

Acknowledgement

In the journey of my studentship, undertaking this PhD has been a truly life-changing experience for me. It would not have been possible to do without the support and encouragement that I received from many people. Thus, without acknowledging their effort, this thesis may not be complete.

First and foremost, I would like to express my deep and earnest gratitude to my research supervisor **Prof. N. L. Singh** who made this work possible. A mere word of sincere appreciation is insufficient to express my gratitude to him. I am really grateful to him for his invaluable guidance, fruitful discussions, constructive suggestions, constant support and encouragement throughout the course, enabled me to complete this challenging task. It has been an intellectually stimulating and rewarding experience to work with him. I am really glad to be associated with a wonderful personality in my life.

Words are scrimpy to express my gratefulness to **Dr. H. Kumawat**, Nuclear Physics Division, BARC, Mumbai, for his guidance, endless support, and encouragement. It was because of his guidance that I was able to improve my understanding of concepts and also grasp the vast and ever evolving frontier topics in Nuclear Physics, experimental as well as theoretical aspects of nuclear measurements. His kind assistance in many aspects is also acknowledged, during my stay at BARC. My visits at BARC has been a great learning experience due to the more interactive people over there.

I would like to thank **Prof. P.K. Jha**, Head, Physics Department, M.S. University of Baroda, Vadodara, for providing me all the necessary facilities and encouragement during research work. I also wish to thank Prof. H.R. Kataria, Dean of Faculty of Science, for his support in

pursuing this work. I thank my all professors at M. S. University of Baroda, for their support and motivations in carrying out this work.

I thank Dr. B.K. Nayak, Dr. Dipika Patel for their valuable suggestions and help during the analysis of experimental outcomes.

I would like to thank all the staff members at M. S. University of Baroda, Vadodara and Nuclear Physics Division BARC Mumbai. For their cooperation in administrative work and support.. I am very grateful to the Pelletron accelerator staff at Inter University accelerator Centre (IUAC), New Delhi and TIFR Pelletron operating staff for smooth operation of the accelerator during the experiments.

I would like to acknowledge all the teachers I learned from, since my childhood, I would not have been here without their guidance, blessing, and support. I would like to thank all my friends, lab mates, and roommates Dr. Asha, Dr. Shilpa Bhavsar, Dr. Ashwini, Mr. Ratan Singh, Dr. Gyansagar Patel, Dr. Himanshi, Dr. Paulomi, Amrita, Radha, Sana, Priti, Neha for their support and motivation during this work.

I gratefully acknowledge Department of Science &Technology (DST),Ministry of Education, Government of India, for providing me financial support to carry out this work..

With a great gratitude, I would like to thank my family for being immensely supportive, loving and caring. I would like to pay my ultimate thanks to my father (**Mr. Brahmadatt Joshi**) and mother (**Mrs. Chetana Joshi**) for everything I am blessed today. It was because of immense love, broad vision and motivation that I could think of perusing higher education. I would like to thank my bhai (**Mr. Mudit Joshi (Kanchu)**) for always being available during all my down time and trying his best to keep me confident. He has always been my Guru to stand me like a rock and resume me as always being a strong version. I will always be grateful for having infinite

blessings by my Nani (**Vasumati Pandya and late Pushpa Pandya**). I would never be able to pay back the love and affection showered upon me by my parents and family. My thanks are extended to my Parents-in-Law **Mr. Vinod Pandya** and **Mrs. Harsha Pandya** for their love and blessings. I have special respect for my father-in-law Mr. Vinod Pandya. I will always be thankful to my lovely **Sangeeta masi, and Shruti didi**, cousins **Yash, Charchit, Yatharth, Parth** for their love, support and always caring for me.

I respectfully shower my deepest gratitude towards my better half for his eternal support and understanding of aspirations towards my career. His infinite love and support has always been my strength. Without his guidance, I would not have been able to complete much of what I have done and become who I am. These few words are not even 1% for the respect I possess for him and blessed I feel to have such loving and caring husband **Dr. Rajan Pandya (Pandi)**. His patience and sacrifice will remain my inspiration throughout my life.

Last but not the least, I feel very happy to express my sincere gratitude and appreciation to all those, whose direct or indirect contribution helped me during research work.

Finally, my open hearted gratitude to the almighty for giving me the opportunity, love, strength and patience to work throughout the years. These years have brought many ups and downs, I thank almighty to raise the situations caused to update me to a stronger version of myself.

With many thanks,

Chhavi Joshi