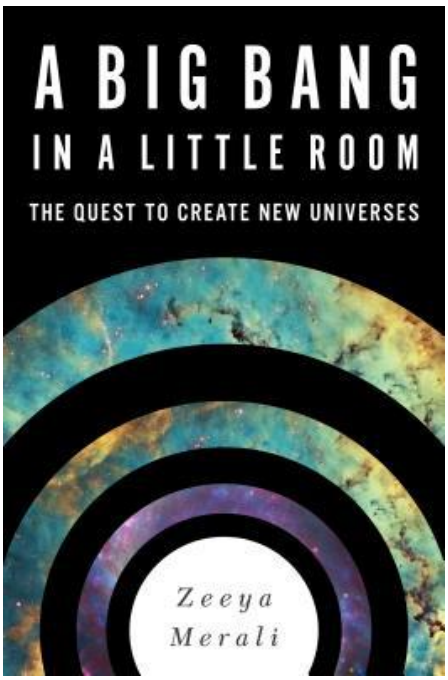

A Big Bang in a Little Room: The Quest to Create New Universes

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An award-winning science writer takes us into the lab to answer some of life's biggest questions: How was the universe created? And could we create our own?

What if you could become God, with the ability to build a whole new universe? As startling as it sounds, modern physics suggests that within the next two decades, scientists may be able to perform this seemingly divine feat-to concoct an entirely new baby universe, complete with its own physical laws, star systems, galaxies, and even intelligent life. A Big Bang in a Little Room takes the reader on a journey through the history of cosmology and unravels-particle by particle, theory by theory, and experiment by experiment-the ideas behind this provocative claim made by some of the most respected physicists alive today. Beyond simply explaining the science, *A Big Bang in a Little Room* also tells the story of the people who have been laboring for more than thirty years to make this seemingly impossible dream a reality. What has driven them to continue on what would seem, at first glance, to be a quixotic quest?

This mind-boggling book reveals that we can nurse other worlds in the tiny confines of a lab, raising a daunting prospect: Was our universe, too, brought into existence by a daring creator?

A Big Bang in a Little Room: The Quest to Create New Universes Details

Date	:	Published February 14th 2017 by Basic Books
ISBN	:	9780465065912
Author	:	Zeeya Merali
Format	:	Hardcover 236 pages
Genre	:	Science, Nonfiction, Physics, Environment, Nature, Reference, Research, Philosophy, Astronomy

From Reader Review A Big Bang in a Little Room: The Quest to Create New Universes for online ebook

Kai Knetsch says

I generally like this topic, but I didn't love this book. It was just OK. Because I like the topic so much, it got me through the book. But I didn't like the constant religious connections every other page. The book is about 90% background info, and only 10% content on creating new universes, which was a little disappointing too. But it was a good refresher.

Rama says

Playing God with the physics of nature

The idea that the universe was started by intelligent beings has been a staple of science fiction writers for many years. And these beings have included a message or a hidden code in the cosmos to tell us how it was done. Several physicists have speculated on the creation of a universe in a lab using inflationary dynamics of false vacuum bubbles. In particular, Physicist Andrei Linde of Stanford University suggested creating a baby universe using fine-tuned physical constants to send a message to the occupants of that universe. Codes may also be hidden in the digits of Pi or the Riemann Zeta function; it could be in the cosmic microwave background (CMB), which is in effect a giant billboard in the sky, the blip from the origin of the universe. There are also cosmic neutrinos, or gravitational waves (ripples in spacetime), or photons/the speed of light could also be carrying this message.

In this book author Zeeya Merali focuses as how current knowledge in physics and cosmology help cosmologists create baby universes with its own set of physical laws. Secondly could we find the Ultimate Truth, the force behind the creation of space, time, and matter (energy)? Is there a God behind all this? Where is the link between us and the Creator? The book discusses if science proves the beliefs held by an established religion? Religion is one of the motivating factors for the author as she interviews numerous physicists and their contribution to cosmology. It becomes apparent why The Templeton Foundation and its “Spiritual Progress” funded this project. Each chapter focuses on one key subtopic and features conversations with physicists. The diversity of scientists’ religious beliefs is an interesting topic, and author freely expresses her own religious beliefs, which explains her enthusiasm for bringing physicists with strong religious orientation.

