

GONE FIZZION

One true inference invariably suggests others.

Arthur Conan Doyle (1892)

The cosmogonic problem has its dangers. It is not certain beforehand that the mind which ventures beyond regions where it has found, temporarily perhaps, an equilibrium, will immediately return to a stable position.

Ferdinand Gonseth (1950)

The search then began for a natural process ... which would insure that if the universe began with, say, nine space dimensions all expanding equally, six of those dimensions would remain trapped....

How this trapping might occur is still an unsolved problem.

John Barrow (1994)

We need a theory about *what makes up space*, a background-independent theory.

Lee Smolin (2007)

I suppose most everybody has the hang-up physics has. Because they see and feel mass, or they think so, they feel that it is fundamental. From my reading, physics' history is ruled by mass and how it moves. How do physicists do physics—how do they think about it—without understanding space and time to do it *in*? It's that bird-or-egg-first problem; physics buys the bird. Now *he's* checking out the egg. This has me thinking about mass and how it moves. I can't see it. He will surely need to find it if he is to claim success.

Haphazardly I wonder: How do space and time give birth to all the rest? It brings to mind again the way the world gets introduced to the Big Bang. In 1949 Hoyle—soon to be Sir Fred—is chief proponent of a universe that never changes. He coins the term; it mocks the notion that the cosmos would begin by banging. Hoyle's own vision-version of the universe has atoms popping out of nowhere at the rate he needs to fill expanding space. It's the first and only physics theory inspired by a horror movie show. First Frank might have liked this. But in 1964 the Big Bang trumps Hoyle's version when, ruling out the pigeon shit, two puzzled physicists discover the Big Flash. Soon the picture's taken and retaken, analyzed and re-analyzed again. With it comes a cannonade of new conundrums. Some are solved—supposedly—by the whiz-before-the-Big-Bang called Inflation.

Inflations come in many flavors but they share two things. They inflate far faster than light-speed. And they happen *after* the whole thing begins. The short

story of the universe becomes: Begin; Big—Inflate—Bang; Expand. Possibly it could be tacked into a tidy composition. It gets messy because many mix up Big Bang with Begin.

My head-buddy's taken a close look at the bit before the Big Bang. He sees something like Inflation from Begin. Not any of the many fine-tuned kinds on my Inflation list. He says it begins with Fizzion. For an instant it keeps on with Fizzion. Then the Fizzion peters out. When Flecks run low on mass their Fizzion's almost out of gas. That's what he says. Or so I think.

It's all a matter then of following the Fizzion. It's primitive: It's two for one. Maybe the Skatalites won't need an explanation but I do. I need to see this movie frame by frame. One Fleck. One Tock and there are two. Freeze frame.

So think it through again. If I could stop it long enough, what would the second Fleck look like? Well, like its mama or its sista it's a Manifold with six dimensions. And like Mama it may bear a lot of matter packed to go. How it all packs in is inexplicable but there is less each Move because when Mama clones she divvies up the loot. In a way she gets to split it with herself. It's like Super Lotto player Whitaker who held *both* winning tickets. Each Fleck looks like Mama but it has less matter.

How does the divvy go? I try to duck it but I can't. I think about it not because I want to but because it's roaming, restless, in my mind. For my money it will turn out not to matter if it's not exactly half. What matters is that it must *not* be half. Not exactly, that is; not exactly as a rule. The Fizzion rule is in the Rules. It must be. If the Rules are quantum theory then the Fizzion rule's some kind of quantum die. Is it fair, with each proportion—0/100 to 100/0—given the same chance? Or maybe it is loaded; maybe it prefers near-equal splits.

Does it matter? Well, I think it does. If matter's divvied up at random, foam grown from a fat Fleck has more matter than the foam grown from a skinny one. *Regardez*, Maigret might say: Here's a reason for the lumps. The lumpiness—galactic superclusters and the voids between them—is the Fizzion rule writ large. Physicists have long suspected lumpiness may rest on quantum fluctuations in the early universe. There may be a way to calculate the lumpiness from the Beginning.

There is another way to think of this. Was our place in space conceived by dice? After several Tocks—say ten—among the Flecks that then exist, there is a single Fleck that is destined to make the space that holds the universe we see. In the following ten Tocks *that* Fleck will turn into a thousand. Each of that thousand will become a lump of space that's on the supercluster scale. If it is *our* supercluster we are here because that single Fleck contained more matter than its neighbors did. If not—with just a little less—here be a void. No Milky Way, no

Sun, no Earth, no trees, no books, no readers—it's the full catastrophe, as Kazantzakis has his Zorba say. (*His worry was the thought of getting wed.*)

All this makes me wonder: Can he handle flatness? Inflation's touted as why space starts out so flat.

"It didn't," he says cryptically. "Not that it matters."

What's he mean? *Of course* it matters! That ball bearing balanced on a razor's edge more than ten billion years?

"That edge is all about a battle. It's Big Bang versus gravity. There is no bang. Not of that kind. There is no battle. Not one that can go either way. So there is no razor. And no edge."

I've found it's sometimes best to park my thinking on the fence.

"No bang. None. There is no need."

