, I turn to Henry Stapp, who had studied with Pauli and Heisenberg. He cites Heisenberg on a crucial idea: “the transition from the ‘possible’ to the ‘actual’ takes place during the act of observation” (Stapp, 2007). In *The Mindful Universe* Stapp argues that in the transition from the wavy potentiality to sharpened actuality, there is a direct causal action to effect novelty. But there takes place at the same time also an “indirect effect”: “these ‘indirect changes’ produce the ‘faster-than-light’ effects called by Einstein “spooky actions at a distance” (Stapp, 2007). Neither the direct nor the indirect influences close the causal gap opened by quantum indeterminacy. I hear a voice whispering: “Whatever affects one directly, affects all indirectly”? Oh but that is Martin Luther King Jr., speaking of justice. Irrelevant?

Far from shirking the bigger questions, Stapp draws on Whitehead to make sense of the transition to the actual as an event at once mental and physical, an event that entangles the observer, the observed, and the mechanism of observation. But this does not

entail a solipsistic universe depending for its actual and measurable form upon human minds; any creature on principle “observes”—and may effect the “collapse of the wave function.” That contested collapse (by others called decoherence) involves the physical and mental poles of every actual entity-- any electron (needless to say Whitehead does not mean by “mental” conscious or thinking, but experiencing). Stapp finds the “mindful universe” in which the observer participates to be thoroughly “psychophysical” (Stapp, 2007). As Shimon Malin, another Whiteheadian quantum physicist, puts it: the events far apart “seem to ‘feel’ each other.” Entanglement takes place “because both events form a single creative act, a single actual entity, arising out of a common field of potentialities” (Malin, 2001). Stapp concludes splendidly: “with our physically efficacious minds now integrated into the unfolding of uncharted and yet-to-be-plumbed potentialities of an intricately interconnected whole, the responsibility that accompanies the power to decide things on the basis of one's own thoughts, ideas, and judgments is laid upon us”(Stapp, 2002).

If the minimum event of the quantum entangles the universe in an ethical circuitry, are we witnessing some new anthropomorphism? Or is it rather the opposite? Stapp means to embed the quantum anthropocentric pragmatism within “the larger nonanthropocentric cosmology of Whitehead” (Ibid). Stapp thus raises questions from within physics, questions for which he finds answers in the theistic philosophy of the process relationalism that has emitted such an ethical charge in theology. Elsewhere Stapp even suggests that without something very like what is meant by divinity we are unlikely to make sense of the pervasive role of observation in the universe.

6 Explicate Complications

A snug return to process theology is however not my last word. For influence taking place instantaneously, and outside of contiguous causal chains, is not comfortably housed within the “causal efficacy” of the “prehensions.” Nor is the apophatic depth of our nonseparability readily accommodated in the process cosmology. So another line of quantum speculation may help, itself influenced, if differently, by Whitehead: David Bohm’s long work on the new paradigm needed to reconcile the two divided pillars of physics. His last book, *The Undivided Universe*, co-authored with his younger

collaborator the mathematician BJ Hiley, probes the undividedness that the pillars already share, as suggesting a wider theory of which relativity and quantum are limited abstractions. He finds in relativity the replacement of permanently existing particles with “stable pulses of finite extent.” “Ultimately the fields of all the particles will merge to form a single structure that is an unbroken whole” (Bohm and Hiley, 1993).

But in quantum theory Bohm finds the more radical nonseparability: “because the quantum potential represents active information, there is a nonlocal connection which can, in principle, make even distant objects into a single system which has an objective quality of unbroken wholeness.” The particle dissolves into “a poorly defined cloud,” whose microtexture is “indivisible and unanalyzable” (Bohm and Hiley, 1993). In quite other words, the relationality becomes apophatic. The bodies of the world remain differentiated but not discrete-- not independent from each other or from the fluid plenum, the holomovement, in and of which they unfold. The multiplicity of its particular bodies thus comprise what he calls the *explicate* order. That *pli* in ‘multiplicity’ and ‘*explicate*, the fold, links Deleuze to Leibniz but also to a theological polydoxy rooted in the apophatic heritage of Cusa and Bruno (Keller, 2008).

At the same time these particulars come enfolded in the fluid plenum of quantum waves. This is the aspect of reality masked by the sham of our separateness. Bohm named this oceanic plenum the “implicate order”—the enfolding. “This,” he writes, “means ‘to fold inward’ So we may be led to explore the notion that in some sense each region contains a total structure ‘enfolded’ within it.” In the 80’s the new technology of the hologram provided Bohm an image for this enfolding. “In terms of the implicate order one may say that everything is enfolded into everything” (Bohm, 1980). Similarly, in 1925, Whitehead had written in response to relativity and the (barely born) quantum physics that “in a certain sense, everything is in a certain sense everywhere at all times” (Whitehead, 1925).

For an apophatically entangling theology, another similitude feels spookily apt: it arrives in the language of Nicholas of Cusa: “God, therefore, is the enfolding of all in the sense that all are in God, and the unfolding [*explicans*] of all in the sense that God is in all” (Cusa, 1987). The enfolding is the complication (*complicans*). He has lodged the folding together of all in God the not-finite, who is the negative infinity resistant to the

idolatrous confusion of finite names with the infinite. And all finite creatures, participant in that ultimate complication, unfold—*explicatio*—from it. But this is the relationalism of a premodern panentheism. What of the relations of finite creatures to each other? Here Cusa performs a monumental and hardly noticed swerve: “to say that ‘each thing is in each thing’ is not other than to say that ‘through all things God is in each thing’.” As the divine is the infinite, and the universe made in its image, the universe is also infinite—but not an absolute or divine infinity but a “contracted infinite.” Anticipating the scales of today’s cosmos, he also infers that what has no boundary can have no center. He thereby deconstructs, in 1440, long before Copernicus and Galileo, the presumption of any “fixed center” of the universe—earth or sun. He construes each creature as a “contracted universe.” Bohm (not unaware of Cusa) would say in 1992 “that the whole universe is in someway enfolded in everything and that each thing is enfolded in the whole.” (Bohm and Hiley, 1992).

