Dr. Perry Phillips, Three Pillars of the Big Bang, Podcast

Biblicalelearning.org by Ted Hildebrandt

Picture a crime scene, right? But instead of yellow police tape cordoning off a city block, the perimeter just stretches across the entire observable universe. Yeah, that is a big crime scene. Right.

And there are no eyewitnesses to interview. There's no security camera footage. And the actual event in question happened roughly 14 billion years ago.

We are walking into the absolute ultimate cold case. It really is the definitive forensic investigation. Yeah.

Because you have all this scattered cosmic debris, galaxies, radiation, choice elements. And as the investigator, you have to work backward from the shrapnel. Exactly.

You have to reverse engineer the blast radius, basically, to figure out exactly what the explosive device was. Yeah. Like the precise temperature of the detonation and the exact millisecond it went off.

Well, welcome to today's deep dive. Our mission today is to unpack a really fascinating presentation by Dr. Perry Phillips. He's an astrophysicist from Cornell University, and he explores what he brilliantly terms CSI cosmology.

It's such a great framing. It is. So for you listening, whether you are deeply immersed in the sciences or, you know, studying theology or just someone fascinated by how we deduce the unknown, this discussion is really about the mechanics of discovery.

Right. We're getting into the how. Yeah.

We are going to deconstruct the three pillars of the Big Bang Theory, looking closely at how scientists actually know what they know. But we are also analyzing how Dr. Phillips takes this 13.7 billion year old expanding universe and reconciles it with the biblical concept of a creator. And that's a delicate balance.

It is. Now, just to be entirely clear up front, we aren't here to endorse a specific stance on the politics or theology of, like, creationism versus secular science. We are just here to impartially report on the source material and examine how this particular astrophysicist bridges that perceived gap in his own work.

Right. Because the value of the source material really lies in its framework. Like, how does empirical data interact with existential belief? It challenges the modern assumption that scientific rigor and theological wonder have to be mutually exclusive.

You know, it offers a really compelling look at the philosophy of science. OK, let's unpack this, because before we can even get into the complex astrophysics and the literal mechanics of the Big Bang, we have to address the philosophical elephant in the room. Oh, sure.

How do science and theology even coexist in this presentation without inherently canceling each other out? So Dr. Phillips addresses this by utilizing a concept that was originally framed by C.S. Lewis. Oh, the boiling teapot thing. Exactly.

Imagine you walk into a kitchen and there is a teapot whistling on the stove. You ask the question, why is that teapot boiling? I could provide a thoroughly accurate, strictly physical explanation for that. Right.

Like the actual mechanics. Right. I could explain that the burner ignited, creating a heat source that transferred thermal energy through conduction to the metal base of the pot.

I could describe how the water heated through convection, hit a phase change threshold, turned it to steam, and forced air through the spout to create an acoustic whistle. I mean, that's incredibly thorough. But I could also just say Mrs. Lewis wanted a cup of tea.

Yes, exactly. So it's like asking why a profound historic oil painting exists. I could say it exists because of the specific chemical composition of the linseed oil and the pigments binding to the woven canvas fibers.

Or I could say it exists because the painter experienced a deep emotional trauma and needed a medium to express it. Yeah. Both explanations are entirely true at the exact same time.

They just answer different fundamental types of why. Right. And that dual lens approach is the entire foundation of Dr. Phillips's CSI cosmology.

He argues that stating God created the heavens and the earth doesn't in any way invalidate or contradict the scientific mechanics of how the universe physically formed roughly 13.72 billion years ago. Give or take 0.03 billion years, according to the data. Right.

Exactly. The scientific method is the tool used to answer the mechanical how and when. And theology is the framework used to explore the existential who and why.

So by establishing that these two lenses are parallel rather than oppositional, we can actually step into the crime scene and start analyzing the physical evidence. Well, if we're looking for evidence, the most logical place to start is the first major clue we ever found. We transition to pillar number one, the expanding universe.

This is a big one. It is. To understand the mechanics of this, we have to rewind to 1912 and look at the work of astronomer Vesto Slipher.

Right. At that point in history, the prevailing scientific consensus was that the universe was entirely static and infinite. The assumption was that galaxies were just drifting around in a void, completely untethered, like air molecules in a room.

