

Richard Feynman. PHOTO BY CHRISTOPHER SYKES.

# Richard Feynman

**1918** May 11. Richard Phillips Feynman is born in Manhattan to Melville Feynman and Lucille Phillips Feynman. The Feynmans eventually settle in Far Rockaway, Queens, sharing a house (owned by Lucille's father) with Lucille's sister Pearl and her husband and family.

**1927** Joan Feynman born. "I was Richard Feynman's first student and he was my first teacher."

**1931** Richard meets Arline Greenbaum.

**1934** High School physics teacher and ex-Columbia Ph.D student Abram Bader explains to Richard the Principle of Least Action.

**1935** Richard graduates from Far Rockaway High taking honors in all academic subjects, including, thanks to an essay deliberately meant to appeal to his teachers' biases, English. Rejected by Columbia because they had filled their quota of Jewish freshmen, Richard enrolls at MIT with \$100 a year scholarship.

**1936** Richard and Arline agree to marry when he finishes his degree. Richard changes his major from Electrical Engineering to Math to, finally, Physics. Richard and fellow sophomore prodigy Ted Welton enroll in MIT's only course dealing with Quantum theory. On losing his place in his lecture, Julius Stratton, the instructor for the first semester and later president of the school, asks, "Mr. Feynman, how did you handle this problem?"

**1938** Richard and Welton are two of only three students willing to take MIT's first course in nuclear physics for credit.

**1939** The graduate admissions committee at Princeton considers Feynman, a "diamond in the rough" whose Graduate

Record Examination scores in physics and math are the best they have ever seen and whose scores in history and literature are lower than those of any applicant they have ever considered accepting. Publishes two papers, one his senior thesis, in *Physics Review*. Graduates from MIT. Richard begins graduate work at Princeton.

**1940** Richard gives his first professional presentation. The audience, to his horror, includes Wolfgang Pauli and Albert Einstein. "And I can still see my own hands as I pulled out the papers from the envelope that I had them in. They were shaking. As soon as I got the paper out and started to talk, something happened to me which has always happened to me since....If I'm talking physics, I love the thing, I think only about physics, I don't worry where I am; I don't worry about anything."

**1941** Summer. Richard works at Frankford Arsenal in Philadelphia. Arline Greenbaum, long ill, is first diagnosed as having Hodgkin's disease, then, correctly, tuberculosis. December. Pearl Harbor is attacked and the U.S. declares war. Richard is invited to join the Manhattan Project.

**1942** Spring. Richard quickly writes his thesis. June. Richard receives his Ph.D. On June 29 Richard takes Arline from Deborah Hospital in Brown Mills, N.J. After they marry on Staten Island he returns her to the hospital.

**1943** March 28. Richard and Arline leave for Los Alamos, New Mexico. Arline stays at Presbyterian Sanitarium in Albuquerque. Hans Bethe, head of the Theory Division, makes Richard a group leader (Feynman is, by a decade, the youngest group leader) and later head of the Theoretical

Computations Group.

**1944** Richard is sent to Oak Ridge, Tennessee, to correct the potentially catastrophic mishandling of nuclear material at the uranium processing labs.

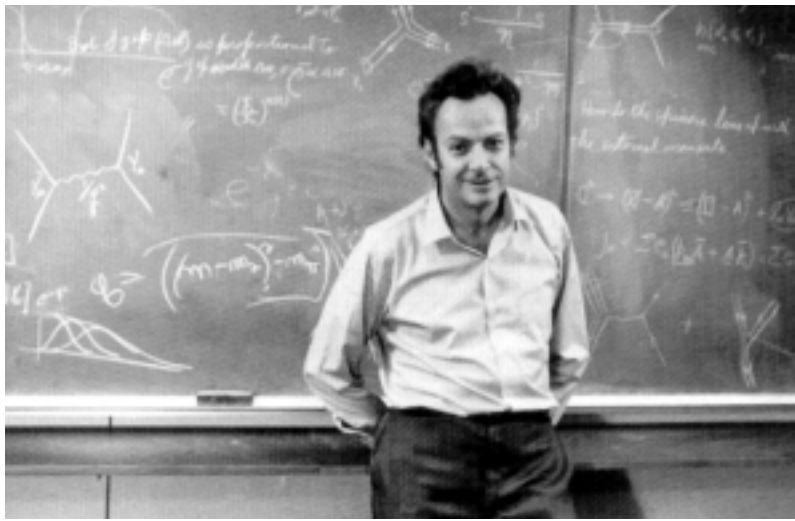
**1945** June. Arline dies in Albuquerque. July. The first atomic bomb is detonated. "Those guys up where I was all had dark glasses. I'm the only guy who saw it with the human eye...We jumped up and down, we screamed, we ran around slapping each other on the backs....Everything was perfect but the aim — the next one would be aimed for Japan not New Mexico." November. Begins teaching at Cornell.

**1947** Spring. Seeing a plate thrown in the Cornell cafeteria, Richard — "for fun" — calculates the relationship between the wobble and spin of a flying plate. Eventually this was applied to his work on the spin of electrons. "The whole business I got the Nobel Prize for came from the piddling around with the wobbling plate."

