Proposition to explain the natural state of nature causing the effects we labeled dark energy by introducing the second of three modifications to the field equations of the general theory of relativity.

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Abstract: I wish to propose three changes to the field equations of the general theory of relativity that can help explain the nature of black holes, the nature of dark energy, and the nature of dark matter. Over forty-five years of research have led me to certain conclusions about the reality of nature, and the single key to unlocking mystery after mystery is to toggle an assumption made at the very core foundations of nearly all the branches of science. When we no longer treat eternal time and infinite space as speculation and instead embrace the premise of eternally infinite 4D Minkowski spacetime, then by examining the implications of that premise applied to the equations of the general theory of relativity and the equations of the special theory of relativity, there is a very clear image of the surrounding universe that develops.

Keywords: Einstein Field Equations, Modified General Relativity/MGR, Dark Energy, Pockets of Spacetime

I propose there is a simple naturally occurring phenomenon we already observe that is indirectly responsible for the effects we attribute to dark energy. In order to understand dark energy mathematically, we need to change how we represent the cosmological constant in the field equations of the general theory of relativity. Lambda is not really a constant because we already see how areas of significant overlapping gravity wells fight off the effects of dark energy.

That is one hint that it is variable and directly related to the mass energy density of any region of spacetime. The greater the strength of the overlapping gravity wells, the stronger the tensor mesh of gravitational attraction, the less we see the effects of dark energy causing expansion. That is the key to better grasping the true source of dark energy, but before we fully explain how and why dark energy works, we need to better understand the effects we see.

We see cosmic expansion of our spacetime in areas of insignificant mass-energy cohesion to spacetime telling us our localized overlapping gravity wells are in a constant battle against something that wants to tear our spacetime apart. Once

we can understand where space and time come from, then we can better appreciate how and why it appears to us to be ripping at the seams.

To understand spacetime we only need to rely on the truths behind the maths of general relativity and special relativity, which tell us something very profound about the nature of time and space. What we know about the field equations of general relativity and the dilation and contraction formulas of special relativity are all well established and well-tested facts that define the faster you move through space the slower you move through time and for most of us, our heads are older than our feet.

Therefore, all bodies sharing the same relative trajectory and relative velocity would all start with the same base perception of both time and space. We call them comoving frames of reference, but what we don't always clearly specify is that they occur in a succession of larger and larger comoving frames of reference.

This occurs because most all celestial bodies are playing the eternal game of follow the leaders. The most massive sibling(s) drags all their local relatives along for the ride and in doing so, since gravity is scale invariant and scale independent, we get larger and larger comoving frames of reference. So when we apply the maths of general relativity against the premise of eternal time and infinite space, instead of getting inflating bubble universes, we get a nested succession of pockets of spacetime.

Pockets of spacetime where all bodies moving as one get a base starting perception of time and space from their most direct frame of reference but then all gravitational fields acting upon each body (or gravitationally bound group of bodies) as well as their relative velocity within that parent frame of reference will further refine the perception of space and time that they in turn pass on to all their children bodies. That is the true nature of spacetime and indicates that if time is eternal, then there must be a larger parent frame of reference that our entire visible universe is part of, which in turn is itself inside a nested succession of larger and larger comoving frames of reference.

If we apply general relativity to our best computer simulations using randomized recursion of mass distribution at larger and larger scale factors, then as we zoom out I predict we would see the natural effects of dark energy take place if the physics of the simulation properly understand orbital mechanics of celestial bodies. Our moon is slowly drifting away from our planet. All the planets are slowly moving away from the sun. Most of the stars in our galaxy are slowly moving away from Sagittarius A*. The diameter of the orbits of the galaxies inside the local group will someday be shown to be slowly increasing. Eventually, we will find evidence that the orbit of the local group itself inside its next largest frame also increases over time. And we will eventually find evidence that structure either

orbits the Great Attractor or it orbits the barycenter between the Great Attractor and the Shapely Attractor, and its orbital diameter also slowly increases over time.

Apply that natural dissipation of localized mass energy cohesion against a succession of parent comoving frames of reference, a nested succession of parent pockets of spacetime, each passing onto their children a perception of space and time, and what would that look like to us at our scale factor? It would look like the very fabric of our spacetime was being torn apart. Inside our visible universe, the areas with the greatest concentration of overlapping gravity wells will fight off the effects of the recursive dissipation of the strengths of mass energy cohesion of all the relative comoving frames at far larger scale factors that contain our visible universe.

The vacuum is not pushing everything outwards. Our universe's ancestors are all pulling on it, but that pull is inversely proportional to how tightly each successive parent frame of reference can hold on to its own spacetime. If we accept eternal time and infinite space as a logical premise, then instead of bubble universes, stringy membranes, or eternal inflation, we instead have an infinite number of separate pockets of nested relative pressurized spacetime massenergy heatradiation. That is why our eternally infinite 4D Minkowski spacetime is sometimes called the multiverse.

Therefore, I propose a modification to the field equations of general relativity to change the cosmological constant into a variable with two components. Uppercase Lambda represents the current strength of the mass energy dissipation across a succession of parent pockets of spacetime. One that is inversely proportional at each parent frame of reference to the relative strength of the overlapping gravity wells making up each successive comoving frame of reference. As time passes, it will become evident that this rate increases exponentially, as predicted by mass energy density dissipation occurring in nested successions.

Uppercase Lambda becomes the numerator of the fraction that now includes a lowercase lambda as the denominator. Lowercase lambda represents the localized relative strength of the overlapping gravity wells of the area of spacetime being referenced on the left side of the equals sign. This revised cosmological constant more accurately predicts where expansion will be greater and where it will be less.

Because of this change, it can make certain parts of astronomical calculations harder when we can not rely on a fixed constant that is the same everywhere but instead have to contend with the variable nature of expansion across different parts of spacetime. If this were true, there would be evidence that the "raisin

bread" analogy of expansion is no longer accurate because the rate it rises is no longer homogeneous.

For those astronomers who read to this point, agree with the conclusions, and recognize the potential implications this has for things like calculating redshift, please know that I share in that collective sigh. The sigh heard round the world.