

Carlo Rovelli: A Physicist's Life, Science, and Poetic Worldview

Early Life and Career

Carlo Rovelli was born in 1956 in Verona, Italy, and grew up in a family that valued knowledge ¹. As a young man in the 1970s, he was actively involved in student political movements at Italian universities ². He even co-founded free radio stations in that era and briefly faced legal trouble for his outspoken views (though charges were later dropped) ³. During this rebellious youth, Rovelli also experimented with LSD – an experience that he credits with sparking his curiosity about the nature of time and reality. He recalled that under LSD he felt time “stop,” which led him to wonder: if a mere chemical can alter our perception of time so profoundly, “*how do I know that the usual perception is right, and this is wrong?*” ⁴. This insight planted the seeds for his later fascination with physics and the fundamentals of the universe.

Rovelli pursued physics in academia, obtaining his undergraduate and master's degrees from the University of Bologna in 1981 and a PhD from the University of Padua in 1986 ⁵. He refused compulsory military service in Italy, a decision that landed him in brief detention in 1977 ⁵ – another sign of his independent spirit. After his doctorate, Rovelli conducted postdoctoral research in Italy and the United States, including positions at the University of Rome and Yale. In 1990, he joined the University of Pittsburgh faculty, where he also engaged with the history and philosophy of science ⁶. Since 2000, he has been based in France as a professor at the Centre de Physique Théorique in Marseille ⁶. Throughout his career, Rovelli has balanced cutting-edge research with a deep interest in philosophy, often writing for newspapers and general audiences. By the mid-2010s he rose to global prominence not just as a theoretical physicist but also as a best-selling **popular science author**, beloved for his clear and poetic writing on complex topics. His short book *Seven Brief Lessons on Physics* (2014) became an unexpected hit, selling over a million copies in 40+ languages ⁷ ⁸, and he has since published several more works for lay readers, such as *Reality Is Not What It Seems*, *The Order of Time*, and *Helgoland*. These books established Rovelli as a rare figure who is both a leading scientist and a gifted communicator with a philosophical bent.

Major Scientific Work: Loop Quantum Gravity

In the world of theoretical physics, Carlo Rovelli is best known as one of the founders of **loop quantum gravity (LQG)** – a major research program aimed at reconciling quantum mechanics with Einstein's general relativity. In the 1980s, together with physicists Lee Smolin and Abhay Ashtekar, Rovelli helped develop the foundations of LQG ⁹. At its core, loop quantum gravity proposes that space and time are not smooth continua but have a discrete, granular structure at ultra-small scales. In fact, Rovelli and colleagues showed that in this theory area and volume come in individual quanta (tiny indivisible units), implying that space itself is composed of “finite loops” woven into an extremely fine fabric ¹⁰ ¹¹. These tiny loops are connected in networks – called **spin networks** – which represent the quantum state of space ¹⁰. In simple terms, LQG says that if you zoom far enough in (on the order of the Planck length, $\sim 10^{-35}$ meters), you would find that space-time is *pixelated* or “atomized” into little chunks, much like matter is made of atoms. Even gravity, in this view, isn't a continuous force but the result of this quantum fabric of space-time. This

radical idea of a granular space-time provides one approach to the long-sought “quantum theory of gravity” ¹² .

Rovelli’s work in loop quantum gravity has had several notable implications. For example, LQG naturally predicts that black holes may not contain a singularity of infinite density at their center; instead, quantum gravity effects could resolve the singularity, perhaps turning it into a bounce or a so-called “white hole” (a speculative time-reversed black hole) ¹³ . In cosmology, LQG has inspired models of a “Big Bounce” preceding the Big Bang, suggesting our universe’s expansion might have arisen from the quantum collapse of a previous universe ¹⁴ . These ideas remain unproven, but they illustrate how Rovelli’s theory offers an alternative to the more famous **string theory** in the quest for unification. Unlike string theory, which introduces tiny vibrating strings in a fixed background of space, LQG boldly quantizes space itself and preserves Einstein’s principle that there is no fixed backdrop – space-time is dynamic and built by quantum processes ¹⁵ ¹⁶ .

Beyond loop gravity, Rovelli has contributed to other areas of physics. He developed the **relational interpretation of quantum mechanics**, an idea he explores in his book *Helgoland*. In this view, the properties of any quantum object (like an electron’s position or energy) exist only relative to something else observing or interacting with it ¹⁷ . There is no omniscient, God’s-eye view of reality – what exists, exists *in relation*. This perspective dovetails with some philosophical ideas: Rovelli was delighted to discover that it echoes the insights of the 2nd-century Buddhist philosopher Nāgārjuna, who taught that nothing has independent existence and that everything exists only through its relations ¹⁸ ¹⁹ . By invoking Nāgārjuna in *Helgoland*, Rovelli wasn’t endorsing spirituality, but he found a poetic resonance between ancient wisdom and modern physics. As he puts it, “*There is no ultimate or mysterious essence to understand... ‘I’ is nothing other than the vast and interconnected set of phenomena that constitute it*” ²⁰ . In other words, reality (including our own selves) is a network of interactions with no single, ultimate substance beneath – a conception that is scientifically radical yet philosophically evocative.

