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## The Big Lab Experiment

Was our universe created by design?

By Jim Holt

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Was our universe created? That is, was it brought into being by an entity with a mind? This is a question I began pondering after my recent inquiry into the [end of the universe](#). (For some reason, cosmic mysteries are best contemplated in pairs.) It is the fundamental issue that separates religious believers, ranging from Deists to Gnostics to Southern Baptists, from nonbelievers. To many atheists, the very idea that our world could have been created by a conscious being seems downright nutty. How could anyone, even a god, "make" a universe?

To get a better understanding of this matter, I thought it might be wise to consult the man who has done more than anyone else to explain how our universe got going. His name is [Andrei Linde](#), and he is a physicist at Stanford University. (He's also an artist and an acrobat, but never mind.) In the early 1980s, the then-thirtysomething Linde came up with a novel theory of the Big Bang that answered three vexing questions: What banged? Why did it bang? And what was going on before it banged? Linde's theory, called "chaotic inflation," explained the shape of space and how galaxies were formed. It also predicted the exact pattern of background radiation from the Big Bang that was observed by the COBE satellite in the 1990s. Linde has been amply honored for his achievement, most recently by being awarded the 2004 Cosmology Prize of the Peter Gruber Foundation (along with Alan Guth, another pioneer of the theory of cosmic inflation).

Among the many curious implications of Linde's theory, one stands out for our present purposes: *It doesn't take all that much to create a universe*. Resources on a cosmic scale are not required. It might even be possible for someone in a not terribly advanced civilization to cook up a new universe in a laboratory. Which leads to an arresting thought: Could that be how *our* universe came into being?

"When I invented chaotic inflation theory, I found that the only thing you needed to get a universe like ours started is a hundred-thousandth of a gram of matter," Linde told me in his Russian-accented English when I reached him by phone at Stanford. "That's enough to create a small chunk of vacuum that blows up into the billions and billions of galaxies we see around us. It looks like cheating, but that's how the inflation theory works—all the matter in the universe gets created from the negative energy of the gravitational field. So, what's to stop us from creating a universe in a lab? We would be like gods!"

Linde, it should be said, is famous for his mock-gloomy manner, and these words were laced with irony. But he insisted that this genesis-in-a-lab scenario was feasible, at least in principle. "What my theoretical argument shows—and Alan Guth and others who have looked at this matter have come to the same conclusion—is that we can't rule out the possibility that our own universe was created in a lab by someone in another universe who just felt like doing it."

It struck me that there was a hitch in this scheme. If you started off a Big Bang in a lab, wouldn't the baby universe you created expand into your own universe, killing people and crushing buildings and so forth? Linde assured me that there was no such danger. "The new universe would expand into itself," he said. "Its space would be so curved that it would look as tiny as an elementary particle. In fact, it might end up disappearing altogether from the world of its creator."

But why bother making a universe if it's going to run away from you? Wouldn't you want to have some power

over how your creation unfolded, some way of making sure the beings that evolved in it turned out well? Linde's picture was as unsatisfying as Voltaire's idea of a creator who established our universe but then took no further interest in it or its creatures.

"You've got a point," Linde said. "At first I imagined that the creator might be able to send information into the new universe—to teach its creatures how to behave, to help them discover what the laws of nature are, and so forth. Then I started thinking. The inflation theory says that a baby universe blows up very quickly, like a balloon, in the tiniest fraction of a second. Suppose the creator tried to write something on its surface, like 'Please remember I created you.' The inflationary expansion would make this message exponentially huge. The creatures in the new universe, living in a little corner of one letter, would never be able to read the whole thing."

But then Linde thought of another channel of communication between creator and creation—the only one possible, as far as he could tell. The creator, by manipulating the cosmic seed in the right way, has the power to ordain certain physical parameters of the universe he ushers into being. So says the theory. He can determine, for example, what the numerical ratio of the electron's mass to the proton's will be. Such ratios, called constants of nature, look like arbitrary numbers to us: There is no obvious reason they should take one value rather than another. (Why, for instance, is the strength of gravity in our universe determined by a number with the digits 6673?) But the creator, by fixing certain values for these dozens of constants, could write a subtle message into the very structure of the universe. And, as Linde hastened to point out, such a message would be legible only to physicists.

"You might take this all as a joke," he said, "but perhaps it is not entirely absurd. It may be the explanation for why the world we live in is so weird. On the evidence, our universe was created not by a divine being, but by a physicist hacker."

Linde's theory gives scientific muscle to the notion of a universe created by an intelligent being. It might be congenial to Gnostics, who believe that the material world was fashioned not by a benevolent supreme being but by an evil demiurge. More orthodox believers, on the other hand, will seek refuge in the question, "But who created the physicist hacker?" Let's hope it's not hackers all the way up.

Jim Holt writes the "Egghead" column for *Slate*. He also writes for *The New Yorker* and the *New York Times Magazine*.

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