

RAYMOND LAFLAMME (1960-2025)



On June 19, 2025, Canada lost one of its great physicists, visionary leaders, and most generous human beings. Raymond Laflamme, OC, FRSC (1960–2025), passed away peacefully at his home in Waterloo, Ontario, surrounded by his wife, Janice Gregson, and their children, Patrick and Jocelyne.

In the days that followed, tributes poured in from around the world—scientists and students, Nobel laureates and policymakers, musicians and neighbours. Some had known him for decades, others only briefly. All said the same thing: Raymond—or simply “Ray”—touched lives.

Ray’s accomplishments were remarkable. He was a pioneer of quantum computing and one of its leading voices worldwide. He was a founding faculty member of the Perimeter Institute and co-founded the Institute for Quantum Computing, guiding the latter into a world-class centre that drew researchers from every corner of the globe. He wrote more than 300 scientific papers, co-authored influential textbooks, and mentored over sixty graduate students and many postdocs who now carry his influence forward. He helped place Canada firmly at the centre of quantum research. But for those who knew him, the accolades never came first. What people remember most is the person: his generosity, his warmth, and his unmistakable joie de vivre.

No obituary can capture a life as full as Ray’s. At best, it can point toward his spirit: the curiosity of the scientist, the vision of the builder, and above all, the kindness of the man.

THE ADVENTUROUS AND CURIOUS SCIENTIST

Ray approached science much like he approached the outdoors: with curiosity and a sense of adventure. As a PhD student under Stephen Hawking, he was asked to confirm Hawking’s claim that the arrow of time would reverse at the universe’s maximum expansion—a reversal that seemed to defy the second law of thermodynamics. Instead, Ray and his collaborator Don Page challenged the idea and showed the opposite. Hawking retracted the claim, later inscribing Ray’s copy of *A Brief History of Time*: “To Raymond, who showed me the arrow of time is not a boomerang.” Soon after, with Ruth Gregory, he revealed that higher-dimensional black strings are unstable, work that became known as the Gregory–Laflamme instability and reshaped the study of spacetime horizons [1].

That same appetite for the unknown eventually pulled him into an entirely new field. While working as a quantum cosmologist at Los Alamos National Laboratory, Ray wandered into a seminar on quantum computing. “I was convinced this idea of computing with quantum mechanics would never be feasible—and I wanted to prove it,” he later recalled with a smile. “Well, we ended up showing that it was absolutely possible!” Together with his long-time collaborator Emmanuel Knill, they established the threshold theorem, demonstrating that reliable quantum computation is possible even with

imperfect components, and laid down the Knill–Laflamme conditions for error correction, tools still essential today [2]. With colleagues, he also discovered the first “perfect” quantum code [3].

For most physicists, the line between theory and experiment is a lifelong barrier. Ray ignored it. He reinvented himself as an experimentalist—a leap almost unheard of as a senior researcher. He saw promise in nuclear magnetic resonance (NMR) as a testbed for quantum computing and set about mastering the hardware. Together with his colleague David Cory, he carried out some of the first laboratory demonstrations of quantum algorithms and quantum error correction [4]. Critics doubted NMR’s legitimacy as a quantum computer, due to a lack of entanglement, but Ray refused to dismiss it. With Knill, he introduced the DQC1 model, what he liked to call “*the power of one qubit*”: proof that even a state with very little entanglement could perform a task beyond the reach of any known classical algorithm [5]. In the years since, DQC1 has echoed across quantum complexity theory, reshaping how researchers think about the structure of quantum computational power.

Having already ventured into NMR experiments, he veered further—this time into quantum optics. At a moment when photons were largely dismissed as impractical for computation, Ray, together with Emmanuel Knill and Gerard Milburn, proposed a radically different path: the KLM scheme. Instead of relying on elusive optical nonlinearities, they showed how linear optics, single-photon sources, and photon detectors could be combined to build scalable quantum computers [6]. Within a decade, the paper had become one of the most celebrated works in the field and a blueprint for today’s multi-billion-dollar photonic quantum industry.

From black holes to quantum computers, from chalkboard to laboratory, Ray’s career showed a scientist unafraid of the unknown, guided by curiosity and an eagerness to open new doors for others to walk through.

THE VISIONARY BUILDER

The same disregard for limitations that once let a cosmologist reinvent himself as a quantum computing experimentalist also made him a visionary leader. In the late 1990s, quantum computing was barely more than theory, and Canada had no foothold. To believe it could lead the world was audacious, but Ray believed it, and made it real.

