

JOHN STUART FOSTER, 1890 - 1964

First and foremost, John Stuart Foster was a physicist by instinct, training and profession. He was bright, visionary and creative. His scientific insight was always clear and powerful; at times it seemed supernatural. His method of reasoning often seemed to involve no method whatsoever; he merely jumped from the premise to the correct conclusion. It was never clear whether he went through or simply skipped all the intermediate steps in the process that a less gifted person would have had to take to get there. He belonged to the first generation of Canadian-born physicists who had achieved international recognition. He was known for his important contribution to the understanding of the Stark effect, his invention of the Foster Scanner in radar and, of course, his beloved cyclotron and Radiation Laboratory at McGill. Foster was also famous for his magnificent sense of humour, for his wild and contagious laugh and for his obliquity of speech. He was truly a remarkable man!



J. Stuart Foster

Stuart Foster was born in Clarence, Nova Scotia, on May 30, 1890; he graduated from Acadia University just before the 1914-1918 war. During the war, he served in the U.S. Armed Forces, 'armed', as he used to say, 'with a soldering iron down in Monmouth, New Jersey'. This service enabled him to receive an American National Research Fellowship and, subsequently, to win the highly competitive Loomis Fellowship to attend graduate school at Yale in 1920. He obtained his Ph.D. in 1924 and immediately moved on to accept an Assistant Professorship appointment at McGill. By then he was already well-known for his experimental work on the Stark effect.

Although Foster always denied being anything but an experimentalist, the lack of a theoretical understanding of the Stark effect at the time must have bothered him. In 1926 he received a fellowship to spend a year in Copenhagen at the Niels Bohr's Institute for Theoretical Physics, where the new quantum mechanics was being hammered out. It was a fruitful sojourn in Copenhagen; he published the important definitive paper on the quantum mechanical theory of the Stark effect in 1927. This paper typified his taste and attitude in physics; he preferred direct, simple and intuitive forms of theory and experiment. Bohr and Heisenberg were his abiding heroes. His work on the Stark effect won him many honours and awards. Among them: Fellow of the Royal Society of Canada (1929); Levy Medal of the Franklin Institute (1930); Sterling Fellow of Yale (1930); Honorary D.Sc. from Acadia (1934); Fellow of the Royal

Society (London, 1935). An FRS only seven years after his Ph.D.!

Foster was a visionary physicist. In 1935, only three years after his great friend and Yale classmate, Ernest O. Lawrence, had succeeded in making the cyclotron work, he assembled a team at McGill and started designing the world's second largest cyclotron and a Radiation Laboratory to house it. In the Fall of 1937, the Governors of McGill voted to finance his project. This was no simple matter for a private university like McGill. Even to this date people still wonder how he managed to do that. Unfortunately, the project had to

be delayed due to the outbreak of the 1939-1945 war.

During the war, like many of his McGill colleagues, Stuart Foster devoted his effort to war time radar research. In 1941 he was sent to the newly established Radiation Laboratory at the Massachusetts Institute of Technology (M.I.T.) as the liaison officer for the National Research Council of Canada. It was a funny appointment because Foster was never much of a liaison man. He had little patience for paper work and his way of dealing with it was any handy nearby wastebasket, especially when his mind was on science (which was most of the time). He preferred to disappear into the laboratory and started inventing things; he invented the Foster Scanner for radar rapid-scanning antenna which involved a new concept that subsequently evolved into a subfield of antenna design. For his war effort, he was later awarded the Medal of Freedom and Bronze Palm of the United States (1947). Oh yes, he also earned the title as "Mad Professor" from the custom officers at the Canada-U.S. border for his frequent smuggling of radar components across the border during the war.

