

Pleasant Springs Church

12-Week Study · A Quantum Case For God

WEEK 5 OF 12

Wave-Particle Duality and Hidden Reality

The double-slit experiment — and the things which are not seen

THE BIG IDEA

When you fire a single electron at a screen with two slits, it behaves like a *wave* — spreading out, interfering with itself, producing an interference pattern. But the moment you set up a detector to *watch* which slit it goes through, it switches and behaves like a *particle*. Reality at the quantum level depends on whether and how it is observed. What we usually call «the seen world» is the surface of a much deeper, much stranger reality the senses do not normally reach. Hebrews 11:3 says exactly this.

If light were only a wave, you would predict that firing light through two slits onto a screen would produce two bright bands — one behind each slit. But the experiment, first done by Thomas Young in 1801, produces an *interference pattern*: many bands, alternating bright and dark. That is the classic fingerprint of waves — like ripples in a pond — overlapping and cancelling and reinforcing one another. So light must be a wave.

But Einstein in 1905 (the same year as his special relativity paper) showed that light can also behave as discrete particles called *photons* — tiny packets of energy. The Nobel committee gave him the prize for this, not for relativity. So light must be a particle.

Which is it? Both. Quantum physics calls this **wave-particle duality**. Light is both, and what it shows up as at any given moment depends on the situation. The bigger surprise came when physicists ran the same double-slit experiment with single *electrons* — ordinary particles of matter, fired one at a time. They produced an interference pattern too. The single electron, somehow, was going through *both slits at once* and interfering with itself.

And then the truly disturbing finding: when a detector is placed to *see* which slit the electron actually goes through, the interference pattern **disappears**. The electron stops behaving like a wave and starts behaving like a particle. The *act of observation* changes the reality being observed. The double-slit experiment is, in the words of Feynman, the experiment that contains *all of quantum mechanics*. It tells us that the world beneath our senses is not what our senses report.

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SCRIPTURE

Hebrews 11:1, 3 · Things Not Seen

Septuagint (LXX) / Greek New Testament

¹Ἔστι δὲ πίστις ἐλπίζομένων ὑπόστασις, πραγμάτων ἔλεγχος οὐ βλεπομένων... ³πίστει νοοῦμεν κατηρτίσθαι τοὺς αἰῶνας ῥήματι Θεοῦ, εἰς τὸ μὴ ἐκ φαινομένων τὸ βλεπόμενον γεγενῆσθαι.

English Standard Version

¹Now faith is the assurance of things hoped for, the conviction of things not seen... ³By faith we understand that the universe was created by the word of God, so that what is seen was not made out of things that are visible.

2 Corinthians 4:18 · Seen and Unseen

Septuagint (LXX) / Greek New Testament

μὴ σκοπούντων ἡμῶν τὰ βλεπόμενα, ἀλλὰ τὰ μὴ βλεπόμενα· τὰ γὰρ βλεπόμενα πρόσκαιρα, τὰ δὲ μὴ βλεπόμενα αἰώνια.

English Standard Version

As we look not to the things that are seen but to the things that are unseen. For the things that are seen are transient, but the things that are unseen are eternal.

Colossians 1:16 · Visible and Invisible

Septuagint (LXX) / Greek New Testament

ὅτι ἐν αὐτῷ ἐκτίσθη τὰ πάντα, τὰ ἐν τοῖς οὐρανοῖς καὶ τὰ ἐπὶ τῆς γῆς, τὰ ὄρατα καὶ τὰ ἀόρατα...

English Standard Version

For by him all things were created, in heaven and on earth, visible and invisible...

Genesis 1:1–2 · Formless and Void — The Wave State

Septuagint (LXX) / Greek New Testament

¹Ἐν ἀρχῇ ἐποίησεν ὁ Θεὸς τὸν οὐρανὸν καὶ τὴν γῆν. ²Ἡ δὲ γῆ ἦν ἀόρατος καὶ ἀκατασκεύαστος, καὶ σκότος ἐπάνω τῆς ἀβύσσου, καὶ πνεῦμα Θεοῦ ἐπεφέρετο ἐπάνω τοῦ ὕδατος.

English Standard Version

¹In the beginning, God created the heavens and the earth. ²The earth was without form and void, and darkness was over the face of the deep. And the Spirit of God was hovering over the face of the waters.