Readers who believe in scientific evidences, and the veracity scientific explanations may find this book unbearable. Even religious readers may also be bored because of weak interplay between science and religion. Case in point, the reflections of physicist Antoine Suarez. He shares his religious convictions convinced him to plan physics experiments that would disprove quantum physics, and when it did not, he found a new way to fit his god into this picture, by embracing the “many worlds interpretation” of quantum physics proposed by physicist Hugh Everett.

There are several notable figures in science who have openly criticized finding god in physics and biology. Renowned physicist Stephen Hawking famously said in an interview in June 2015 that there is no god and science is able to explain the origination of everything. Hawking also said that before we understood science, it was natural to believe that God created the universe. But now science offers a more convincing explanation about creation and the origin of the universe. He suggested that it is unnecessary to invoke God. Theoretical chemist Peter Atkins of University of Oxford has pointed out on the incompatibility of science

and religion. He observes that the religion scorns the power of human comprehension, and science encourages inquiry and reasoning. In one interview with Ben Stein, Atkins said that the religion was "a fantasy", and "completely empty of any explanatory content. It is also evil! Evolutionary biologist Richard Dawkins is another prominent critic of religion said that religion is both a source of conflict and a justification for belief without evidence. It is not based on evidence and called it "one of the world's great evils".

Merali’s true intentions show up when she observes that string theory and inflation may be hiding the truth that God may have created heavens and earth. She focuses on such topics as the relation between the laws of physics and God’s happiness, the existence of a physical “consciousness field,” and how quantum physics may support religious beliefs such as life after death, and resurrection. She hopes that within the next few decades physicists may be able to create baby universes. This is fiction than science, since the data from the LHC particle accelerator is not supporting her wish. We need scientific claims that can be backed up with evidence and not by wishful thinking. She ignores one key question in this book. Do humans have moral and ethical right to tinker with cosmos?

Peter Herrmann says

Eye opening, at several levels. I try to keep up with science, and know that there have been various versions of multiverse theories over the past few decades, but was unaware of how many and of the details, and of the fact that the LHC might be already .. or soon to be - churning them out. Or not. One reviewer here criticized the shallowness of her coverage .... but I think this book was not meant to be an in-depth treatise or text book on cosmological theories (as he seemed to think it ought be) so much as an overview ... because there is a lot of ground (or should I say 'space' ?) to be covered. As an overview I think it is good. Several other reviewers misinterpreted - I think - her discussion of the theological viewpoints of some of the prominent scientists in this field. As an atheist myself I was NOT affronted by these views - as these reviewers obviously were, nor do I attribute these scientists' views to the author (as these reviewers did); I simply found it surprising and informative and thought provoking that there are cosmologists and scientists (not many, I surmise) who have religious views that can also accommodate such phenomena as strings and multiverses. I think some of these reviewers - who accuse of her inserting her own religious views - need to get a grip (and perhaps read her words a little more closely). If, in fact, I misread her words and she did insert some of her own views (which I strongly doubt) - it was done in a most unobjectionable way (IMHO). Or I think I would have noticed. Also, the theological discussions were few and far between and did not take up much discussion. I found this a most thought provoking book and will look for more of her books (if any now, or in future).

Peter Mcloughlin says

A short book which explores the idea of creating a universe in a lab. Inflation, the multiverse, the simulation hypothesis all make an appearance as well as some of the physics ideas to how it could be possible to make your own universe. Also, it raises the possibility that our own little universe might have been cooked up in someone's garage.

Robert Spillman says

A Big Bang in a Little Room is a surprising helpful book that was fun to read, but confirms how little I really

understand about modern physics. Zeeya Merali takes the reader on a cruise through the current beliefs in physics as they pertain to the science behind black holes, spacetime, and the origin of matter and universes. The Big Bang is a primary focus, and the Little Room refers to the possibility of creating a small "Big Bang" in instruments such as the Large Hadron Collider(LHC) in Europe.

