Dedicated

to

my beloved mother
Acknowledgement

It would never have been possible to complete my thesis without the guidance of my mentor, valuable help from my colleague and support from my family and the almighty.

Foremost, I would like to express my sincere gratitude to my supervisor Dr. Chetan G. Limbachiya for the continuous support of my Ph.D study and research, for his patience, motivation, enthusiasm, and immense knowledge. His guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better supervisor, advisor and mentor for my Ph.D study.

I am extremely thankful to Dr. Ajay S. Gor, Principal, P S Science and H D Patel Arts College, Kadi and Dr. Minal Trivedi, Principal, HVHP Inst. of PG Studies and Research, Kadi for providing me excellent facilities and friendly atmosphere in the research laboratory throughout this work. I am also thankful to all the faculty members of the research laboratory for their encouragement. My thanks are also to all other supporting staff members of the college and university office for their continuous support and help.

I would like to thank Prof. K N Joshipura, Retd. and former HoD, Physics Dept., SPU, Vallabh Vidyanagar, Prof. P. C. Vinodkumar and Dr. Minaxi Vinodkumar who helped and guided me at every stage of my Ph.D program.

I gratefully acknowledge the financial support from UGC, Government of India through the major research project No. F.40-429/2011(SR) during the research work. I would like to thank DST for providing me the opportunities to attend the Preparatory SERC School on physics of highly charged Ions, TIFR, Mumbai. It has provided me basic course work for my current study.

Many thanks to Dr. Mukesh C Patel, Dr. Parimal Chattrabhuji and Dr. Ram Kesur for nourishing my research with valuable advice and support. My research would not have been possible without their helps.

It gives me an immense pleasure in acknowledging my best friend Dr. Manan N. Shah whose support was really valuable and admirable throughout my Ph.D. thesis writing.

My special thanks to my colleagues and best friends Dr. Bijoy Roy and Dr. Harshal Deota who have always supported me in my throughout research work and thesis writing.
I would like to thank Hardik Desai, Dr. Jasmin Kumbhani, Dr. Deepkumar Joshi who as a good friend was always willing to help and give his best suggestions. It would have been a lonely lab without him. Everyday tea time will recall the memory of beautiful time spent with you at tea-stall.

Also my sincere thanks to Dr. Sidhdharth Pandya, Dr. Mayuri Barot, Dr. Avani Barot, Ms. Zalak Patel, Ms. Reenu Abraham for providing a friendly atmosphere during my research.

I would also like to thank my parents, my wife Unnati and my elder brother and his family. They were always supporting me and encouraging me with their best wishes. I would also like to thank my rest of the family members for their constant support.

I would like to remember and present this thesis as a tribute to my grandfather Late. Shri D.D. Swadia for his support and his blessings. It is because of his blessings, I have completed my thesis.

Last but not least, my gratitude in terms of prayer to Almighty for giving me courage and blessing me with such a noble fortune by virtue of what I am here.

Mohit S Swadia