Yeah. And if that were true, you would expect a random distribution of movement, like some galaxies drifting toward us, some drifting away. But Slipher started analyzing the light from these galaxies, specifically looking at their spectrum.

Using the Doppler effect, right? Yes. But applied to light waves rather than sound. Oh, like the train horn analogy.

Exactly like that. When a train approaches you, the sound waves compress. So the pitch goes up with light.

When an object emitting light moves toward the observer, the light waves are compressed, shifting toward the blue end of the visible spectrum. Oh, shit. Right.

And when the object moves away, the waves stretch out, shifting toward the red end. So Slipher meticulously cataloged these galactic emissions and realized something totally shocking. Nearly every single galaxy he observed was redshifted.

Yeah. They weren't drifting randomly. They were all fleeing.

And the implication of that was so deeply disruptive that even Albert Einstein resisted it. Oh, Einstein hated it at first. He really did.

He had just formulated his equations for general relativity, which essentially dictated that the matter and energy of the universe were intrinsically tied to its geometry. But his own unvarnished math revealed a universe that could not sit still. It had to be dynamic, either expanding outward or collapsing inward under its own gravity.

Because the entire scientific community just knew the universe was static. Einstein actually introduced a cosmological constant into his equations. A literal fudge factor.

Yes. A mathematical fudge factor designed specifically to counteract gravity and force his modeled universe to just hold still. And it took a Belgian priest and theoretical physicist named Georges Lemaitre to look at those equations and suggest that the universe was, in fact, expanding.

But the theoretical math needed empirical proof. Right. Which arrived via Edwin Hubble.

He used the massive Mount Palomar telescope to measure not just the redshift of these galaxies, but their actual distance from Earth. And the how of that calculation is crucial here. Hubble didn't just guess the distance.

He looked for Cepheid variable stars within those distant galaxies, which are incredibly useful stars. They are. They are specific types of stars that pulse in brightness at a very predictable rate based on their true intrinsic luminosity.

By measuring how fast a Cepheid star pulses, astronomers know exactly how bright it actually is. So by comparing that true brightness to how dim it appears from Earth, they can calculate the exact distance. It's like knowing exactly how bright a 100-watt light bulb is and then measuring how dim it looks to figure out how many miles down the road it is.

Exactly. And by combining those precise distance measurements with Slipher's redshift data, Hubble identified a definitive mathematical pattern, which we now know as Hubble's law. The farther away a galaxy is from us, the faster it's receding.

Yes. The speed of recession is proportional to the distance. Dr. Phillips uses the Raisin Bread model to visualize this, and it perfectly illustrates the mechanics.

Oh, I love this model. It's so clear. Imagine a loaf of raisin bread baking in the oven.

The dough represents the fabric of space itself, and the raisins are the galaxies. If you have two raisins that start one centimeter apart and, after an hour of baking, they are two centimeters apart, they effectively moved away from each other at one centimeter per hour. Right.

But take two raisins that started 16 centimeters apart. As that same dough doubles in size, they end up 32 centimeters apart. They moved 16 centimeters in that same single hour.

So the galaxies aren't just flying through pre-existing empty space. Space itself, the dough, is actively swelling and dragging the matter along with it. Exactly.

Which logically dictates our next step in the investigation. If the fabric of space is currently expanding outward, running the timeline in reverse means the universe is contracting. Right.

Playing the tape backward. Yeah. If you rewind the expansion of the dough 14 billion years, all those galaxies, all that matter, and all that energy had to be compressed into a remarkably tiny, dense point.

That state of infinite density is the Big Bang. Here's where it gets really interesting, though. Because if we look at the modern understanding of this expansion, there is a massive twist.

Oh, yeah. The dark energy twist. Yeah.

I mean, wait, if gravity is an attractive force and this expanding universe is full of incredibly massive galaxy clusters constantly exerting gravitational pull on one another, shouldn't the expansion be hitting the brakes? How can it possibly be hitting the gas? That is the exact question astrophysicists were asking for decades. Everyone expected the expansion to be slowing down under the collective gravitational weight of the universe's mass. It just makes sense.

