

## Dumb Maths and Magic Bits Cause Vacuum Catastrophes

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<https://youtu.be/wdqULyUDStk?t=3h6m28s>

A transcript from the [Ronald Green](#) (YouTube) post:  
*Are You Sure? - The Uncertainty of Certainty* (Oct 2, 2023)  
<https://youtu.be/wdqULyUDStk?t=3h6m28s>

[3:06:28-3:09:02](#) (~2.5 minutes) Terry Bollinger: I just wanted to comment, real quick, on what Dominik said. Dominik, what you described is called the vacuum catastrophe.

If you put infinite density of any kind of information into space, information *absolutely* has mass and energy. It is not some magical freebie-freebie thing. So, the reason why so many of our theories collapse into a catastrophe — called the vacuum catastrophe — is precisely that. It's because they all assume fully classical, infinite-information, points-are-free, ideas of certainty that date from the 1700s — and 1800s, 1700s to 1800s — before relativity, before quantum theory. It's built into the maths! You use those maths, you *will* get a vacuum catastrophe — there's not much other choice.

And yet... we keep doing that!

The idea that information is free is from computer scientists like myself. It's our fault! We built computers in the 90s that were so good at crushing bits into little bitty tiny disks that physicists who started getting interested in information science about that time, like Gerard 't Hooft, *really* got *entranced* by this idea. They thought, "Oh wow, this information is so small! It's *free*, it's *free*! That's... *the fabric of the universe*! It's what it's built from!" And they went through these convoluted arguments, and the worst one was from Gerard 't Hooft — bless his heart, a really nice guy, Nobel Laureate — but he put this paper out, and he said, "Oh, the black hole surface — the event horizon — it's... it's... it's *pure information*!! It's got little tiny bits — Planck-scale bits. *That's what it is!*"

There's absolutely no justification for any of this! He's taking the infinite uncertainty and suddenly declaring, "It's a bit!" It doesn't even make sense. If you're in computer science, you know that bits are actually some of the most complicated devices to build. You can make them very small, but you can never make them infinitely small. And you cannot make one electron into a bit — that was another mistake people made. You have to have a *machine* with a *magnetic field*, and the electron — *then* you have a bit.

So, in a sense, we computer scientists created this disaster. We gave people the impression that bits are so cheap — and look, they ain't cheap, I live in Ashburn [Virginia], we've got [data] centers all around us — that we give the impression that [information] is *infinitely* cheap. That's not the way things work! You have to face the uncertainty before you even pull back from it and see, "How do we get so much of what *seems* to be certainty?"

I gotta go! It's been great talking to everybody — a fun session!