Science Meets Poetry: Rovelli’s Humanistic Style

One thing that makes Carlo Rovelli stand out is his **poetic, humanistic approach** to writing about science. He often weaves in philosophy, art, and literature, conveying the sense that physics is a deeply human endeavor rather than a dry technical exercise. Rovelli himself argues that the divide between the sciences and the humanities is artificial and harmful. “*Our culture is foolish to keep science and poetry separated,*” he writes; “*they are two tools to open our eyes to the complexity and beauty of the world.*” ²¹ . This belief is reflected throughout his popular books and essays, which frequently reference history and poetry. For instance, in *Reality Is Not What It Seems* Rovelli devotes a chapter to **Dante Alighieri**, examining medieval ideas of the cosmos, and compares Dante’s vision of a harmonious universe with modern physics ²¹ . He also highlights the ancient Roman poet **Lucretius**, whose epic *On the Nature of Things* poetically anticipated atomic theory in a way that Rovelli finds “luminous” and inspiring ²² . By linking contemporary physics to Dante and Lucretius, Rovelli emphasizes continuity between scientific inquiry and broader human culture. He has even authored a book on the pre-Socratic philosopher *Anaximander*, underscoring how the spirit of questioning the world transcends ages.

Rovelli’s writing style is often described as **lyrical** and accessible. He has a talent for explaining complex concepts in everyday language and with imaginative analogies. *Seven Brief Lessons on Physics*, despite covering heady topics like general relativity and quantum mechanics, reads almost like a series of meditations. In it, Rovelli conveys wonder at the universe. He reminds us that physics isn’t just about

abstract equations – it's about us. *"Nature is our home, and in nature we are at home,"* he assures readers. The strange scientific revelations of modern physics – *"where space is granular, time does not exist, and things are nowhere"* – are **not** something that alienates us from reality, but rather something that *"reveals to us... the stuff of which we ourselves are made."* ²³ . In other words, we *belong* in this weird, beautiful universe. Such passages show Rovelli's almost romantic view of science: as a way to feel more connected to the cosmos, not less.

He often conveys a sense of **awe and humility**. In *The Order of Time*, a book exploring the nature of time from physics to philosophy, Rovelli ends on a poignant note about human life. After discussing entropy and the flow of time, he reflects on the ephemeral but precious nature of our existence. He calls our existence *"a precious miracle that the infinite play of combinations has unlocked for us, allowing us to exist."* With that perspective, he advises that we *"savor... every fleeting and cherished moment of the brief circle of our existence."* ²⁴ . This eloquent, almost spiritual reverence for life's transience is a far cry from the stereotypical scientist's dispassionate tone. It shows how Rovelli uses poetic language to bridge scientific fact with personal meaning. Readers often note that his books make them feel uplifted or contemplative, not just informed. Rovelli manages to celebrate scientific knowledge *and* the mysteries that remain, inviting the reader to share in the joy of **not knowing everything** but being eager to learn.

Science, Meaning, and Religion – A Nuanced Outlook

Rovelli's philosophical outlook on science and meaning sets him apart from many outspoken atheists or "neo-atheist" figures like Richard Dawkins and Sam Harris. **He is himself an atheist**, but notably a very **humble and non-dogmatic** one. In interviews, Rovelli openly states, *"I do not believe in God, since you ask explicitly."* However, unlike some atheists who speak with absolute certainty, he immediately adds that this is *"not because I think I know the answers, and that people who believe in God don't... It's because I know that I don't know the answers, and I am aware of this ignorance."* ²⁵ . This encapsulates Rovelli's attitude: he is comfortable with **uncertainty**. He says, *"I struggle to understand how people can be so sure they know about God."* ²⁵ For Rovelli, neither science nor religion provides final answers to all the big questions, and one should be wary of anyone claiming absolute truth. *"Whoever boasts of being certain is usually the least reliable,"* he writes pointedly ²⁶ . This principle applies across the board – whether it's a religious fundamentalist **or** a militant atheist. In fact, Rovelli has criticized the stridency of some celebrity atheists. He argues that **scientific arrogance** can be as misguided as religious dogmatism: *"Scientists such as Richard Dawkins who pretend to atheist omniscience are no less intolerant, in their way, than Christian absolutists."* ²⁶ . In Rovelli's eyes, claiming you have all the answers (be it "God definitely exists" or "God definitely doesn't exist") betrays a lack of intellectual humility that true science requires. **Science, he insists, is "not about certainty" – it flourishes by remaining open-minded and willing to be wrong** ²⁷ ²⁸ . *"The search for knowledge is not nourished by certainty: it is nourished by a radical distrust in certainty,"* Rovelli notes ²⁷ . This ethos contrasts sharply with the more combative confidence of figures like Dawkins, who often speak as if science has essentially debunked all theology. Rovelli instead emphasizes how much we *don't* know: *"The more we learn, the more we don't know... We must accept to live at least partly in ignorance, but nevertheless remain absolutely curious."* ²⁹ .