**1948** April. Richard and Julian Schwinger compare notes on Quantum Electrodynamics at the Pocono Conference. Oppenheimer, now director of the Institute for Advanced Study at Princeton, receives a paper from Japanese physicist Shin'ichiro Tomonaga — another version of QED.

**1949** April. Richard presents his formulation of QED at Oldstone-on-the-Hudson Conference. Shortly afterward young physicist Freeman Dyson, speaking at the American Physical Society, declares, "We have the key to the Universe. Quantum Electrodynamics works and does everything you wanted it to do."

**1950** Richard accepts appointment as



Richard Feynman. PHOTO COURTESY OF MICHELLE FEYNMAN.

Professor of Theoretical Physics at the California Institute of Technology.

**1951-1952** Spends sabbatical year at the Center for Research in Physics, Rio de Janeiro; he plays in a samba band during Carnival.

**1954** Receives Albert Einstein Award. Elected to National Academy of Science. "When I was in high school, one of the first honors I got was to be a member of the Arista....when I got into the Arista I discovered that what they did in their meetings was to sit around and discuss who else was worthy to join this wonderful group.... When I became a member of the National Academy of Sciences, I had ultimately to resign because that was another organization most of whose time was spent in choosing who was illustrious enough to join."

**1958** Summer, Geneva, Switzerland. Meets Gweneth Howarth, a young English woman working her way around the world, and impulsively suggests she come work for him — keeping house — in Pasadena. The next day Richard apologizes to Gweneth for his forwardness, but she accepts his offer anyway.

**1959** Richard is appointed Chace Tolman Professor of Theoretical Physics at Caltech. Spends his sabbatical year as a "graduate student" in biology at Caltech; his duties include teaching first year biology. "I got a tremendous boost obtaining the best score [from student evaluations] of all teaching assistants; even in biology, not my field, I could explain things clearly and I was rather proud of it." December. "There's Plenty of Room at the Bottom," groundbreaking talk on nanotechnology delivered to annual meeting of American Physical Society.

**1959** Summer: After a year of red tape, Gweneth receives a green card to work as Feynman's housekeeper. She lives in her own quarters and chauffeurs Feynman to work, having passed the California driving test with a 100% score without study.

**1960** Gradually Richard falls in love with Gweneth and — unable to make big decisions — sets a date in the future to propose to her. The date comes and he finds the decision easy. They marry soon after.

**1962** Son Carl Richard born.

**1961-1962** As part of Caltech's effort to revitalize the physics curriculum, Feynman agrees to give up research for two years and teach freshman Physics; the course is preserved in *The Feynman Lectures on Physics*, published in 1965. Feynman later tells a colleague that the Lectures would, ultimately, prove his most lasting contribution to Physics.

**1965** Feynman receives the Nobel Prize in Physics, along with Shin'ichiro Tomonaga and Julian Schwinger, for his work in Quantum Electrodynamics. "I don't see that it makes any point that someone in the Swedish Academy decides this work is noble enough to receive a prize — I've already got the prize. The prize is the pleasure of finding the thing out, the kick in the discovery, the observation that other people use it — those are the real things, the honors are unreal to me."

**1967** Turns down honorary degree from University of Chicago. "...I thank you for considering me for such an honor. However, I remember the work I did to get a real degree at Princeton and the guys on the same platform receiving the honorary degrees without work — and felt that an honorary degree was a debasement of the idea...."

**1968** Daughter Michelle Catherine born.

**1972** Received Oersted Medal for Teaching

**1973** Receives Niels Bohr International Gold Medal

**1974** Delivers Commencement Address at Caltech.

**1978** October. Richard is diagnosed

with cancer; the 14-pound tumor in his abdomen has crushed his kidney and spleen.

**1983** MIT graduate student Daniel Hillis tells Feynman of his plans to leave school and start a company that will build a computer using a million processors operating in parallel. "That is positively the doper idea I ever heard," responds Feynman. He also insists on going to work for Hillis' Thinking Machine Corporation in the summer of that year.

**1985** *Surely You're Joking, Mr. Feynman!* published. Ralph Leighton, Richard's friend and drumming partner (and son of Feynman's Caltech colleague Robert Leighton) creates the book from tapes made during his drumming sessions with Feynman. Dr. Joan Feynman, knowing that her brother is dying, takes a job at the Jet Propulsion Laboratory in Pasadena to be near Richard.

**1985** Feynman and Leighton publish *QED: The Strange Theory of Light and Matter*, taken from Richard's Alix B. Mautner Memorial Lectures at UCLA, which created a popular explanation of quantum electrodynamics.

**1986** February. Richard joins the Rogers Commission inquiry into the explosion of the Space Shuttle Challenger. Engineers had warned NASA not to launch if temperatures fell below 53 degrees and at a live press conference Feynman uses a glass of ice-water to demonstrate that the shuttle's rubber O-ring gaskets lose resiliency at low temperatures. Feynman spends several months investigating NASA operations and fights to have his work included in the Commission's final report; it is relegated to the appendix.

**1986 - 1988** Feynman continued to live his life in his unique and inimitable way, and to battle cancer. The events of these years are the setting of the play "QED." ■

—Timeline created by **Christopher Breyer**