



Acknowledgment

My thesis work involved a significant number of collaborators, and am indebted to all of them for bringing this thesis to its conclusion. It gives me great pleasure to acknowledge my indebtedness to Dr. S. Mukherjee, my thesis supervisor, for invaluable guidance and encouragement during the course of this thesis work and motivating me to carry out this investigation in the field of nuclear structure. I wish to thank Dr. Amit Roy, Director of IUAC, for allowing me to carry out this thesis work and extending all the necessary support.

Words are insufficient to express my heartfelt thanks to Dr. R.K. Bhowmik, for his constant support, active involvement and valuable suggestions at every stage of this research work, especially during the data analysis. I really learnt from him "what is called dedication". I owe a debt of gratitude to Dr. Pieter Doornenbal for proposing the experiment at GSI and allowing me to perform the second part of the experiment at IUAC. I thank Mr. Akhil Jhingan for his great interest in the particle detection system, his design of the mechanical structure for the IUAC experiment, his support in the preparation phase and during the experiment. I especially want to thank Mr. S. Muralithar for allowing me to pursue this work, for his help during the preparation and analysis of the experiment.

My sincere thank also goes to Mr. E.T. Subramaniam and Ms. Kusum Rani for their immense help for the electronics and data acquisition system during the experiment. I also acknowledge the help of Mr. Rajeev Ahuja, Mr. Pradeep Barua, Mr. Ashok Kothari, Mr. S.K. Saini for their immense effort for installing the mechanical structure and Clover detectors.

I gratefully acknowledge the help from the Pelletron staff at IUAC especially Dr. Sandeep Chopra and Mr. Sunil Ojha for the smooth operation of the machines during my experiment.

I am grateful to my collaborators and colleague Mr. R.P. Singh, Dr. Pushpendra.P. Singh, Dr. S. Mandal, Mr. I. Kojouharov, Dr. M. Górska, Dr. J. Gerl for their kind support during the thesis. I must thank Mr. S. Appannababu, Ms. R. Garg, Ms. J. Kaur, Mr. D. Siwal, Ms. A. Sharma for collaborating in the experiment.

I must thank the the RISING collaboration for showing the faith in assigning me the job of developing the beta counting system. Of course, the success of development would not have been achieved without the hardwork of all of YOU guys - the local RISING family. Thanks to Pieter Doornenbal for all the help, whenever I asked you, Mr. I. Kojouharov for your advice regarding these delicate detectors, Mr. W. Prokopowicz for the help providing for the detection chamber, your expertise in the field is of all mechanical questions, Mr. H. Schaffner and Mr. Nick Kurz for the data acquisition. Special thanks to Pancho during all the critical moments while testing active stopper. I also thank Dr Stephane Peitri for his kind support during this development.

I am also grateful to Dr. Jürgen Gerl, Dr. Christoph Scheidenberger and Dr. Hans Emling the former head of KPII group for supporting my visit and stay at GSI. I also acknowledge the help of Dr. B. Rubio, Dr. P. Regan, Dr. J. Benlliure, who financially supported the active stopper project. I also thank Dr. E. Casarejos, Dr. A. Algora and Dr. Zs. Pódolyak for providing the help during testing of active stopper with and without beam. A special

thanks to Dr. S. Tashenov for showing great interest in our work and taking the initiative for doing the simulation for this detector.

I express my indebtedness to Prof. A. C. Sharma, Head of the Department, M.S. University of Baroda, Vadodara, for providing me all the necessary facilities during the course of these investigations. I also wish to thank Prof. C. F. Desai, former Head, Physics Department and Prof. N. L. Singh for their encouragement. I express my regards to all the staff members of the Physics Department for their cooperation.

I offer a big special thanks for which the words are insufficient to Hans Jurgen Wollersheim for scientific, financial support and for teaching me every thing about Coulomb excitation and active stopper and for the hours of interesting conversations and for forcefully keeping me in track through out my thesis. This thesis would not have been possible without your help . Well I really learnt how the things are done step by step and paitiently . I will never forget the nice moments which I have spent in your office and those three days of hard work in fort Unchagaon in INDIA where we almost worked for 12 hours a day. I am still learning how to organise things in proper orderly way. A special thanks to Renate for moral support.

Finally, I would like to thank all of my friends and family that were supportive as I worked toward the completion of this work. Thanks to Fouran Singh for encouraging me to do thesis, a big thanks to Sonti for helping me through out my thesis work also a big thanks for taking care of my cars when ever I was away. Thanks to Thomas for all the support and help. Thanks to my small friends Abhishek and honey for short drives and picnic trips we made when ever i felt little depressed. I express my thanks to Jean Claude Pivin and Abhishek Yadav for there kind support. My grandmother (Mrs. Praksho Devi), my grandfather (Mr. Kanshi Ram), who could not survive to see this thesis, my wife (Kamna), my son (Aditya), my mom, you were a big inspiration to me, my dad, my sister, my brother and my father-in-law, you were more than a father to me in this whole period. Thank you for everything. Ive appreciated all of your support and encouragement, and Im thankful that I always knew that you all were proud of me.

There are hundreds of other people to thank, and if youre reading this, youre probably one of them. So, thank you!



(Rakesh Kumar)