There is enough science to please the informed, but it is presented in an explanatory fashion that others will tolerate enough to learn the basic ideas. Not easy, but factual and thoroughly interesting.

It is punctuated with a narrative of the individuals behind these ideas, such as an anecdote about Steven Hawking in the audience of a physics meeting listening to a talk on black holes. Hawking's ALS has him in a wheelchair, uses a computer to "speak," and has a small group of assistants, but his mind is alert and he disagreed with a couple of points made by the speaker. Afterwards, the two continued their debate and started developing alternative ideas that led them to move to a separate room. Hawking continued his debate for hours, resulting in the belief he was kidnapped, with the appropriate ensuing brouhaha.

Sections of the narrative explain the thinking behind parallel universes and the basic mathematics that lead to these hypotheses. Too much for my frame of reference, but I'll allow that equations are often surprisingly useful in predicting the natural world.

Raising the possibility of parallel universes and preordained destiny often conflicts with many belief systems of a God, so Merali explores the implications with those physicists who hold religious beliefs. "How would these ideas impact your belief in a God?" The answers were thoughtful, sometimes painful, but explore a boundary between science and religion that was fascinating.

It takes a while to read the book, but the level and balance are just right for those of us who are interested, but can't survive the calculations.

P.J. Wetzel says

Is our universe the offspring of a 'parent' universe that we can't see but which is responsible for our reality being the way it is?

Zeeya Merali's new book 'A Big Bang in a Little Room' puts this question into sharp focus. The title of the book could have been 'A Physics Hacker’s Recipe for Creating an Embryo Universe in a Test Tube.' Since the broad acceptance of the theory of inflation, which says that our universe began as a much smaller piece of 'stuff', physicists have been studying the equations and have come to the conclusion that a baby universe can start with as small as one ounce of mass - about 28 grams, an amount that is clearly within our grasp to experiment with.

So ... can we create a universe? Merali pursues the question through a series of a dozen interviews with physicists who have addressed it. The answer seems to be yes. Whoa. Normal flawed human beings as creators of a universe.

What would our creation look like? Could it spawn life, as ours did? What are our responsibilities to it? These are some of the mind-boggling questions that she explores.

And yet it appears we would have difficulties knowing much of anything about our creation. I wonder if Merali gave any thought to titling her book ‘The Ultimate Tempest in a Teapot," because before this universe has a chance to grow much beyond its initial embryo, it would be lost to observation, much like a black hole

with its event horizon. Our test tube would emit a signature of the 'creation' event and then would appear empty. Our offspring would be silent forever after.

But the implications are immense. If the physics Merali discusses prove correct, then Humanity stands on the cusp of being able to play God. With inflation working its bizarre 'magic' our creation could grow its own galaxies, stars, and planets, to produce living, breathing, sentient creatures capable of seeking the identity of their creator and questioning their reason for being.

If we can create such a universe, then we can't rule out that our own universe was thus created. We can't rule out that 'God' could be a group of physics geeks in a lab. Or something else. But suddenly there is a hint that we might be able to 'prove' God is real. Merali seems to like that idea.

In “A Big Bang in a Little Room” the author walks us through the physics step by step with the aid of interviews of a dozen of the key luminaries in the field including Alan Guth, Andre Linde, and Alexander Vilenkin. But she goes beyond the physics.

Zeeya Merali believes “in a personal God.” She squares with us about that up front. At the same time, she takes pains to establish her legitimate credentials as a scientist. Merali is no “crackpot.” She earned her PhD in theoretical physics and cosmology under Robert Brandenberger at Brown. But there is a slant to this book that is informed by her religious position. Slant, but no overt bias, I would judge. She takes pains to avoid contaminating or conflating the subject science with her beliefs. Yet each of her interviews contains a significant synopsis of the subject’s religious persuasion, and it is clear that there is passion behind that content. She appears to have chosen some of her interview subjects based on their beliefs and may have deliberately avoided ardent atheists such as Sean Carroll and Lee Smolin.

