Richard Feynman Special Colloquium

November 1 & 8, 2018 at 4:10PM in Lewis Lab. 316

November 1, 2018 :

Jean Toulouse "Richard Feynman, a man of many paths..."

Introduction: Richard Feynman was born in 1918, at a time when modern physics had just started (e.g. the year Max Planck received the Nobel prize for his discovery of energy quanta, only 13 years after Einstein published his special theory of relativity and the year he published his general theory of detail balancing in the absorption/emission of light which shaped the development of Quantum Electrodynamics). In the course of his life, after receiving his PhD from Princeton on "The Principle of Least Action in Quantum Mechanics", he participated in the development of the atomic bomb at Los Alamos, perfected and completed the theory of quantum electrodynamics for which he received the Nobel prize in 1965, made seminal contributions to our understanding of superfluidity and superconductivity in Condensed Matter Physics, suggested the existence of quarks (partons) to explain high energy nuclear collisions, then turned to quantum gravity. A great teacher and story teller, he developed the well-known Feynman Lectures and its 3 volumes, as well as several other lecture series on Gravity and Statistical Physics. Toward the end of his life, he became interested in parallel computing and even investigated the possibility of a quantum computer. He passed away in 1988, when the computer revolution was well underway, and the year the Nobel prize was awarded for an experimental method to study weak nuclear forces at high energy", a topic to which he himself contributed.

Rosi Reed "Introduction to the famous Feynman diagrams and how to use them"

Feynman diagrams, which appear to be pictures of processes that happen in space and time, allow one to calculate scatter amplitudes and other observables and arrive at the same answers as people obtain through much more laboriously techniques using fields. The diagrams do not show geometric trajectories, instead they show topological configurations which reflect the quantum uncertainty of a given interaction. A simple mathematical formula is attached to each diagram which expresses the likelihood of the process depicted by the diagram.

Daniel Ou-Yang "What do you care What Other People Think?"

Reminiscences in four little stories of Feynman from his two autobiographies, "Surely Your Joking Mr. Feynman", "What do you care What Other People Think", and two events to remember: "Mr. Feynman comes to UCLA" and "Mr. Feynman goes to Washington".

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Ivan Biaggio “Moving ions in crystals, and precessing probability vectors in atoms: Feynman in solid state physics and coherent light-atom interaction”

Feynman wrote a paper that started with “An electron in an ionic crystal polarizes the lattice in its neighborhood” and another one that started with “Electromagnetic resonances in matter have become a fundamental tool for studying the structure of matter.” Both led to new approaches used in condensed matter physics and in coherent light-matter interaction. I’ll describe the two systems that Feynman was looking at in those two papers and some subsequent work."

Javier Buceta “Feynman, Cajal, and Octopuses: the Mechanisms of Seeing”

Richard Feynman displayed scientific interests in many fields that went beyond traditional Physics. Using his own words “If you look closely enough at anything, you will see that there is nothing more exciting than the truth”. Some nice examples are shown in his celebrated Feynman Lectures such as Chapter 36, Vol.1 where he analyzed an interesting physiology problem. I will use that chapter ("Mechanisms of Seeing") as a guideline to illustrate the broad scientific curiosity of Richard Feynman.

Ariel Sommer “Feynman's Computer”

In 1981, Richard Feynman raised a provocative question: what kind of computer do you need in order to run an exact simulation of nature, including the quantum effects? He proposed that an efficient, exact simulation of quantum mechanics would require a computer made of quantum mechanical parts--a quantum computer or quantum simulator. Since then, several platforms including trapped atoms, photons, and superconducting circuits have been used to implement quantum simulators, and researchers are pushing towards the realization of universal quantum computers.