If I throw a baseball straight up into the air, the initial explosive energy pushes it upward, but the Earth's gravity immediately starts fighting that momentum, slowing it down until it arcs and falls. But in the late 1990s, observations of distant supernovae revealed the exact opposite, roughly nine billion years into the universe's lifespan. The expansion didn't just fail to slow down.

It began to accelerate. To use the baseball analogy, that is like throwing a ball into the air, watching it slow down as it rises, and then suddenly halfway to the clouds, it just hits an invisible gas pedal and rockets out of the atmosphere. It completely defies the intuitive laws of physics.

It's wild. It really is. It forced a total paradigm shift.

To explain this acceleration, cosmologists had to theorize an entirely new property of space. We call it dark energy. It isn't a substance we can capture in a jar.

It appears to be an inherent energy native to the vacuum of space itself. So it's basically an anti-gravity force. Basically.

As space expands, more space is created, which means more dark energy is created, pushing the universe apart faster and faster in a compounding runaway effect. OK, so we have an expanding universe which establishes Pillar 1, but this creates a profound causal chain. If rewinding that expansion means everything was once packed into a microscopically dense, incredibly pressurized point, that point had to be unimaginably hot.

Very hot. So the logical next question for our crime scene is, did a fire that massive leave behind any cosmic smoke? This leads us to Pillar 2, the cosmic microwave background or the cosmic campfire. I like the campfire analogy.

If you hike deep into a forest and stumble upon a clearing with a ring of stones, you can determine if a campfire was burning there recently simply by touching the rocks. Right. Even if the flames are out.

Exactly. Even if the campers are long gone, the residual thermal energy tells a story. In the 1940s, physicists George Gummo, Ralph Alpher and Robert Herman applied this exact logic to the universe.

They predicted that if the cosmos originated in an unimaginably hot, dense state, the residual heat- this Planck radiation from that initial flash of light- should still be permeating the entire universe. But wait, because the universe has been expanding for 14 billion years, that initial intensely energetic light wouldn't look like visible light anymore, right? Correct. The expansion of space stretches the wavelengths of the light traveling through it.

So the incredibly short, high-energy gamma waves from the early universe have been stretched out over billions of years, elongating into the microwave region of the electromagnetic spectrum. Got it. Gummo and his team predicted this background radiation would be universally present and uniformly cold, hovering just a few degrees above absolute zero.

And the narrative of how this predicted radiation was actually discovered in the real world is easily one of the most serendipitous moments in scientific history. It really is. Fast forward to 1964.

Arno Penzias and Robert Wilson, two scientists working for Bell Labs, were calibrating a highly sensitive horn-shaped microwave antenna in New Jersey. They were just trying to bounce radio signals off echo balloon satellites. But their receiver was plagued by this constant, uniform, low-frequency hiss.

They systematically attempted to eliminate every conceivable source of interference. They accounted for urban radar from New York City. They checked the internal wiring.

They cooled the receiver with liquid helium. And then the pigeons. Yes.

They even climbed into the giant antenna and discovered that a flock of pigeons had been roosting inside. The metal was coated in pigeon droppings, which they meticulously scrubbed out, documenting it in their notes as a white dielectric material. I love that they are out there with wire brushes, literally scrubbing pigeon poop off a state-of-the-art satellite dish, entirely convinced that bird droppings are ruining their telecommunications experiment.

But even after the dish is pristine, the hiss remains. And it doesn't change when they point the antenna at the sun or the Milky Way or empty space. It is coming from everywhere all at once.

Because it wasn't local interference. Merely miles away at Princeton University, a team led by Robert Dick was actively constructing a specialized radiometer designed specifically to hunt for the residual heat Dumont had predicted decades earlier. Oh, wow.

So close. Yeah. When the two groups eventually communicated, Dick realized his team had been scooped.

Penzias and Wilson hadn't found instrument noise. They had accidentally tuned their antenna into the fading thermal echo of the Big Bang itself. They had discovered the cosmic microwave background.

That is incredible. And we later launched highly specialized satellites like Sokobe, WNP and Planck to perfectly map this microwave radiation across the entire sky. And the data they returned matched the exact mathematical curve predicted for the thermal remnant of the Big Bang.

To put this in a wonderfully mundane perspective for you listening, if you turn on an old analog television set and tune it to a dead channel displaying nothing but static snow, roughly three to 10 percent of that visual static is your television antenna physically intercepting the remnant radiation of the creation of the universe. Which is just mind-blowing to think about. Truly.

