Acknowledgement

This thesis is the final phase of my journey in obtaining my Ph.D. The journey towards the thesis completion was not in isolation, but in the interactive medium of reinforcement by numerous people including my wellwishers, friends, colleagues and various institutions. At this moment of accomplishment, first of all I would like to express my deep gratitude to Professor K. N. Joshipura, my research supervisor, for the patient guidance, enthusiastic encouragement and useful critiques for research work. I am also thankful to Prof. A. R. Jani, Head of the Department- Physics, for providing me excellent facilities guidance and nourishing encouragement in the department. I also express my sincere thanks to all teaching and non-teaching staff members of Physics Department and Sardar Patel University for providing necessary administrative help. I gratefully acknowledge Dr. Manjusha Kuksheestha, my project investigator at Anand Agricultural University for providing necessary support during the period of thesis completion.

I am particularly grateful to Dr. H. N. Varambha (UK) for his valuable advice, constructive criticism and his extensive discussions in learning Quanemol N package and related low energy work. My grateful thanks are also extended to Prof. P. C. Vinodkumar, Dr Minaxi Vinodkumar, Dr. Chetan Limbachiya, Dr. Bhushit Vaishnav and Dr. Sumona Gangopadhyay for their valuable insights towards the research.

I would also like to extend my thanks to Prof. M. Allan of Fribourg University at Fribourg, Switzerland; Dr. Bhas Bapat, Dr. Subramaniyan, Mr. S. B. Banerjee and group of PRL for enabling me to visit their laboratory and help me acquiring some experimental insights in our field. Prof. Nigel Mason, of UK and Prof. K.L. Baluja (New Delhi) for their helpful guide lines about the low energy work. I am also thankful to Dr. K.C. Rao student of Prof. S.V.K Kumar at TIFR for his discussions on experimental work in the field of electron scattering.
I owe a great deal of appreciation to my colleagues – cum-friends Harshit, Foram, Manisha, Umang and Ravi for their personnel attention and valuable discussions during my research endeavor. My room partners – cum-friends Doyel didi, Soniya, Jinkal, Dipali, Rajal and Manali owes a sincere and warm thanks, as they were always beside me during the happy and hard moments; cheered and encouraged me. Arpit, Kaushal, Manan, Navin, and Mihir Sarvaiya deserve special mention here for their friendship, inspiration and constant support in the later days of my research tenure. I wish to acknowledge the help provided Umesh Dhobi, Rajib Kar, Payel didi, Rasi and Sangeeta in collecting references required for research. I am also thankful to Brinda, Dipika, Minal, Rapti, Vishnu, Chirag, Praveen, Tushar, Rajdeep, Samiran, Soumen, and all the members of Khai-Khai group.

My thanks are due to my Mejo Mama, Mejo Mami for their motivation resulting to momentum PhD work; Choto Mama, Mami and Twarit for their love, understanding and affection. I convey special acknowledgement to Bashona Mashi, Majumdar Uncle and Aunty, during the inevitable ups and downs of conducting my research they often reminded me life’s true priorities, this helped me a lot to work for hours together tirelessly.

I would like to pay high regards to my Ma and Baba for their love, care, moral support and lifting me uphill this phase of life. My dada and sweet Boudi deserve sincere expression of thanks for their encouragement and inspiration throughout my research work. I owe everything to them.

At the end it is a pleasant task to express my thanks to all those people who knowingly and unknowingly contributed in successful completion of this project and made this phase an unforgettable experience for me.

- Pooja Bhowmik