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Richard P. Feynman

Nobel Prizewinner

October 21, 1965, 3:45 a.m.

"Hello? Dr. Richard Feynman? This is the American Broadcasting Company calling. May I congratulate you on your Nobel Prize?"

"Look. This is a heck of an hour—"

"But aren't you pleased to hear that you've won the prize?"

"I could have found out later this morning."

"Well, how do you feel, now that you've won it?"

"Please — some other time . . ."

And so Richard P. Feynman, Richard Chace Tolman Professor of Theoretical Physics at Caltech, sleepily learned that he was winner of the 1965 Nobel Prize in physics.

9 a.m.

Stockholm, Sweden
Royal Academs of Sciences today awarded you and Tomonaga and Schwinger jointly the 1965 Nobel Prize for Physics for your fundamental work in quantum electrodynamics with deep ploughing consequences for the physics of elementary particles. Prize money each one-third. Our warm congratulations. Letter will follow.

Erik Rudberg
The Permanent Secretary

It was official. Richard Feynman shared the $55,000 prize with Shinichero Tomonaga of Tokyo and Julian Schwinger of Harvard for their independent work in quantum electrodynamics done in the years 1947-49.

10:30 a.m.

Accompanied by his wife, Gweneth, and three-year-old son, Carl, Feynman meets the press — radio, television, newspaper, and magazine — in the Athenaeum on the Caltech campus.

Reporter: "Is there any way your work can be explained in laymen's terms?"

Feynman: "There certainly must be. But I don't know what it is."

Reporter: 'Well, then, what was your reaction when you first heard that you had won the Nobel Prize?"

Feynman: "I thought it was some student calling as a prank. I wasn't too polite. But after the third call I was convinced. I hope the guys who called will accept my apologies."

11:45 a.m.

Some reporters who couldn't get to the morn-

ing press conference show up in Feynman's office for a repeat performance.

Television newsman: "I'll tell you what I'm going to ask you, so you'll be ready when the cameras start. One of the questions is: What applications does this paper have in the computer industry?"

Feynman: "The answer to that will be – none."

"Well, then, does it have application?"

"It hasn't got any."

"Oh, you're kidding, sir!"

"No."

"Well, I'm going to ask you also to comment on the statement that your work was to convert *experimental data* on strange particles into *hard mathematical fact.*"

"No, I'm not going to comment on *that.*"

"All right – What time did you hear about the award?"

"OK – now turn on the cameras!"

4:15 p.m.

Feynman is the center of attention at a packed physics department research conference tea in East Bridge, as he describes his busy day.

"This man from the *Times* came to photograph me. He was taking a lot of pictures, and he was talking all the time and he said, 'This morning – what did they ask you?' I said, 'Well, the hardest one they asked me was to explain in a few words – you know – what the damn thing is about.' So he says to me, still taking pictures, 'Hell! If you could explain in a few words what it was all about, it wouldn't be worth no Nobel Prize!"

Someone asks Feynman when he is supposed to be in Stockholm for the award ceremony.

Feynman: "The tenth of December . . . I'll have to get a borrowed tux somewhere."

"Tails," says Carl Anderson, chairman of the physics department and winner of the Nobel Prize in physics in 1936.

Feynman: "Tails –"

Feynman shares the limelight with his wife, Gweneth, and son, Carl, at a press conference in the Athenaeum.

Anderson: "Tails. And you have to have a tall silk hat. Get the collapsible kind, that you can sit on. You can get them in Stockholm. You can rent them all there."

Feynman: "Y'know, I'll put it on and think to myself – here, but a few years ago, stood Anderson."

Anderson: "Many years, many years."

Feynman: "In this *very suit!*"

Late evening

At his home, in a private interview with student editors of the *California Tech,* Feynman tells of phoning Tomonaga earlier in the afternoon (when it was nearly midnight in Japan).

"Congratulations."

"What did we do to win the award?"

"We invented a scheme for pushing a great problem under the rug."

"Maybe it will stay under the rug – but maybe it won't."

"Same to you."

"How does it feel to be a Nobel Prizewinner?"

"I guess you know."

"Can you explain to me in laymen's terms exactly what it was you did to win the prize?"

"Please – I'm very sleepy!"