And the mapping of the cosmic microwave background did more than just prove the universe started hot. By analyzing the incredibly slight temperature variations, the acoustic peaks within that radiation, astrophysicists were able to calculate the precise density and composition of the entire universe. And the results triggered an absolute existential crisis in cosmology.

Oh, massive crisis. Because the CMB analysis reveals that everything we can interact with, protons, neutrons, electrons, the atomic building blocks of planets, stars and human beings, accounts for roughly four percent of the universe. Just four percent.

That is all the baryonic matter in existence. It's like we've been studying the foam on top of an ocean thinking we understood water, only to realize we have no idea what the ocean itself is actually made of. That's a great way to put it.

The data confirmed that 23 percent of the universe consists of cold, dark matter. We know it exists because we can observe its gravitational effect. It provides the unseen mass required to hold spinning galaxies together, preventing them from just tearing themselves apart.

Right. And the remaining 73 percent is the dark energy we discussed, the driving force accelerating the expansion of space. So we exist in a universe where 96 percent of the total mass-energy budget is comprised of phenomena we can observe but cannot fully define.

Which makes the four percent of normal matter we can define incredibly important. We have established that the universe is expanding outward from a hot, dense origin point. We've detected the residual thermal radiation.

The next logical investigative step is analyzing the debris itself. Exactly. What did it make? Right.

What exactly did that extreme heat forge? This brings us to pillar three, the three-minute recipe or the elemental abundance. So in the absolute earliest moments of the Big Bang, the ambient temperature was so profoundly high that basic atomic structures just couldn't exist. Quarks couldn't bind into protons.

And once protons did form, the thermokinetic energy was too intense for them to capture electrons. Everything was just moving too fast. Right.

But as the universe rapidly expanded, the temperature plummeted. So if the early universe was effectively a giant, incredibly dense fusion reactor, I would assume it just started churning out all the heavy elements. Like it seems logical that this initial explosion forged the carbon in our cells, the oxygen we breathe, and the iron deep in the Earth's core.

That is a very common assumption. But the thermodynamics of the Big Bang actually didn't allow for it. The universe was expanding and cooling at such a rapid rate that the window for nucleosynthesis, the forming of new atomic nuclei, was incredibly narrow.

How narrow? The conditions were only right for about three minutes. Wow. To fuse elements, you have to overcome the intense electrostatic repulsion between positively charged protons.

You need enough heat and pressure to force them close enough that the strong nuclear force takes over and brings them together. And three minutes wasn't enough time to build heavy elements like iron. Nowhere near enough.

Those heavier elements require sustained fusion over millions of years, which happens much later in the cores of dying stars that eventually go supernova. OK, so what did it make? The Big Bang only possessed the specific temperature and density required to fuse basic hydrogen protons into helium. After roughly three minutes, the universe had expanded and cooled past the threshold where fusion could occur.

The cosmic forge simply shut down. The mathematical proof of this is where the theory truly locks into place. George Gamow, Ralph Alpher, and Hans Bethes co-authored a foundational paper on this.

And actually, as a quick inside physics joke aside, Gamow only asked Bethes to put his name on the paper with Alpher just so the authors would read Alpher, Bethes and Gamow. Yes, a play on alpha, beta, gamma. It's a legendary bit of physics humor.

Scientists are nerds, but the actual math they performed was: they calculated the decay rates of neutrons and determined that just before fusion began, protons and neutrons were locked in a very specific ratio of seven to one. And what's fascinating here is if you take that precise seven-to-one ratio and run it through the physics of nuclear fusion during that three-minute cooling window, the math dictates an unavoidable outcome, which is the resulting universe must be composed of roughly 75 percent hydrogen and exactly 25 percent helium by mass. The timeline and the temperature strictly prohibit any other result.

And when modern astronomers look out into the universe using spectroscopy to measure the chemical composition of the oldest gas clouds or analyze the atmospheres of ancient giant planets like Jupiter, the ratio of helium is exactly 25 percent, plus or minus just one percent. The sheer precision of that observation cannot be overstated. It's this exact mathematical alignment across all three independent pillars that cements the Big Bang as a solid scientific consensus, not just a guess.

