Bird of Passage at Four Universities
Student Days of Rudolph Peierls

G Baskaran

A glimpse into the student life of Rudolph Peierls, when he was 18–22 years old, gives us a flavor of happenings during the birth of quantum mechanics and how one started understanding properties of matter such as a metal and a semiconductor, using the newly found quantum mechanics. It also shows how a bright young mind could get nurtured and shaped when placed in a proper environment. Peierls, during his college days, had the opportunity to work closely with three great physicists, Sommerfeld, Heisenberg and Pauli, in succession spending one year with each. This experience had its effect – Peierls’s discovery of hole theory of electrical conduction in solids, formulation of the theory of thermal conduction in solids, analysis of anharmonic interactions and discovery of Umklapp process. It is also interesting that the academic load was far from a burden and was filled with weekend activities and summer vacations involving sailing, skiing, hiking and concerts.

Peierls was born in 1907 at Berlin in Germany. His schooling and most of his university education was in Germany. On finishing school he was keen on becoming an engineer. However, there was a general discouragement from his family. His father’s friend and a famous chemist, Fritz Haber, advised Peierls to take up experimental physics. But circumstances led him to choose theoretical physics as a career. Peierls stayed as a university student from the winter of 1925 till the summer of 1929. These four years, during the young age 18–22, created a special theoretical physicist, who began...
Peierls was ready to put his mind to any quantitative question in physics. He would start from first principles and work his way up.

his journey and started establishing some fundamental principles of the quantum theory of solids.

Peierls was versatile and had a nose for important things: Peierls theory of hole conduction, Peierls Umklapp process, Landau–Peierls theory of diamagnetism, Peierls substitution, Peierls–Brillouin zone, Bethe–Peierls approximation, Peierls–Nabarro barrier, Peierls stress, Peierls variational principle, Landau–Peierls uncertainty principle, Peierls proof of phase transition in 2D Ising model, Peierls instability, Peierls–Kapur resonance and so on. Peierls was ready to put his mind to any quantitative question in physics. He would start from first principles and work his way up.

At the age of 27, already an established theoretical physicist, Peierls started working on nuclear physics. His first collaborator was Hans Bethe, his student days' friend at Munich University. Peierls' foray into nuclear physics resulted in the historically famous *Frisch–Peierls Memorandum* of 1940, which they sent to the British Government. This led to the Atomic Bomb Project, at first in Britain under the name *Tube Alloys Project* and later in USA as the *Manhattan District Project*. Later Peierls also wrote extensively about matters of public concern, especially to do with nuclear weapons and later the SDI proposals.