P R E F A C E

The work described in this thesis was done in the Nuclear Physics Laboratory of the North Bengal University by the author while he was a recipient of College Teacher Fellowship from the University Grants Commission under the Faculty Improvement Scheme. The author had planned the experimental set up for measurement of pair production cross section in the threshold region and started the work during 1978-79. It took a considerable time to collect materials necessary for measurements.

The measurements of pair production cross section near threshold region were considered to be useful in view of new theoretical development in the seventies.

Experimental verification of these theoretical results has been performed by the author in two different methods at energies near threshold for pair production. Analysis of data evaluation of results and conclusions drawn are original and are the total responsibility of the author. The author has participated in some other experiments in the nuclear physics laboratory. The list of his publications is given below in additional support of the candidature.

(1) "Atomic Rayleigh Scattering of Photons in the momentum transfer range 0-10 MeV", S.K.Sengupta, N.C.Paul,

J.Bose and N.Chaudhuri, Phy. Rev. A-20, No. 3, 19 (1979).

(2) "Atomic Rayleigh Scattering of Photons in the threshold of K- absorption edges", S.K.Sengupta, N.C.Paul, J.Bose, G.C.Goswami, S.C.Das and N.Chaudhuri, Journal of Physics, B15, No. 3, 1980.

(3) "Atomic pair production by photons in the threshold region", J.Bose, S.K.Sengupta, N.C.Paul, S.C. Das and N.Chaudhuri, Phy. Rev. A23, 1817-1822, 1981.

(4) "Atomic Rayleigh Scattering of photons in the momentum transfer range 0-10 MeV", S.K.Sengupta, N.C.Paul, J.Bose and N.Chaudhuri, 6th International Congress of Radiation Research, Tokyo, Japan, May 13-19, 1979.

(5) "New measurement of coherent and incoherent atomic scattering factor", S.K.Sengupta, N.C.Paul, J.Basu, and N.Chaudhuri, Nucl. inst and Meth, 193, 395 (1981)

(6)"A simple method of studying atomic screening effects in Pair Production", J.Basu, S.K.Sengupta, N.C. Paul, G.C.Goswami, S.C.Das and N.Chaudhuri, Nucl. inst. and Meth, Vol. 200, No. 23, 265, 1982.

(7) "A method of studying atomic screening effects pair production", J.Basu, N.Bhattacharya, S.K.Sengupta and N.Chaudhuri, Nucl. inst and Meth. (accepted for publication).

(8) "New measurements of coherent and incoherent atomic scattering factors using Radioactive gamma ray sources",

S.K.Sengupta, N.C.Paul, J.Basu, S.C.Das and N.Chaudhuri, Paper presented in the 5th Symposium on X-ray and gamma ray sources and application at the University of Michigan, Ann. Arbor. Michigan, June 10-12, 1981.

(9) "Experimental study of atomic screening effects in pair production near threshold, J.Basu, S.K.Sengupta, N.C.Paul, G.C.Goswami, S.C.Das and N.Chaudhuri, Paper presented at the 2nd International Symposium on Radiation Physics, University of Sains, Malayasia, May 25-30, 1982.

(10) "Inelastic scattering of photons by bound atomic electrons", N.C.Paul, S.K.Sengupta, J.Basu and N.Chaudhuri - Paper presented in the 2nd International Symposium of Radiation Physics, University of Sains, Malayasia, May 25-30, 1982.

The reprints of some of the papers are attached with the thesis.