Acknowledgements

I am indebted to many people for their support during the work on this thesis. First, to my thesis advisor, Biswarup Mukhopadhyaya for his unwavering goodwill, support and guidance. I particularly appreciate the timely advice in matters both physics and non-physics given by Dileep Jatkar, Dilip Kumar Ghosh, Asesh Datta and the faculty at Harish-Chandra Research Institute.

My thanks also go to the particle physics community in India, I have learned much from the regular schools, conferences, meetings and ready informal discussion. I would also particularly like to thank Bruce Mellado for helping me understand the working of particle detectors and statistics.

My sincerest thanks to Peter Skands for the opportunity to work on PYTHIA 8 at CERN. Those four months opened up a new world to me.

I have benefited from discussion and advice from many colleagues, in particular, Priyotosh Bandyopadhyay, Subhaditya Bhattacharya, Sanjoy Biswas, Shailesh Lal and Satyanarayan Mukhopadhyay.

Finally, I would like to thank my family — my parents, for their encouragement and support and for putting up with my long absences, and my husband for being with me as always, across distances and timezones.