

Acknowledgements

I would like to express my sincere gratitude and appreciation to all those people without whom completing my Ph.D. thesis would have never been possible. There are no proper words to convey my deep thankfulness and respect for my supervisor, Dr. Amit Pathak who at times is more like a guardian to me. His immense support, guidance and continuous motivations have really helped me to finish my thesis with more ease than what I actually thought to be. I would also like to thank him for the intellectual freedom that he provided during my Ph.D. tenure which gave me a space to engage with various concepts in and around the proposed topic.

I have my sincere thanks to my co-supervisor, Dr. Gazi Ameen Ahmed and members of my doctoral research committee: Dr. Rupjyoti Gogoi and Prof. Ramesh Ch. Deka for offering their unreserved help and advices to finish my thesis step by step. Also, I shall remain grateful to all the faculties and staff of the Department of Physics, Tezpur University who have contributed in some ways in completing my Ph.D. I am indebted to Department of Physics and Tezpur University for providing me with necessary laboratory and computational facilities that helped to swiftly complete my research work.

It gives me an immense pleasure to thank my collaborators cum advisors, Prof. Takashi Onaka and Dr. Itsuki Sakon from University of Tokyo and Professor Peter Sarre from University of Nottingham for their feedbacks and insightful comments. Despite their busy schedule, they were always willing to offer their helping hands whenever I was in need.

Warm thanks to my friends in the department and outside the department who have always been a great support. It would be difficult to mention all their names, but in particular, I would like to thank Aish, Pranjal, Gauri Ma'am, Shivani Ma'am, Tanvir, Prathana, Pratikshya, Gau-

tam and Pranju for their motivating words.

Names that require special mention are Trisha, Duyi and Prithibi who are more than a family. Their presence added colour to my Ph.D.life. Thanks to you for the strength that you give me from time to time and keep faith in me always. I also give my heartfelt thanks to Gitu who has been a great friend cum mentor in all these years. Special thanks to Somo for always believing in my potential and bringing the best out of me. I shall always remain indebted towards him for his constant support and encouragement. No one could have been a better support than you, Somo.

Above and beyond all, I thank my mother and my three elder sisters for always being my pillar of strength and teaching me to be strong and independent. I am forever indebted to my family for their love, support and strength to achieve what I dreamt of. For giving me opportunities in every possible ways since my childhood, I owe my Ph.D. to my family.

Mridusmita

Date: July 20, 2018