

RADIATION PHYSICS RESEARCH IN BOSE INSTITUTE

– REMINISCENCES OF AN EX-WORKER*

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Acharya Debendra Mohan Bose was for a time associated with Dr. C.T.R. Wilson when the latter was trying to develop the cloud chamber technique. Later Bose used a cloud chamber for accurate measurement of ranges of α -particle emitted by a number of radioactive nuclei. While working in Germany as an interned scientist during the first world war, Bose photographed what is now regarded as the first record of a nuclear reaction occurring in a cloud chamber. Bose maintained an active interest in nuclear physics throughout his life and it is no wonder, therefore, that when he took over the Directorship of Bose Institute, investigations in radiation physics became one of the important lines of research pursued in the Institute.

Bose himself improved the photographic emulsion technique to make it a quantitative tool for radiation research and used it, in collaboration with Miss B. Choudhuri, in cosmic ray investigations. Miss Choudhuri also investigated the relation between energy, range and mean grain spacing along tracks of α -particles and protons.

Before and during the world war two, researches in experimental nuclear physics was carried out in the Institute mainly by Dr. S. D. Chatterjee who was joined for a period by Dr. N. K. Saha. Later younger workers like Dr. I. L. Chakravarty, Dr. A. Naha worked with Dr. Chatterjee. After nearly half a century it is almost impossible now to imagine

the difficulties which the early workers in radiation physics had to face in pursuing their research. The sources available for research were scarce, detectors had to be fabricated from scratch, electronic equipments were not available commercially and had to be home-built using whatever components were available, information flow in the form of books, journals and reports was almost non-existent, financial and human resources were severely limited and communication and contacts with more advanced laboratories abroad were few and far between. Research was more inclined to be an art in pursuit of science and individual contributions rather than group activities were characteristic of this early phase. In spite of these numerous handicaps surprisingly large and significant contributions to radiation research were made from Bose Institute during this period. In this report we shall mention only some of these investigations.

During this early phase Dr. S. D. Chatterjee investigated, in collaboration with Prof. P. R. Roy of the College of Science, University of Calcutta, Szilard – Chalmers reaction in various compounds of cobalt. They used a Ra-Be source in a paraffin moderator as a source of thermal neutrons and counted the resultant β -activity in thin-walled Gieger Müller counter coupled to electronics designed and fabricated in the laboratory. Using a solution of sodium cobaltcyanide, to which a small quantity of cobalt nitrate has been added, as the target and an irradiation period of three months it was possible to precipitate the ^{60}Co activity and establish its long period of noting that the counting rate remained practically constant for at least three weeks.

During this period artificial radioactivity induced in fluorine by the bombardment of α -particles from a polonium source was investigated and the radioactivity of the ^{22}Na daughter product was studied. Using Ra-Be neutron

* This article is a document on the radiation physics research done in Bose Institute between the period of Second World War and late seventies when the author left Bose Institute. The article was written in early nineties and the manuscript was given to me to include the latest research activities. I regret my inability to have fulfilled his wishes during his lifetime but do hope to complete the same shortly. The present article has been published without any editorial modifications. – Editor.

** Formerly Head of the Department of Physics, Bose Institute. Deceased : May 23, 2004.