Similarly, Bernard D'Espagnat, the French quantum physicist, offers a version of nonseparability. He speaks of the stone that we all mistake as the model of discretion: "its 'quantum state' is 'entangled' (this is the technical word) with the state of the whole Universe"(d'Espagnat, 2006). If each localized entity is thus understood to be entangled nonlocally in *everything* else, the microcosm in the macro, the minimum and the maximum coincide. Of the ineffably nameable infinite, Cusa says: “And because the maximum has no opposite, the minimum coincides with it...and therefore the maximum is also in all things.” That is Cusa’s leading instance of the principle he launched in opposition to the dominant Aristotelian logic of non-contradiction: the *coincidentia oppositorum*. And that maximum, as infinite, cannot finally or fully be known by its participant finitudes.

With the Cusan theocosm, in other words, we may speak of a negative theology positively complicated by cosmological nonseparability. It anticipates quantum motion beyond the scientifically decidable: as, again, by Bohm, who writes that “in some sense a rudimentary mind-like quality is present even at the level of particle physics, and that as we go to subtler levels, this mind-like quality becomes stronger and more developed...One may then describe the essential mode of relationship of these as participation...” This is very close to Stapp. Bohm continues: “there may be further

unknown sets of entities, each having its implicate order, and beyond this there may be a common implicate order, which goes deeper and deeper without limit and is ultimately unknown” (1993). That sentence unfolds beyond the scientifically decidable. It is not therefore theology—but surely does hint at a common ground (or Eckhartan unground) between science and religion. The ground reflects the common order itself. Deploying Whitehead for a “new paradigm for religion and science,” Joseph Bracken proposes “structured fields of activity” as the ordering principle constituted by the sociality of the “innumerable momentary self-constituting subjects of experience” (Bracken, 2009). One may with Bohm—and the apophatic heritage—imagine this sociality as effecting fields within fields, ultimately extending or bottoming into the unknown.

7 **Activating Inter-carnation**

If I may shift in conclusion back to theopoetic metaphor, it appears that quantum nonseparability here discloses a materiality worthy of the trope (developed in Hartshorne and elaborated by McFague)of the universe as “the body of God.” Or in a 15th century poem of the Indian Sufi Kabir : “the secret one slowly growing a body” (Kabir, 1989). Such a theological experiment cannot be held hostage to the particular limitations of any scientific theory. For instance, we need not get tangled up in the quantum formalism of Bohm’s early determinism. Of course any whole may risk sealing its relationality into a totality that tends to homogenize its continuities and plug its gaps. But if we do not take the risk of some version of holism, doesn’t its opposite prevail: the standard dominant subject discretely rendering his private properties global? Bohm lays claim in his later work to a theory that is neither absolutely determinist nor absolutely indeterminist (1983). And of course determinateness does not imply determinism. With Whitehead, we might say that the past always imposes itself on the present but never fully--it cannot eliminate the “elbow room in the universe.” There is no ‘causal closure,’ as Stapp emphasizes. And no omnipotent determinism, let alone predestination, will secretly plug the gap.

Theologically I stitch that margin of agential indeterminacy to the edge of the mindful unknowing. This means holding the ultimate concern of a divine *complicatio* in intimate tension with its ethically pluralist and indeterminist *explicatio*. Between them, like a multiversal membrane, like the subtle potentiality of each in the other, flow the nonseparable superpositions of us all.

The power of religion to surprise and therefore to reveal has worn down over the centuries. Might the startling edge of physics be revealing to us the depth of our relationality and the width of our entanglement now, in this ecologically catastrophic century, for good reason? It won't solve our problems. Nor will a deity, if she comes entangled in the web of creaturely intra-actions. We do not need a transcendent *solution*; we need the *resolution* with which to unfold responsibly, to materialize mindfully, the churning potentiality of our complicit histories and our shared complexities. The possibility of a creaturely con-vivality—of living together-- does not cease its calling. If quantum entanglement can no longer be relegated to an irrelevant sub-classical zone, if matter is entering its post-classical phase, perhaps its queerness will spook us theologians into more intra-active incarnationalism: an activating *inter-carnation*. As we absorb the new cosmology at the vital edges of its entwined indeterminacies, our theology becomes all the more engaged for its knowing ignorance—its mindful uncertainty. As philosopher of religion Mary Jane Rubenstein puts it luminously: by attending “to the strangeness of the most familiar...such wakeful thinking might finally endure, rather than close down, the perilous openness of wonder” (Rubenstein, 2008). It is not only religious thinkers who wax wondrous: Vlatko Vedral writes that “the implications...are mind-blowing enough that we physicists are still in an entangled state of confusion and wonderment” (2011).

Between the maximum and the minimum, decohering amidst our superpositions, we exercise our tangled agencies willy nilly. The matters of concern that arise in the causal interplay of moment to moment life may take on a new intensity—emotional, aesthetic, ethical, spiritual—in the face of this acausal mystery of boundless nonseparability. The interdisciplinarity of science and religion may stir some reciprocal “enchantment” (Griffin, 1988). And by the same token it may make us more mindful both

of our ignorance and of our peril. The lifeblood of the world will circulate unobstructed through all our nonseparable differences—or continue its earthly hemorrhage.

~C Keller NYC September 2, 2012

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