Some other achievements

Richard P. Feynman already has an impressive list of honors and achievements to his credit. He is a fellow of the Royal Society of London and a member of the National Academy of Sciences. In 1954 he won the Albert Einstein Award for scientific achievement, and, in 1962, the Ernest Orlando Lawrence Memorial Award given by the Atomic Energy Commission for significant contributions to nuclear science.

Just as famous a teacher as he is a theoretical physicist, Feynman has completely revised Caltech's courses in introductory physics. In 1964 he served as a member of the California State Curriculum Commission to select textbooks for elementary grade arithmetic courses.

Born in New York City in 1918, Feynman received his BS degree from MIT in 1939, and his PhD from Princeton in 1942. After wartime work at the Los Alamos Scientific Laboratory, he became professor of theoretical physics at Cornell University in 1945. In 1950 he came to Caltech with the same title. He has been Richard Chace Tolman Professor of Theoretical Physics since 1959.

Feynman's interests range well beyond the field of theoretical physics. He likes to go camping with his family, play the bongo drums, and draw. (He is currently trading drawing lessons for physics lessons with an artist friend.)

Feynman, who is also an enthusiastic traveler, believes in speaking to his hosts in their own language. Recently, in the hope of taking a trip to South America, he worked hard learning Spanish. Finally he got an invitation to speak in Brazil – where the native language is Portuguese. Undaunted, he found a tutor and took six weeks to prepare for delivering a series of lectures on quantum theory in Portuguese – or in what he calls "Feynman's Portuguese" ("I could understand what I was saying, but I couldn't understand real Portuguese").

At last report he was starting to learn Swedish.

The work that won the prize

Quantum electrodynamics, the field in which Feynman's work was done, was born in the late 20s when Dirac, Fermi, Heisenberg, and Pauli applied the new quantum mechanics to the old equations of Maxwell's classical electrodynamics. The new theory, by quantizing the fields and physical quantities involved, was able to describe the standard

Feynman celebrates with students, friends, and colleagues Carl Anderson and Robert F. Bacher.

Caltech undergraduates publicly — not to say perilously — congratulate Feynman from the tower of Throop Hall.

radiation processes occurring in atomic physics.

However, the new theory was unable to provide precise answers. Thus, when an electron moved into a lower-energy orbit and emitted a photon, the theory could predict only a first approximation of the wavelength of the photon. Correction terms in the equations, which should have yielded more precise answers, diverged and gave infinite values, which were physically meaningless. The general feeling was that these difficulties reflected some basic errors in the formulation of the theory, and from 1935 to 1945 there were numerous attempts to determine what revisions were necessary to make it work.

But no radical flaw could be found. Moreover, by 1946 experiments were being conducted with much-improved accuracy, made possible by the development of microwave techniques, and the weaknesses of the theory were being re-exposed. Feynman and Schwinger, independently, took up the problem again, while Tomonaga continued work already in progress.

The fact that the three worked independently using three different methods gave great breadth and richness to the theory that finally emerged. Tomonaga proceeded with basic physical principles, Schwinger with massive mathematical formulation, and Feynman with a reconstruction of almost the whole of quantum mechanics and electrodynamics from his own point of view. Tomonaga and Schwinger worked within the framework of field theory, and Feynman took a radical approach that treated all events in terms of particles.

The nature of Feynman's approach made it difficult for him to find acceptance for his results at first. After he had some spectacular successes in solving problems, he and Schwinger decided in 1948 to present their theories at a conference. The audience was not too receptive to either, but seemed particularly hostile to Feynman's unorthodox, particle approach. So, even though not all the divergence difficulties had been overcome, he decided to publish his results, at about the same time as did Tomonaga and Schwinger. Seventeen years later, while those few problems still remain, modern quantum electrodynamics has brought order to that vast part of physics lying between gravity and nuclear forces. Moreover, Feynman's simplified rules of calculation are now standard tools of theoretical analysis in both quantum electrodynamics and high-energy physics, and the Feynman diagrams (pictures of interaction trajectories) vastly simplify quantum electrodynamics interaction calculations.

Feynman himself believes that the discrepancies of the few remaining divergences in his theory have not been resolved; they still present a serious problem.

—Tim Hendrickson '67, Stuart Galley '66, Fred Lamb '67.