One quote from her interview with Stephen Hsu on page 25 came the closest to setting off an alarm for me. The discussion is about searching for a possible message from a putative creator of our universe coded within the Cosmic Microwave Background radiation that permeates it. Hsu is quoted as saying “If you think about stepping outside theoretical physics for a minute, you just say ‘What’s the most exciting thing you could discover?’ Well, if someone could give you, quote, ‘proof that our universe was created by a loving God,’ that would be pretty good, right? And this is coming up with a quasi-realistic way in which that could actually happen.”

Really? That’s just so random and specific. The general question is a profound one, and I would have preferred a more open minded exploration of it. For me, in the context of this book and its subject matter, the most exciting thing that we could discover is ‘proof that universes can reproduce, and better yet evolve’. If I’m going to get specific I’m going to ask for a parent universe that has passed its design, with quantum mutations, to offspring universes such that we can affirm a genealogy—an inheritance—and trace the origin of our finely tuned, life-friendly reality back to an ex-nihilo tunneling/emergence of some crude primordial self-replicating, rule-based order from the random, timeless, meaningless, all-pervasive vacuum, the ‘uncaused cause’ (discussed by Suarez on the top of page 46 and Vilenkin on page 102 though they seem to take the position that the mathematics somehow precedes the physical emergence rather than merely being inherent to what emerged). For me the exciting prospect of child universes speaks of an evolution that could be every bit as patient and long-suffering as the emergence of life as we know it from the elemental debris of exploding stars. But that's just me.

The science of creating universes is not new, and most of the ground-breaking advances that Merali covers date back thirty years. I first became aware of (and excited about) the possibility of creating a child universe when I read Alan Guth’s 1997 “The Inflationary Universe: A Quest for a New Theory of Cosmic Origins” (Perseus Books). In fact the key diagram in Merali’s Book, on page 128, is taken directly from page 262 of Guth’s book. Merali covers all the relevant science from then to now, though, and the advancements bring us closer to achieving the test-tube universe. In truth, Merali’s best candidate for the ‘Little Room’ is the 27-

kilometer long circular tunnel, the particle accelerator ring of the Large Hadron Collider and the most powerful ‘atom-smasher’ humans have ever created. There we would hope to both create and detect a signature of our baby universe. New to me was the calculation that such an event would indeed produce a unique detectable signature that would confirm our success.

Fun stuff. As I indicated earlier, we would only have a fraction of a second before the baby universe severs the ‘wormhole’ umbilical connecting it to us, its parent universe. Merali asks “Could we send a message to prospective intelligent beings who might emerge in that child universe?” and yet she doesn’t explore many of the possible ways to do so. She seems to pin her hopes on forcing a specific configuration rooted in String theory. But there seems a simpler way, assuming we are able to entangle in-going information, perhaps none is lost (?) - the ultimate spooky action at a distance - the ultimate 'external' signal from 'God'. The diagram on page 128 reveals that a fragment of ‘true vacuum’ -- ordinary space -- tags along into the new universe encircling the rip-roaring ‘false vacuum’ big bang explosion. The discussion on page 126 reveals that a ‘ship’ sent into that remnant of the parent universe would not be swallowed by the exponentially inflating embryo. Hey. Maybe it's just the dreamings of a sci-fi writer, but it seems plausible that that ‘ship’ could deliver an information-packed ‘bible’—perhaps a hard drive with all the knowledge we could cram into it, or more intriguingly, a book of life—an ‘ark’ carrying the DNA of every living thing.