Another difference is Rovelli's **respectful tone** toward religion and spiritual inquiry. He doesn't see scientists and believers as inevitable enemies. For example, he often points out that the **Big Bang theory** was first proposed by Georges Lemaître – a Belgian physicist *and* Catholic priest – who saw science and faith as compatible ³⁰ . Rovelli admires Lemaître's work and notes that the priest-scientist found "mutual attraction" between his religion and his science ³⁰ . In Rovelli's view, a religious person searching for truth through

faith is not so different from a scientist searching for truth through experiments – both are driven by curiosity and wonder about the universe. Rovelli himself, while personally an atheist, has engaged in friendly dialogues with religious thinkers. In one anecdote, he recounts sitting next to an Irish Catholic bishop on an airplane: the two had a “*marvellous conversation*” discussing their points of agreement and disagreement, in an atmosphere of mutual respect ³¹. “*I don’t hold anything against people who are religious, and I hope they don’t hold anything against me because I am atheist,*” Rovelli says ³¹. This courteous approach is worlds apart from the combative rhetoric of a neo-atheist like Sam Harris, who often portrays religion as a dangerous delusion. Rovelli, by contrast, focuses on **common ground** – for instance, he sees value in how both science and religion grapple with profound questions, even if they reach different answers. He also appreciates that scientific discovery can inspire a kind of **spiritual awe** (without invoking the supernatural). He once remarked that studying the universe can feel “better than LSD” ³² – a tongue-in-cheek way to express how science, for him, provides a mind-expanding, almost transcendent joy.

In summary, Carlo Rovelli’s outlook mixes **scientific rationality with a deep well of humility and appreciation for mystery**. He diverges from prominent new atheists by refusing to turn science into an ideology that claims total certainty or eradicates meaning. Instead, Rovelli sees science as a continuing human *conversation* with the world – one that is enriched by philosophy, open to poetry, and even, at times, enriched by dialogues with religious thought. He finds beauty in the fact that we are part of the natural world and that our existence is fleeting but meaningful in its very transience ²⁴. As Rovelli beautifully writes, we are “*a precious miracle*” of cosmic chance, and knowing this should not make us despair, but rather encourage us “*to serenely immerse ourselves in time... savoring the clear intensity of every fleeting and cherished moment*” of life ²⁴. Science for Rovelli is not cold or spirit-crushing – it is a **profoundly human endeavor** that, when approached with curiosity and humility, can illuminate our place in the universe and deepen our sense of connection to it.

Sources: Carlo Rovelli’s books *Seven Brief Lessons on Physics*, *Reality Is Not What It Seems*, *The Order of Time*, *Helgoland*; interviews and reviews in *The Irish Times*, *The Guardian*, *Evening Standard*, etc. ²⁷ ²⁶ ²⁵ ²¹ ²³

²⁴

¹ Carlo Rovelli joins SFI’s Fractal Faculty - Santa Fe Institute

<https://www.santafe.edu/news-center/news/carlo-rovelli-joins-sfis-fractal-faculty>

² ³ ⁴ ⁵ ⁶ ⁹ ¹¹ ¹³ Carlo Rovelli - Wikipedia

https://en.wikipedia.org/wiki/Carlo_Rovelli

⁷ ⁸ Richard Dawkins and Carlo Rovelli on science and culture – books podcast | Science and nature books | The Guardian

<https://www.theguardian.com/books/audio/2017/jul/11/richard-dawkins-and-carlo-rovelli-on-science-and-culture-books-podcast>

¹⁰ ¹² ¹⁴ Loop quantum gravity - Wikipedia

https://en.wikipedia.org/wiki/Loop_quantum_gravity

¹⁵ ¹⁶ Loop quantum gravity: Does space-time come in tiny chunks? | Space

<https://www.space.com/loop-quantum-gravity-space-time-quantized>

¹⁷ ¹⁸ ¹⁹ ²⁰ Quantum Physics and No Spirituality—Carlo Rovelli and Helgoland | by Graham Pemberton | Medium

<https://graham-pemberton.medium.com/quantum-physics-and-no-spirituality-carlo-rovelli-and-helgoland-756f4a79c7a9>

21 22 27 28 Reality Is Not What It Seems by Carlo Rovelli review – physics versus certainty | Science and nature books | The Guardian

<https://www.theguardian.com/books/2017/jan/21/reality-is-not-what-it-seems-by-carlo-rovelli-review>

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<https://www.irishtimes.com/news/science/carlo-rovelli-on-schrodinger-god-and-physics-being-better-than-lsd-1.3455527>

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<https://www.standard.co.uk/culture/books/there-are-places-in-the-world-where-rules-are-less-important-than-kindness-carlo-rovelli-book-review-a4573238.html>