I read a paper by a heavy hitter saying the Big Bang is an accelerator that's more powerful than anything on Earth. Surely it gave things some kind of kick.

"It goes back to filling space."

I remember. The whole of space is and always was filled with matter. The problem is, how did it get to be that way?

"And the answer is . . . ?" He's upbeat, almost chatty.

And I see it. It is simple. It's the Rules. Each Move, each divvied bit of matter sticks with its Fleck. It's not hurled out from a center. It's not moving. And as space emerges, as there comes to be a there there, it's just *there*. There isn't enough time for it to move. Even if there were, it has no empty place in space to go like an explosion does. The Beginning shows why matter is found all through space and always was.

"Does that matter move much now?"

I hadn't thought of that. I check it out. No one seems to think the Big Bang left a universe of boiling eddies. Its early days were like hot soup that isn't stirring. Now many galaxies are on the move, no question. But it took gravity and time to get them underway. The Milky Way is trudging over to the Shapley Supercluster at not even one percent of small-accelerator speed. It's just rolling to a local low spot, so to speak. Far-flung galaxies that are receding from each other are not blasting out through space. They are stationary—more or less—as space between them grows. The only thing that is expanding into space is space.

"I did it!" he says on a sudden. "On my own."

I think he means he owes Frank nothing. No, he means me. Maybe he means more than me.

It takes me time to realize what he has done. He has manufactured Einstein's ether. By the 1930s Einstein knows he needs an ether that is real but undetectable. One that is useless as a Frame of Reference. He says little of it. Kostro says

that Einstein reinvented ether. But, 'Einstein's relativistic ether conception is today almost unknown among physicists, philosophers, and sometimes, also, historians of physics.' What Einstein didn't—couldn't—know is what his ether's made of. This is what Frank's exultation is about. It's true: He did it! He found out.

My next thought is he stands on other shoulders. I can feel he's unconvinced, dismissive, almost bursting, like he wants to dance a jig, whatever that is. I want to tell him that bacteria could claim four-billion-year-old patent rights on hundreds of his genes. Rather this than say his genes are mine. I want to tell him: Face it—without all the physicists where would we be? And would Newton have created modern physics with no Pachelbel? Could Einstein recreate it with no Bach? To me it seems unlikely. Perhaps he gets my drift, or maybe not but he subsides. I try to turn my mind and maybe his mind too to the Beginning.

As space unfurls, new properties emerge like overtaken ferries looming from the morning fog. Where were they hiding? Well, not hiding. Latent? Unaccustomed as I am to being at a loss for a *bon mot*, I wonder. Could it be there *is* no word for where they were? These properties lack meaning till they are in view.

First and foremost is Flecks' volume. I can see no reason to suppose it changes as they fizz. If it did could we detect it? I can't even see what this would mean. For early Moves the volume of a Fleck may not be a useful concept. One cannot check it from outside because there is no out. One cannot see it from inside because one can't get in. There is no metric for its measurement and no one to measure. It's Moves that give the volume meaning; meaning comes as Moves make space.

It comes to mind again his space has *substance*. Once again the implications leave me stunned. He starts with what must be the simplest possible Beginning and the simplest Rule. It's a cosmologic irony that space emerges in a way that is Relational; yet once it has emerged it's absolute!

If I sense correctly where he's heading, his space has more mass than all the mass that it contains. Yet there is no way to pin it down. It defies all efforts to detect it, as Michelson's and Morley's trolling for the aether shows. And aether, Einstein's ether—no, Lorentz's—is exactly what it *is*! So much for the received wisdom courtesy of Close. I see now it keeps on reappearing for the simple reason that it's real. How are the mighty fallen and their certainties brought low! Reichenbach heaps ridicule on absolute space. Kant says it is 'itself nothing and no object at all.' It is, Kant says, a 'mere idea.' Now my guy reveals it is the biggest object of them all. Some nothing!

My mind wanders back to Maxwell's definition of the vacuum. Something like what's left after we take out all we can. It's a facile definition. We *cannot* remove space. So there is no nothing, or no vacuum as the physicists prefer. Vacu-

um is a fiction since space is a fact. Here ends the Catastrophe—a really mere idea whereby the physicists were had.

In its stead his vision's based on Fizzion: Even though the volume of a Fleck is very small, a mere few hundred Moves can manufacture a fantastic quantity of space. Its substance fills its volume, volume that it borrows from its Flecks. With its volume other properties emerge. Though he hasn't said so, temperature is a hot topic as the Big Bang begins. It's a measure of how fast the particles of matter move. It emerges—that is, it takes on meaning—after there is space for them to move in and some time for them to move. So does density, which is how much matter's packed into a given volume. As Flecks Fizzion, density emerges. For an instant it is unimaginably dense. Ever since I studied up on black holes I have had this worry: Why does the infant universe not form a black hole and so end? Now I see the answer's easy: With more Fizzion density decreases. Fizzion is so fast that gravity, as it emerges, cannot keep up with the mass. Almost, I forget another worry. That matter of the matter in the Flecks. Early in his Fizzion many properties—foundations of our physics—come to be. I can't figure out exactly when. And I can't figure out if he is sulking but he is no help.