Here is where I found the book lacking - or at least where I craved a whole lot more. What happens to that little remnant fragment from of the old universe, and to a putative ‘bible’ sent into it? Could it convey a message that would have hope of surviving? What are the constraints regarding entanglement and information preservation? Wouldn’t that putative ship ‘seed’ the baby universe with the parent’s physical constants and properties, perhaps with quantum-scale mutations? Could it possibly seed the baby universe with life itself—the ultimate ‘panspermia’? Merali is virtually silent on these questions. Back around 2000 I wrote and emailed Alan Guth asking what this remnant fragment could accomplish, but I got no reply. I was just asking! But I guess my mail got put in the “crackpot” file though I hold a PhD in Atmospheric Science from Colorado State University and worked 25 years as a research meteorologist at NASA. Since Merali has the established credentials, I had hoped for her to ask these questions and provide more answers.

Anyhow, when I saw Merali’s book advertised, I got excited. I was hoping for an update to the baby universe ideas Guth had written about in his book, and she provides that, and so I recommend this book. It is a solid, well-written introduction for the lay person who is not familiar with the physics of creating a child universe. And I got a wonderful quote that I’m going to use and paraphrase:

“Because it might happen, in the quantum world, it *will* happen if you wait long enough” (page 36, the emphasis is mine). My paraphrase assumes that the quantum universe is timeless until an observer is interjected, so if I understand correctly ‘waiting long enough’ is no problem. Therefore my paraphrase is “If it is possible, it has happened.”

Merali has carefully and clearly outlined the ‘blueprint’ or ‘recipe’ by which a good ‘Physics Hacker’ can manufacture an entire universe. It all seems perfectly possible. So … has it happened already? Are we living in a child universe? Are we poised to conceive the next generation? Wonderfully provocative questions. Perhaps the biggest question is 'Just because we can do it, should we?' What are our ethical responsibilities? Her take-away answer to that might surprise you. It did me. I won't give it away.

Thank you for the engrossing discussion, Zeeya Merali.

Xavier Alexandre says

From an author whose impeccable credentials allow her to talk meaningfully about the very last discoveries of cosmology, we get a very clear and structured description of our potential ability to spawn our very own new universes. The mere fact that this may be possible could profoundly change our beliefs, at least for those of us who want to base our emotions to rhyme with reason.

The book is structured as an investigation, with each chapter devoted to one or 2 scientists, each detailing the bricks they bring to the edifice.

As a scientific writer, Zeeya Merali is also unconstrained by politically correct "publication speak" and also addresses some of the potential implications of the above for matters such as the existence of G-d, free will or lack thereof, as well as our moral duty towards any creature we may spawn.

We may have been ourselves spawned in such a way... Not unlike finding G-d's cooking recipe. Just imagine.

Warmly recommended.

Geoff Walling says

Holy Cow! These people have already created black holes at the LHC (which I didn't know), and are seriously thinking they can create mini universes complete with life. Don't worry - there's only a small chance that they will destroy the world doing it. Very well written and a great update about what's been happening in the physics world over the last few years. Not much math, so it's easy to follow.

Kathy says

Author Merali does a very good job of explaining theoretical physics and cosmology to those of us without the advanced math, interspersing the various theories with the personal backgrounds of the various physicists, and exploring the moral/ethical/religious/metaphysical implications as well. How would we create a new universe? How would we know if we had, if it occupies a different time/space? Do we bear an ethical responsibility to any life that may evolve in our baby universe? Very dense ideas, I need to follow this up with something light and fluffy.

Dan Graser says

A little throat-clearing first: I find this area of physics incredibly fascinating and the potential for the creation of universes in a laboratory such as the cauldrons of the LHC is something I think should be studied and discussed more often. I also enjoy the intersection of science and religion and I enjoy works where that line is discussed in an informed way by scholars qualified to do so. Every author has their own beliefs/biases and they are entitled to them.

Now, having said that, this is a just a frustrating mess of superficial biography, limited discussion of the topic identified in the book's own title, trite discussions of important theories (this contains the shortest and most annoyingly insipid summary of Loop Quantum Gravity in print), and a ridiculously vapid insertion of bizarre theistic concepts into areas they don't even remotely come close to addressing. This constant need to bring

the author's personal religious beliefs into genuinely interesting areas of science has all of the effect of adding emojis to a Yeats poem. Sad to say, this is one to be avoided, just follow the research happening at CERN and you will be much more informed and interested as a result.