In 2002, Ray co-founded the Institute for Quantum Computing (IQC) at the University of Waterloo and led it for fifteen years. He loved to tell how its blueprint was first sketched over dinner at David Johnston’s farm, with Johnston—then Waterloo’s president—and Mike Lazaridis, founder of BlackBerry. Ray agreed to return to Canada only if they would match his vision with resources, “with many, many zeros,” as he liked to joke. From those beginnings, IQC grew into one of the world’s leading centres for quantum information, home to hundreds of researchers and facilities envied worldwide. More than its size, though, it was the culture Ray built that mattered: he convinced brilliant theorists, experimentalists, engineers, mathematicians—even politicians—to take a leap together. Almost everyone in today’s global quantum community can trace a connection back to IQC, and to Ray’s belief that Canada could be a home for world-class quantum science.

Ray also knew the effort had to extend beyond one institute. As founding director of CIFAR's Quantum Information Program from 2003 to 2016 and the driving force behind QuantumWorks, he helped knit together a national network of researchers, institutions, and students. Many of the people he mentored in those years now lead quantum programs across Canada and around the world.

His reach went further still. Governments sought his advice on shaping science policy in Canada and abroad. He played a central role in the proposal that became Canada's first National Quantum Strategy, then co-chaired the advisory council guiding its future. He also chaired the expert panel that produced the Council of Canadian Academies' landmark report on the responsible adoption of quantum technologies [7]. Ray's voice helped set priorities not just for labs and universities, but for the country itself.

Through it all, Ray never stopped being a teacher. He co-authored two textbooks—*An Introduction to Quantum Computing* [8] and *Building Quantum Computers* [9]—that trained thousands of students, wrote review articles that made subfields accessible, and co-founded startups to see how research could live outside the lab. He once said he wanted to “learn how building a company works”, so he went and did it. That's how Ray operates.

To ask why Canada has long punched above its weight in quantum is to arrive, inevitably, at Raymond Laflamme. He saw further, built wider, and left behind institutions, strategies, and communities that will carry his vision forward.

THE KIND AND GENEROUS MAN

No matter how far Ray's vision stretched in building institutions, or how closely he examined the smallest details as a scientist, his true focus was always people. After his passing, tributes poured in from around the world, not of titles and awards but of the countless ways he touched lives with his kindness and generosity. They were streams of stories, admiration not for his accomplishments but for his humanity.

Ray showed up when it mattered, often quietly, always sincerely. A student who reached out distressed during their first PhD term found him ready to talk the next day, on Christmas Eve. A new postdoc, suddenly ill and alone in a new country, found him at their side on hospital visits. A colleague at Perimeter, grieving the loss of a mother, found him at the memorial, despite Ray's own chemotherapy. If someone was in need, Ray was there.

That same care extended to the broader community. When concerns were raised about how female students were being supported in STEM, he didn't deflect; he co-chaired an EDI committee, and later he and Janice created a scholarship for women in quantum information. When a young boy came to see “where the man who studied with Stephen Hawking worked,” Ray sat with him for ten minutes, asking questions, listening intently. For the boy it was unforgettable. For Ray it was simply what you did.

He carried a lightness that put people at ease. In a pickup hockey game, a student once gleefully dumped him into a snowbank. Ray got up grinning, “Finally, someone is here to play for real,” he said, already plotting his revenge.

In the classroom, no problem was too small. One instructor remembered an undergraduate’s surprise when an “older man with a French accent” sat down to help with a problem set, unaware it was the founding director of IQC, whose work they had just studied in class.

Ray made space for others to grow. He encouraged students to lead public events, even when the guest was Stephen Hawking. He stood nearby, but let them be the ones at the podium. As one student put it, “More than anything, he let us all grow.” That is the legacy of a true mentor.

And through it all, Ray never lost his humility. When praised for his leadership, he would shrug, “I just answer the phone when I am called.” When congratulated on a scientific result, he would say, “My students did it,” overlooking that the idea often began with him. He was often honoured in public, yet still grew embarrassed when singled out. Even near the end, he remained bemused to be treated as a celebrity at high schools and undergraduate events. He never stopped being surprised that others saw him that way.

Ray’s legacy lives on—in the students he mentored, the institutions and vision he built, and in his children, whom he always said were his greatest accomplishment. His imprint endures in Canada’s quantum landscape and in the lives of all who knew him.

Farewell, Ray

MARTIN LAFOREST, Quantacet, University of Waterloo PhD ’08 under Raymond Laflamme
SHAYAN MAJIDY, Harvard University, University of Waterloo PhD ’24 under Raymond Laflamme



Raymond Laflamme and his instantly recognizable camper van.

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