

THE SINGULARITY PROBLEM

Singularity is almost invariably a clue.

Arthur Conan Doyle (1891)

All sorts of nasty things—TV sets showing Nixon’s “Checkers speech,” green slime, Japanese horror movie monsters, etc.—emerge helter-skelter from the singularity.

John Earman (1995)

A true theory of quantum gravity should replace our present concept of Spacetime at a singularity. It should give a clear-cut way of talking about what we call a singularity in classical theory. It shouldn’t be simply a non-singular Spacetime, but something drastically different.

Roger Penrose (1996)

By predicting that [when] the universe began ... the density of the universe and the curvature of space-time would have been infinite, the theory of general relativity predicts that there is a point in the universe where the theory itself breaks down, or fails. Such a point is an example of what mathematicians call a singularity.

Stephen Hawking (2005)

I can’t dodge it any longer. If he’s on the job we have to take a closer look. It’s the *Singularity*. It’s the mother of them all.

In the ’60s and the ’70s, Penrose and Hawking say a Singularity is different from ordinary space. They say GR says that a Singularity is how the universe began. Which is to say they need another theory because at a Singularity—if GR’s right to say that they exist—GR breaks down. Few physicists believe the universe came from a GR Singularity. It’s funny how now that I think he *might* be on the job it is all changed. I sit, not moving, coffee cooling, trying to review this problem as it might appear to him.

As problems go the problem of the Singularity is huge. That is to say, it’s huge because this Singularity is simply size-less. A hell of a place, I think he might think and he would be right, to start a universe. *I* try to think of such a place; my thinking flounders. But then I think again of Holmes, who says the best clues are bizarrest.

It really doesn’t matter that her Frank’s not here today. I think he thinks that Singularities are pointless. If it was my call . . . but I tell myself again it’s not. She knows her Frank can’t do it and she doesn’t care. She has a different agenda. It bugs me but there’s nothing I can do. Well, I *could* just bugger off to Bali. From my place

it's a half hour to LAX. There must be twenty routings to Jakarta so some airplane has an empty seat that's leaving soon. I close my eyes. Night surf sings siren songs to me from Uluwatu Beach. Night air still smells the same. The problem is that if you can't stay on the board, the chicks just walk on by.

With a mental lurch I'm in North Hollywood. There's an erratic rattle in the duct that feeds me its recirculating air. It's an outlandish place to be. I'm building a bank balance, an outlandish thing to do. My eyes are scanning and rescanning words on-screen. Some site on singularities and edgy math. Dispiritedly I read on. The math is based upon GR it seems. But Singularity is all that GR has to say about the way the universe began.

My reading about Hawking has my thinking flipping back and forth between the universe's origin and a black hole. No one has seen a Singularity; it's only calculations that insist they must exist. Her Frank would start to squirm at this point. With good reason. Anything with zero size is hard to grasp. Though, practically, a magnetic bottle might grip a black hole. As I read on, it seems that a black hole could be a perfect garbage dump. It has no smell. It brings no gulls. It sports no rats. It needs no space. It's never full. Its gravity lets nothing out. And best of all it can't be seen from anyone's back yard. I'm not surprised to find that most of the disorder in the cosmos is now in big black holes. Any old black hole conceals a vast amount of entropy, the final form of garbage in this world.

So a black hole could be the perfect business opportunity. No license, permit or approval is required. Anyone can open up their own and they are common in the cosmic landscape; every one is up for grabs. Of course there could be complications. A big black hole would not be easy to control; a small one wouldn't have a useful appetite for garbage on a New York scale.

Until Penrose and Hawking, Singularity's obscure, a cosmic curio. They put it firmly on the physics map and fuel a frenzy of research. It soon becomes a sexy public topic. Its common name embodies an odd property. Not even light can get out once it's in the trap. But Hawking later shows that a black hole should give off energy as low-grade thermal radiation and, since energy is mass, a black hole thus evaporates. But the evaporation of a big black hole is bogglingly slow. Think of a cow-dung heap the size of Sol that farts a molecule of methane in a million years.

The message from my reading on the Web takes time to penetrate: The Problem isn't physics; it is physicists. They have a hang-up. They think of mass that's falling onto something massive, say a star; in the end its mass becomes too much. The pressure at its center becomes bigger than the force that keeps the sub-atomic particles apart. Physics says the mass collapses in a little heap. If there's enough it squishes in a heap that is supposed to have no size. It's not the kind of thing that one can check, but physicists set out to calculate what happens to the matter as it squishes.

Some say its size can't get right down to zero. But physicists can't settle on a place for it to stop. One might think that they could pick a size and stop there. But, if they do, the answer hinges on what size they pick. So *they* let it go to zero, then they wrestle with infinities.

So their Problem comes right down to this: They need a size below which matter *absolutely* cannot go.

"What if space does come in pieces?"

Is he asking *me*?

"A piece is where a physicist could stop."

He doesn't seem to need an answer. I wait for more but he subsides into a silence that endures into the night.