Is the Universe Expanding Into a Black Hole? An Alternative to the Dark Energy Model

Victor A. Grauer
(victorag@verizon.net)

October 2011

Abstract

A model of universal origins and destinies first worked out by me in the mid-70’s predicts that the universe is destined to continue its expansion until, paradoxically, it “collapses” into a “black hole” produced by gravitational interaction with an extra-dimensional twin, a prediction consistent with the relatively recent finding that the expansion of the universe is accelerating beyond the rate previously assumed. My prediction could be further tested by calculating whether the rate of black hole collapse implied by my model is consistent with current estimates of the rate of enhanced acceleration.

Key words: big bang, black hole, antimatter, mirror universe, expanding universe, dark energy, cosmological constant

1. An Antimatter “Twin”

Early in 1975 I submitted an article (ultimately rejected) to Scientific American magazine containing the following diagrams:
The article, entitled “Dimensionally Inverse Mirror Model,” visualized the Big Bang in such a way as to resolve the dilemma produced by the apparent absence of naturally occurring antimatter in the Universe. The antimatter could be accounted for if we imagine the “white hole” of the original explosion of matter into 3 dimensions (see Figure 1, universe A) to have been accompanied by an “equal but opposite” black hole, formed by an implosion of antimatter into a companion universe defined by three additional, “dimensionally inverse,” dimensions (Figure 1, universe B). Since the resulting matter and anti-matter are segregated into dimensionally distinct realms, there would have been no possibility of electromagnetic interaction and thus no mutual annihilation.

2. Space Turned Inside Out

The antimatter universe, which would, from our point of view, have to be squeezed into an extremely tiny space (presumably sub-Planck in size), could be visualized as an exact mirror image of our universe, only inside out. In other words, the smallest things in our universe, sub-atomic particles, would, from one perspective at least, be the largest things in the mirror universe, and the largest things in our universe, galaxies and galaxy clusters, would be the smallest things in the mirror universe. While such an arrangement might seem impossible to imagine, it can in fact be approximated in a certain type of anamorphic image, designed for projection onto a conical mirror.¹

In such an image, the center is spread out over the periphery, and the periphery is at the center. It is only through the use of a conically shaped mirror that such an image can be resolved into its original form. See, for example, this anamorphic image, dating from Eighteenth Century Netherlands, where the central letter “O” has been projected onto the periphery:
If our universe is inside-in and expanding, then the inside-out companion universe, which I nicknamed “Tiny Alice,” must be understood as impanding. At least from our point of view. But from its point of view, it is we who could be tiny, inside out and impanding, while it could be the one that is expanding. Which raises the interesting question of whether there is any way to distinguish between them.

3. A Deferred Annihilation

In my original paper, I asked the following question: “Might the point where the outermost galaxies accelerate to reach the speed of light be another mirror where matter and antimatter confront one another?” Figure II was designed as a crude representation of such a possibility, in which universe A (our universe) and universe B (the antimatter universe) are this time both represented as impanding. Figures I and II can thus be understood as two different ways of visualizing the same relationship. (There is clearly no single 2 (or 3) dimensional model that could completely represent a space of six or more dimensions.)

The notion of an expanding universe collapsing into a black hole is not as counter-intuitive as it might seem, so long as we remain sensitive to the topological effects produced by added dimensions. If, for example, we consider the following diagram (Figure III) as two dimensional, then the lines emanating in opposite directions from universes A and B could potentially expand forever.
If we add a dimension, to consider Figure III as representing one half of a sphere, then the lines can be understood as geodesics, which must ultimately converge on the opposite side of the same sphere, as in Figure IV:

![Figure IV](image)

“In such a model,” I wrote, “the impanding galaxies would be analogous to a black hole . . . The ‘event horizon’ created by the eventual acceleration of the galaxies to the speed of light (so that we could never see them) would be identical to the event horizon created by a black hole (whose gravitational force is so strong as to permit no light to escape).”

Research on “optical geometry,” conducted by cosmologist Marek Abramowicz has demonstrated that similarly “inside-out” models can be applied, under certain conditions, to the study of black holes:

According to our calculations, in the region close to a black hole not only does the centrifugal force reverse direction but *all dynamic effects that depend on the sense of inward and outward are also reversed*. . . Perhaps the most important general result obtained with the help of optical geometry is that in certain situations *space appears to be turned inside out*. . . On a more basic level, optical geometry shows that *‘inward’ and ‘outward’ are not absolute concepts; they are relative in spaces warped by strong gravitational fields.*

(My emphasis.)