You have the mechanical reality of Hubble's expanding space, the thermal fingerprint of the cosmic microwave background, and the rigid mathematical proof of the 25 percent helium abundance. It is, as Dr. Phillips describes it, a cord of three strands that cannot be easily broken. Right.

So having rigorously laid out this empirical evidence, Dr. Phillips transitions back to the overarching mission of his CSI cosmology. How does an astrophysicist who works with this hard data reconcile it with the theology of creation? He contextualizes it using Proverbs 25.2, which reads, It is the glory of God to conceal a thing, but the honor of kings is to search out a matter. I like that.

Yeah. Dr. Phillips basically frames scientific discovery as an act of uncovering intentional clues. He likens it to parents hiding Easter eggs for their kids.

The creator doesn't obscure the mechanics of the universe to keep humanity ignorant. The clues, the redshift, the microwave background, the helium ratio are hidden specifically so humanity can experience the profound intellectual joy of seeking them out and discovering how the system works. And to demonstrate that this alignment isn't just an exercise in confirmation bias from a theologian, Dr. Phillips points to the writings of Robert Jastrow.

Jastrow was a highly prominent astronomer, a leading scientist at NASA, and notably a self-described agnostic. Right. He did not approach cosmology with any sort of religious mandate.

Not at all. Yet in his book, God and the Astronomers, Jastrow conceded that the empirical astronomical evidence points directly to a surprisingly biblical view of origin. Jastrow highlighted that the scientific narrative reveals a chain of events that commenced suddenly, sharply, and at a definite moment in time.

The astrophysical data points to an explosive beginning out of absolute nothingness, a concept theologians call creatio ex nihilo. The physical evidence demands a sudden creation event. Which prompts Dr. Phillips to pose a deeply challenging question to his audience.

He asks if an agnostic scientist like Robert Jastrow can examine the cold mathematical data of the Big Bang and recognize a clear, undeniable correlation with the sudden Genesis account, why do so many Christians struggle with it? It's a great question. He posits that the astrophysical data doesn't undermine the theology. It simply provides a magnificent, high-definition schematic of the mechanics behind it.

If we connect this to the bigger picture, the core takeaway of this deep dive challenges the modern cultural assumption that data and meaning are mutually exclusive. Dr. Phillips illustrates how an individual can fully engage with the rigorous mathematical reality of a 13.7 billion year old expanding universe while simultaneously maintaining a profound sense of spiritual purpose. Exploring the physical how of the boiling teapot doesn't require you to abandon the intentional why.

Exactly. They aren't enemies. So what does this all mean? You have just walked the perimeter of a 13.7 billion year old crime scene.

You've analyzed the swelling dough of expanding space. You've listened to the ancient microwave echo of the cosmic campfire. And you've verified the strict mathematical recipe that fused exactly 25 percent of the universe into helium.

The evidence left behind in this ultimate cold case is pristine. It's a beautiful picture. But examining all of this leaves me with one final thought, something for you to mull over on your own that wasn't strictly covered in Dr. Phillips's presentation, but is the inevitable consequence of the physics we just unpacked.

OK, where does the logic take us? Well, the Big Bang provides a meticulously detailed account of how the story started. It reveals a universe that began completely connected, deeply unified in a single, infinitely hot, dense point. But earlier we discussed the twist of dark energy.

Right, the antigravity force. Yeah, that inherent property of the vacuum that isn't just expanding space, but actively hitting the gas pedal, driving galaxies apart at an accelerating rate. If that acceleration never ceases, what does that dictate for our future? That's a dark thought, literally.

It is. The unavoidable mathematical conclusion is a scenario cosmologists call the Big Freeze. It points to a distant future where the fabric of space expands so rapidly that every single galaxy is pushed away from every other galaxy faster than the speed of light.

The night sky will eventually become completely void, pitch black, and utterly silent. Wow. The universe that began in total compression, stretching outward until it reaches a state of absolute freezing isolation.

Precisely. We know from the evidence that our universe began in a flash of profound unity. But if dark energy remains constant, the physics suggest it will end in total solitary darkness.

We know how the story started, but how will it ultimately end? Thank you for joining us on this deep dive. Keep looking up, keep asking the big questions, and we will catch you next time.