The crown of Foster's career was undoubtedly his cyclotron and Radiation Laboratory. He resurrected and updated his project upon his return to McGill in 1944. By 1946 University financial backing was at hand; the cyclotron was under construction and the first phase of the Radiation Laboratory was complete. The cyclotron was officially commissioned in 1949. The cost of this phase of the whole project was less than \$300,000, an incredibly low figure for a 100-MeV machine; thanks to the large team of highly skilled graduate students, mostly veterans of the war. Many important pioneering research works were carried out at the facility which had helped to place Canada on the map of international nuclear physics. Foster was always proud to say that the Laboratory under his tutelage (he retired in

1960) produced more than 100 Ph.D. graduates who staffed various Canadian and U.S. institutions.

No description of Foster is complete without reference to his sense of humour, which could be depicted as Mark Twain or Stephen Leacock with a down-east background. Examples abound. To a traffic policeman, threatening a \$20 fine: "Haven't you got anything cheaper?" During a tour of Leningrad, when the guide from the Soviet Academy of Science was boasting about the efficiency of their underground system in comparison with those in Paris, London and New York, Foster remarked: "Seems reasonable." To the humanists who complained about their lot: "They can go to work too." To a geologist talking about his research problem: "When you get stuck, turn on the water."

As devoted to physics as he was, Foster was exceptionally quick to appreciate good work in art, music and letters

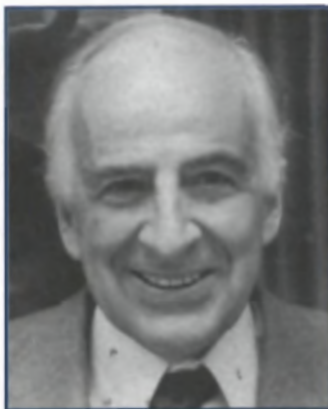
generally. He liked to recognize the musical or artistic talents among his graduate students and their families. He was fiercely loyal to McGill, his family, friends and graduate students. Once convinced of a student's worth, he would tirelessly promote his interests long after graduation.

Foster received many honours and awards which are too numerous to be listed here. Apart from those already mentioned above, suffice it to add: Tory Medal of the Royal Society of Canada (1946); President of Section III of the Royal Society of Canada (1948-49); D.Sc. from McMaster (1950) and from Dalhousie (1960); Medal of Achievement in Physics of CAP (1958). His achievement is, as he used to say of the others, "enough for any one man." Throughout his life, until his death in 1964, Foster was a mover and shaker of modern Canadian science.

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BRUNO PONTECORVO, 1914 - 1993

Bruno Pontecorvo was only briefly in Canada (1943-1948) but he was the most legendary and flamboyant of the stars that illuminated Canadian physics during the past century. Born in Pisa, Italy, on August 22, 1914, he was the youngest and most dashing member of Fermi's group in Rome, perhaps almost the opposite in personality to Rasetti who had such a strong influence on Laval University. Pontecorvo will be remembered for the depth and elegance of his ideas, particularly for experimental neutrino physics and neutrino astrophysics, two fields for which he was the founder and leader for many decades.



Bruno Pontecorvo

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At the Montreal Laboratories (see Phillip Wallace's article on "Atomic Energy in Canada: Personal Recollections of the Wartime Years", in this issue) and in the early days of Chalk River, Pontecorvo was very impressive. Working with Geoffrey Hanna and others, he suggested the chlorine absorption of neutrinos as the basis for radiochemical detection of neutrinos. It later was this method which allowed the first detection of solar neutrinos. From the spectrum of tritium beta decay, he found the first good limit for the neutrino mass. Also, at the Chalk River Nuclear

Laboratories (CRNL), he pioneered the study of muon decays and proposed the universality of the weak decay for electrons and muons. His imagination and creativity were extraordinary, similar to that of his great teacher, Fermi, whom he emulated.

Pontecorvo's verve extended to his private life. He excelled at tennis, let his furnace ashes simply accumulate in his Deep River basement and, in the close-knit community of Deep River, his escapades sometimes bent the rules. After a brief sojourn in England, he shocked his friends in the West by leaving with his family for Russia in 1950.

At Dubna, near Moscow, his physics continued to flourish, but he could not travel outside Eastern Europe until 1978.

Pontecorvo died in Dubna on September 24, 1993. His brilliance as an experimental and theoretical physicist was long remembered at CRNL.

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