Caitlin Merriman says

This book is nothing like I thought it would be, but it was wonderful to read. It’s at once a well and clearly-written account of a small collection of interesting cosmological theories and their theorists, a recounting of various interviews with theoretical physicists, and an examination of the points at which physics, philosophy and religion intersect. I love the way Merali uses her simple style of writing to communicate the big complex ideas she’s examining. Well worth a read.

Jerry says

This book tells the history of cosmology through the perspective of several notable scientists and uses as a unifying theme the idea of creating a new universe in the laboratory.

It is an engaging book, well written and easy to read. It explains how inflation worked to enormously expand the size of space after the big bang. Talks about the different kinds of black holes and about white hole singularity. Talks about mathematical ideas that suggest a universe might be formed from energy in a false vacuum equivalent to 25 grams. Talks about how a baby universe would look like a black hole attached to our universe by a wormhole which would then break off leaving us with no further access to it. Talks about why a universe forming in a laboratory such as the Large Hadron Collider or even naturally would not expand in a way that impinged on the space of our universe. Talks about the ethics of trying to make a baby universe in the laboratory.

Steven Felicelli says

I'd strayed from quantum physics in my pop-science-reading (to neuroscience), because findings seemed to have plateaued. This was a rousing return. A heavy book about quantum cosmology, god and equations that suggest time doesn't exists beyond our perception of it!?!

Jennifer says

First book of the new year, and it's a good one. Zeeya Merali asks whether we'll be able to construct a baby universe in a laboratory, given what we know now of the biggest and smallest forces in the universe. More, she asks whether we *should* do that--is it wise or cruel, possibly to create new life, even new sentience, without the ability to help that life? Because as far as anyone can tell, a baby universe would almost immediately be pinched off from our own, forever out of reach of its creators. No matter what the reader's spiritual leanings, this book is bound to raise some interesting, even uncomfortable questions.

A Big Bang in a Little Room asks some fascinating questions, but for me the most valuable aspect of the book was the way in which it showed the scientific method at work--questions, hypotheses, experiments,

failures, redirections. Most science books present the current state of the field with maybe a little attention to past theories, but Merali speaks to many of the scientists who've been working on the problem over half a century or more, and shows how they link up with work done early in the twentieth century. It's a story of false starts and startling insights, and one whose ending has not yet been written.

Peter Tillman says

OK, I'm going to declare defeat here, and put this in the DNF pile. This book is what you get when you turn loose an enthusiastic young theoretical physicist onto an intriguing, but currently untestable, idea. She has some interesting interviews with fellow-physicists, and writes about such topics as, could our cosmos be a simulation? Did our Alien Overlords leave a message hidden in the cosmic microwave background?

Then she gets into topics like free will, religion and quantum physics, and Vipassana meditation, and I started getting restless, and skimming. Mind, this isn't Tao of Physics stuff. She's talking to respectable academic physicists, who have a constitutional right to practice Vipassana meditation on their own time. But I don't have to read about it.

And for the universe as a simulation, besides being untestable (although people have looked), I mean, what would be the point? As one of her interviewees pointed out.

I'm hesitant to grade the book, but for what I read, my totally subjective rating is about 2.5 stars. Rounded down because, well, my time is gone, and I don't care about Vipassana meditation, though it's a great name. Probably better to leave the pocket universes for the SF writers.

The Physics Today review that led me to try to read it is gone now, but here's an excerpt: http://physicsworld.com/cws/article/i...

"The thought of a scientist trying to design a laboratory experiment in which to create a whole new universe probably sounds like it belongs in the plot of a science-fiction B-movie. But as author Zeeya Merali explains in her new book A?Big Bang in a Little Room, there are more than a few eminent physicists who think that this is theoretically possible – although there’s a long way to go before it can be achieved in practice. There are many variations on the general idea of how this apparently outrageous plan might be turned into reality, and while they are all speculative, the basic idea underpinning them is part of the cosmological?mainstream. ... "
