ACKNOWLEDGEMENTS

It would not have been possible to write this thesis without the help and support of the kind people around me. It is a pleasant aspect that I have now the opportunity to express my gratitude to all of them.

First of all, I would like to convey my sincere thanks and appreciation to my thesis supervisor Dr. Tirthankar Roy Choudhury for his continuous support and patience towards me through my PhD life, not to mention his advice, criticism and unsurpassed knowledge in this subject. Working with him has been a great pleasure and I sincerely hope to do more productive work with him in the future. It has been really a privilege being his student. Thank you Sir for everything.

Besides my supervisor, my earnest thanks goes to Prof. Andrea Ferrara for his insightful comments and timely suggestions. His uncompromising attitude towards the quality of work has always been a source of inspiration for me. Without your immense help this thesis would never have been an enriching experience. Also I would like to thank Prof. Jasjeet Singh Bagla for being with us. His meticulous comments were of enormous help to me. I would take this opportunity to express my deep gratitude to Girish Kulkarni, Jaswant Kumar Yadav, Stefania Pandolfi, Prof. Alessandro Melchiorri, Suman Majumdar and Tapomoy Guha Sarkar for their collaboration on parts of this research. I would also like to thank Anjan Da, it was a great experience to discuss scientific as well as non-scientific problems with you. Special thanks to Prof. Xiaohui Fan and Prof. Jane Charlton for permitting me to use some published figures in this thesis.

I would like to acknowledge the financial, academic and technical support of Harish-Chandra Research Institute (HRI). Thanks to all the academic and non-academic staff of HRI who are giving their best for a smooth working atmosphere.

How can I forget to thank all my HRI friends who made my journey entertaining and amusing with their valuable (!) thoughts? I will never forget how to discuss on pointless and meaningless things for hours over a cup of tea. Thank you Niyogi, Dhiraj, Jonthu, Tarat, Manoj, Rambha, Pandu, Hochi, Satya, Atri Da, JD, Sanjay Da, Mama, Shamik Da, Subho Da and Anirban Da for being with me whenever and for whatever I needed.

Special thanks also to my University friends - Banerjee, Kaka, Jyoti Da, Joy Da, Bagchi, Chiku Da, Arghya Da, Shikhar mama, Bachcha Da and my school friends - Uja, Hodo, Diganta, Gantait and the list goes on!

Not only this thesis, but also my life after school would not have been complete without one person, my best friend - Akash. I am in debt to you throughout the journey of my life. You were with me during the toughest time of my life and you will always remain very close to my heart no matter how far you are. I honestly thank God that He gave you as one of my true friends. I will also be thankful to Akash for introducing me to another beautiful person:
Mr. Abhijit Sengupta. We fondly call him Kaku. Your enthusiasm and great interest in Science always surprised me. Sometimes, I wonder how you can manage to keep your desire to know about every little aspect of Physics despite your busy daily schedules. Perhaps, this attitude of yours will always inspire me for higher studies. I have learned so many useful things from you. Akash and Kaku, you have helped me a lot to overcome many difficulties which cannot be described in this small acknowledgement. I can even write a whole book about you - love you guys. I would also like to express my deepest appreciation and heartiest thanks to my love - Sanhita. Without your generous and unselfish support, I could not have completed my PhD. Wherever I go, I will always think about you. Thank you so much for not only being my friend, but also for being an intense source of support and inspiration.

Last but not the least, I would like to convey my heartfelt gratitude and love to my parents and my brother to whom I owe my whole life rather than my PhD for their unconditional love, immense support and constant encouragement. I would not have reached anywhere near where I am today without their unrelenting support and patience. I will always consider myself the luckiest person in the world to have such admirable parents and brother. You are and always will be my strongest source of encouragement, inspiration and motivation. I dedicate this thesis to you - my Maa, Baba and Dada.