Editorial

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A reading of the biographies of great scientists of the eighteenth and nineteenth centuries, reveals that many of them were highly creative interdisciplinary experimentalists. The eighteenth century biologist Luigi Galvani was professor of anatomy at the University of Bologna. Galvani's experiments involving electric charges and frogs, are seen as the beginning of the unveiling of the electrical nature of the nerve–muscle function. This work aroused the interest of his colleague Alessandro Volta, who was professor of physics in Pavia. Volta, after whom the unit *volt* is named, developed the ideas that led to the Voltaic pile, the precursor of today's battery. Volta also discovered and isolated methane gas. The English scientist Michael Faraday, conducted pioneering experiments in physics and chemistry. He received little more than a primary education, and was first inspired by a lecture by Humphry Davy. He isolated benzene in 1825. Faraday demonstrated the principle of electromagnetic induction in 1831, showing that electrical energy could be generated by mechanical means. Examples of prominent twentieth century scientists are A L Hodgkin and A F Huxley. They were both students of physics, mathematics and physiology at Trinity College, Cambridge. Their knowledge of mathematics and practical physics, along with expertise gained by working with Kenneth Cole on ion transport through biological membranes, enabled them to propose the Hodgkin–Huxley equations, which won them the Nobel Prize for Physiology or Medicine along with J C Eccles in 1963.

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A theoretical physicist of exceptional intellectual prowess, Hans Bethe, is featured in this issue of *Resonance*. He has been described in articles that appear here, as the "last link among the founding fathers of physics in the last century", and "The Master Nuclear Physicist". He was awarded the Nobel Prize in

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Physics in 1967 for his theory explaining the production of energy in stars. Bethe recently passed away at the ripe old age of ninety eight. He was renowned for his formidable mathematical skills, his mastery of physics, and a technical stamina that few could match. It was not surprising therefore, that he was chosen by Robert Oppenheimer to head the Theoretical Physics Division at Los Alamos in 1943, to work on the atomic bomb project. While he considered it important to make a contribution to the war effort against the Nazis, Bethe later publicly opposed the hydrogen bomb, and was a strong proponent of disarmament. His contributions to the Manhattan Project were crucial to its success; yet he grappled with the moral implications of nuclear weapons and their deadly potential. On the fiftieth anniversary of the Hiroshima bombing, he called on fellow scientists to refrain from any activity that contributed to developing future nuclear weapons. He is reported to have written to President Clinton in 1997, urging him to stop not only all tests of nuclear weapons, but also the sponsorship of "computational experiments, or even creative thought designed to produce new categories of nuclear weapons". In addition to his activities aimed at influencing government policy, Bethe actively pursued research well into his nineties.

Resonance is very fortunate to have articles by several experts, explaining the importance of Bethe's contributions to physics, and gratefully acknowledges the initiative of R Rajaraman in bringing out this issue. Indranil Mazumdar explains Bethe's Nobel Prize winning work in his article on energy production in stars. The Lamb shift was a problem that Bethe is said to have solved on a train during a return journey from the workshop where the problem was posed and discussed! How Bethe obtained the solution is the subject of the article by A N Mitra. Neutrino physics is an area in which recent discoveries have been made and which is related to the work of Bethe. The sequence of events that led to these discoveries has been traced in the article by G Rajasekaran. Finally R Rajaraman, a student of Bethe, motivates the study of nuclear matter and describes the difficulties in analyzing such a complicated system.