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THE BIBLICAL CASE

Zetting's 'Christmas Lights' Analogy

Dennis Zetting offers a memorable picture for what the double-slit experiment may mean theologically. Imagine a house with a million Christmas lights hung over every square inch — the trees, the lawn, the swimming pool, the fence. The owner spent eleven months stringing them. On Christmas Eve he gathers his neighbors, but instead of flipping all the switches at once he turns them on one at a time — the house, then the lawn, then the trees, then the pond. Were the lights *real* before they were switched on? Of course. But from the neighbors' perspective they were not *perceptible* until the switch was thrown. Zetting's argument: Genesis 1 may describe exactly this. Genesis 1:1–2 says the earth was *without form and void* (Hebrew *tohu wa-bohu*; LXX *aoratos kai akataskeuastos*, literally *invisible and unconstructed*) — an undetectable wave-state. Then in verse 3, God speaks: «*Let there be light,*» and creation is observed into existence — the switch is thrown. Genesis is, on this reading, the most detailed ancient description of what quantum physicists call the wave-to-particle transition.

What the Bible Already Said About 'What Is Seen'

Hebrews 11:3 is one of the most quietly radical sentences in scripture. It says *what is seen was not made out of things that are visible*. In Greek: *eis to mê ek phainomenôn to blepomenon gegonenai*. The visible world has its origin in things invisible. For two thousand years that statement puzzled theologians. Now physicists are saying the same thing: the macroscopic visible world rests on a microscopic substrate that is not visible at all and does not even behave according to visible-world rules.

The Observer and the Observed

One of the deepest implications of the double-slit experiment is that the universe at the quantum level is not the kind of thing that simply *is* independent of who is watching. Reality at the bottom is relational — it answers to observation. Some interpretations of quantum mechanics (the Copenhagen interpretation, most famously) take this to mean that consciousness itself is a fundamental ingredient of physical reality. Others disagree. But all serious physicists agree the data are baffling. From a theological angle, this is unsurprising: scripture says there is a Conscious Observer who has been watching every quantum event since before the foundation of the world. *The eyes of the LORD are in every place, keeping watch on the evil and the good* (Prov 15:3).

'Things Not Seen' Is Not Anti-Reason

Hebrews 11:1 defines faith as *the conviction of things not seen*. Modern readers sometimes recoil from that, hearing it as a license for credulity. But modern physics has demonstrated, with mathematical rigor and laboratory verification, that some of the deepest and most certain truths about the physical world are about things not seen. The atom is not seen. The electromagnetic field is not seen. The Higgs boson was predicted by mathematics 50 years before it was verified at CERN. Faith and sight are not

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opposites; they are a sliding scale, and the further into reality you press, the more you live by reasoned conviction about things not seen.

THE CONVERGENCE

The visible world rests on an invisible one. The behavior of matter depends on whether and how it is observed. Hebrews 11:3 made this claim before there were electrons to fire through slits. 2 Corinthians 4:18 told us the unseen is what abides. Quantum physics has supplied the laboratory demonstration of a metaphysics scripture has held all along.

DISCUSSION QUESTIONS

1. Hebrews 11:3 says «what is seen was not made out of things that are visible.» What does that mean to you now, having heard about wave-particle duality?
2. Does the observer effect — that reality at the quantum level depends on observation — change how you think about Proverbs 15:3 («the eyes of the LORD are in every place»)?
3. Where in your life are you most tempted to live by *sight* only? What would 2 Corinthians 4:18 ask of you there?
4. If matter behaves one way when watched and another when not, what implications might this have for our intuitions about «reality is what you can see and touch»?
5. How does the existence of mathematically-predicted-then-experimentally-verified physical realities (like the Higgs boson) reframe the popular slogan «I won't believe what I can't see»?

CLOSING PRAYER

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*Lord, you have hidden so much, on purpose, behind the surface of things. You have made a world whose deepest layers will not show themselves to a casual glance. Forgive us when we have settled for the surface and called it all that is. Give us the faith of Hebrews 11 — the reasoned conviction of things not seen. Make us patient observers, willing to look long enough that the deep reality begins to disclose itself. Through Jesus Christ, in whom every visible and invisible thing was made. **Amen.***

Week 5 of 12 — A Quantum Case For God, a Pleasant Springs Church discipleship series. The complete 12-week study, and every other lesson, is at **ps-church.com/discipleship/quantum-case-for-god**