4. Testing . . . Testing

I sent copies of my paper to a few physicists, some of whom were gracious enough to read it and respond. The consensus was that my model was interesting, but as there was no way to test it, nothing more could be said. With no hope of getting my paper published in either Scientific American or any established scientific journal, I eventually rewrote it and distributed the newer version on the Internet, under a title both more descriptive and more whimsical than the original: “The Inside-Out Symmetrical Tiny Everywhere Universe (Tiny Alice).”

Since I’m neither a physicist nor a mathematician, and had other projects in the works, I did little on the “Tiny Alice” front from that time to this, tacitly accepting the verdict that there was no point in pursuing such a fanciful idea if there were no way of testing it.
As it turns out, however, there is a way. And the test has already been performed. And “Tiny Alice” appears to have passed at least one hurdle. Though the test took place several years ago, it was only when reading about the awarding of the Nobel Prize in physics to Saul Perlmutter, Brian Schmidt and Adam Riess that the possible relevance of their work to my “Tiny Alice” model finally sank in. Specifically, teams led by these three individuals demonstrated, back in 1998, that, as predicted by the model I proposed in 1975, the rate of acceleration of the expanding universe was speeding up, a surprising result since almost all cosmologists were assuming that, due to traditionally understood gravitational forces, it must be slowing down.

Since the galaxies of Tiny Alice would be fully as massive as those of our universe, despite their Planck-length dimensions, the gravitational attraction of the two universes toward the black hole produced by their convergence would clearly outweigh any internal gravitational resistance to expansion on the part of either in itself. If this model can be taken seriously, then it would provide cosmologists with a possible alternative to models based on either dark energy or a “cosmological constant.” Whether the rate of accelerated expansion predicted by my model would be consistent with the observed evidence remains to be seen. Since the mass of both mirror universes would have to be identical, the calculation may not be difficult. But that’s not for me to say. My math is worse than Einstein’s! 😊

Appendix

As discussed in the second version of my paper, the “Tiny Alice” model raises some other questions that might be of interest to physicists and cosmologists alike. Here are some excerpts from that document:

This tiny universe is naturally inapprehensible by us because it is so small. But where is it? Naturally it would have to be everywhere (since, according to the most widely accepted Big Bang model, the center of the universe is everywhere) . . .

Tiny Alice could be thought of both as a tiny singularity somewhere lost in the center of our universe (wherever that could be) and at the same time everywhere in our universe, tucked away just out of “sight” . . .

Thus, the particles of Tiny Alice and the particles of our universe could be directly encountering and interacting with one another. They would also be mirroring one another. Could such a hall of mirrors be responsible for some or all of the strangeness of the quantum world? And couldn’t this explain the embarrassing fact that particles seem to be "made up" of "smaller" particles which in turn are made up of those same "larger" particles?
Given the clear entanglement of the two universes with one another, one wonders, moreover, whether this relationship might account for some of the bizarre features of quantum entanglement. For example, the Einstein/Podolsky paradox involves two “entangled” particles shooting out in opposite directions, remaining entangled even when light years apart. But if we see one such pair shooting outward toward distant stars and galaxies and another, complementary, or mirror, pair, shooting in toward the center of Tiny Alice, then maybe we could posit a kind of equivalency principle, that could balance them out.

The extra dimensions of a mirror universe might also have some bearing on the extra, “curled up,” dimensions posited by string theory, as suggested in 1987 by Kaku and Trainer:

If this theory (superstrings) is true, it means that our universe actually has a sister universe that co-exists with our universe . . .

According to the superstring theory the other multidimensional universe has shrunk to such an incredibly small size . . . that it can never be reached by humans. . .

Today theoretical physicists are making intense efforts to prove that the lowest energy state predicted by the superstring model is a universe in which six dimensions have curled up . . .

---

1 For a description of anamorphic images of this and other types, with illustrations, see Martin Gardner, “Anamorphic Art,” *Scientific American* 232 (1), 110-116 (January 1975).

2 This name reflects on both the “Tiny Alice” of Edward Albee’s well known play, who lives in a miniature replica of her huge castle, and Lewis Carroll’s Alice, who famously lost herself in a looking glass.
