Dedicated To ........

My Father: Late Manik Chandra Roy

My Mother: Smti. Bandana Roy
Acknowledgements

First of all, I would like to express my most sincere gratitude to my supervisor, Prof. Ramendu Bhattacharjee, Dept. of Physics, Assam University, Silchar who brought the scientific temperament, inquisitiveness and thirst for the knowledge in my mind through his galvanizing instructions and patient guidance during the few years passed by. All along, the help I received from him and the discussion with him were motivations to excel each time. I thank him for the lessons learnt in the process which will definitely help me to move ahead. His continuous support and constructive suggestions led me step by step to proceed with the studies as well as my research work, without which this work would have not been possible and to prepare this thesis finally.

Further, I extend my sincere thanks to Prof. Tapodhir Bhattacharjee, Hon’ble Vice Chancellor, Assam University, Silchar, for providing a peaceful academic environment and inspiration during my research. I also sincerely thank Prof. D. Biswas, Dean, Albert Einstein School of Physical Sciences and Prof. A .K. Sen, Head, Dept. of Physics, Assam University, Silchar for their moral support and encouragement during my Ph. D work.

I am grateful to Dr. Himadri Sekhar Das, Dr. B. Indrajit Sharma and Dr. Atri Deshmukh, Department of Physics, Assam University, Silchar, for their continuous support and inspiration throughout the whole Ph. D work.
I would express my great appreciation to Mr. Pritibhajan Byakti, SRF, Saha Institute of Nuclear Physics, Kolkata (SINP) who helped me in each & every step by sending useful research papers and numerous books for this work whenever required. Moreover, he helped me tackling various mathematical obstacles involved in this work by sparing his precious time.

It is my proud privilege to thank Dr. Uday Shankar Chakraborty, Dept. of Mathematics, Assam University, Silchar and Dr. Sudip Choudhury, Dept. of Chemistry, Assam University, Silchar for their immense and diligent aids through pen and paper works in solving various intricate mathematical steps.

I must place on record my appreciation to Mr. Saurav Shome, SRF, Tata Institute of Fundamental Research, Mumbai; Dr. Nabendu Sen, Dept. of Mathematics, Assam University, Silchar; Dr. S. S. Nath, Central Instrumental Laboratory, Assam University, Silchar; Mr. Pinak Pani Nath Choudhury, Dept. of Zoology, S. S. College, Hailakandi; Dr. Gunakar Das, Department of Physics, Kalashib Govt. College, Kalashib, Mizoram; Dr. Joydeep Choudhury, Department of Physics, Assam University, Silchar; Dr. Nirmal Kumar Sarkar, Dept. of Physics, Karimganj College, Karimganj; Dr. Tanuj Biswas, Silchar medical College, Silchar; Mr. Abhijit Nath, Dept. of Chemistry, S. S. college, Hailakandi; Mr. Ashim Kalyan, Dept. of Physics, S. S. college, Hailakandi and Mr. Rupam Sen, Dept. of Physics, S. S. college, Hailakandi for their encouraging support and co-operation throughout the Ph. D. work.

I am very much thankful to Mr. Raghunandan Das, Mr. Dipankar Paul, Mr. Jameson Maibam, Mr. Ratan Das, Mr. Sujit Ranjan das and Mr. Chinmoy Bhattacharjee, Ph. D. scholars, Dept. of Physics, Assam
University, Silchar, who were generous enough in extending their helping hands whenever I needed.

I also acknowledge Mr. Subrata Bhattacharjee, Mr. Sibasish Bhattacharjee and Mrs. Sarmistha Deb for providing laboratory accessories.

I am very much thankful to my friends Shrubhrangshu, Karunaksha, Arindam, Pradyut, Chaitali, Anamika, Pratap and Deblin for multiplying my joys and dividing my sorrows.

I'm grateful to Dept. of Science & technology (DST), Govt. of India, for granting the INSPIRE Fellowship (No. DST/INSPIRE Fellowship/2010, IF10372).

I take the opportunity to acknowledge Mr. Rupayan Chakraborty for providing me computer at initial phase of my research work. His mental support encouraged me during the period of research.

I will be failing in my duty if I do not acknowledge the love, affection, inspiration and encouragement provided by my parents, sisters (Mona, Churdibhai & Misti) and relatives for carrying out the present work unless which it would have not been a reality. The strong faith of my Maa makes me in attaining this phase.

Date: 27.08.11
Place: Assam University, Silchar

(Subha Gaurab Roy)