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Persistent holes in the Universe

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Document Version

Publisher's PDF, also known as Version of record

Publication date:

2015

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Pranav, P. (2015). *Persistent holes in the Universe: A hierarchical topology of the cosmic mass distribution*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.

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Acknowledgements

I arrived in Groningen on a cold, dreary winter day a few years back. Many winters later, and quite a few experiences in my bag – some extraordinarily beautiful, and some not so – I am at the finishing line of the primary goal of this journey. My journey in to science started on quite a random note, but I can say with conviction now that this random foray has been one of the most amazing things to have happened to me. The success of this journey is by no means a doing of my own exclusively. If not for the unwavering belief that numerous people showed in my ability, and the unflinching support that they have given me, this gargantuan task would have been like a flower nipped in the bud. I take this opportunity to thank everyone who has been a part of this saga – visibly or invisibly.

For reasons best known only to me, the question whether to start with my parents or my brother, has been running in the background in my mind for almost a year now. The resolution has come only towards the end, when I spent the last few months with my parents and rediscovered them.

Ma and papa, words fail me when I attempt this, chiefly because I am not adept at things emotional and such. Despite my handicap, I am in a constant awe and reverence by how you have chosen to live your life. Your unflinching devotion towards living a moral life, and doing the right thing, even in the face of the strongest adversities is a source of highest inspiration. I know I cannot do much wrong, even if I am tempted to sometimes, because I have you as my example. You give me hope that the Universe looks after its good children. Your unconditional love is the strong pillar I hold on to, the solid rock on which I stand. If there is an iota of truth about the theories of reincarnation, do accept me as your child in the coming lives too!

Pushkar, biologically you are my elder brother, but technically nothing short of a second father. You filled my childhood with untold joy and imagination. I still remember how I used to look forward to returning from my boarding school during the vacations with an almost insane glee. This was all in an anticipation of hearing about your latest exploits in the magical kingdom of which you were the king. Not

to mention that funny and imaginary ghost of a slave you had, and your promise of making him my slave for a few rupees. It is another story altogether that despite having parted with all my childhood savings, and a constant imploring for the last 20 years now, I am yet to get a glimpse of the legendary *paad-foosooki*. On a more serious note, you have been my lord protector, and I always knew you were standing behind me whenever things got tricky. Always be the boss you are. I could not have asked for a different elder brother.

Rien, I have slowly come to realize that going through a PhD is equivalent to going through the motions of a relationship. There are many shades to it, and not all bright always. In the last couple of years, I had many "healthy debates" with you. But let there be no doubt that I have immensely valued your opinions and contributions, not only for the PhD, but also for life. If at times I have taken the liberty of expressing myself, sometimes vociferously and aggressively, it was only because somewhere I knew you have all good things for me in your heart, and that you would take them in the right spirit. People tend to take liberties with people they are more comfortable with. This thesis would not have been anywhere close to what it is right now, if not for your constant nudges in the right direction.

Herbert, you have been a friend, philosopher and guide in every sense of the phrase. To top it up, you have been a saviour at a number of occasions – more than I could possibly keep a count of. My topological aspirations would have died a premature death, in the absence of that fateful encounter with you. I remember that conference in Avignon, France, when I met you and told you all topology passes miles above my head, mostly because the vocabulary is alien to me. Your characteristically demure reaction was to invite me for lunch. Over that lunch, and a few bottles of wine, you asked me to erase all I had learnt from my mind, and started drawing things in air. In those couple of hours, I learnt from you what I could not learn in six months in a class. I have not looked back since then. Thank you, Sir, for being there whenever I needed it the most.

Gert, to be honest, I was scared of you right from the beginning. It did not help things that my earliest encounters with you in the topology lectures, in the early sleepy winter mornings. It is my loss that I let that inertia, driven by fear, to avoid crossing crossing paths with you, unless absolutely necessary. However, I believe I have the years in the future to make up for it. I am aware you have been watching my progress silently and almost invisibly. I hope I give you a reason to be proud of me.

Bernard, it is only towards the end that I start to understand your role in my PhD. You have been there with an encouraging word constantly. A conversation with you can lift up the spirits of the most morose man. You mince no words in putting forward your opinion, yet you care deeply in your heart for your students. you are an immensely wise soul, with an infectious energy. It is not everybody's cup of tea to simultaneously juggle the various things that you do. I hope to keep picking your mind for many years to come!

Chanda Jog and Tarun Deep Saini deserve a special mention here, and for similar reasons. Chanda for being instrumental in pushing me towards astronomy, and reposing a faith in me against all advice. Thank you Mam, I have not met a more

kind soul yet. You are one of the finest scientists I know. Tarun, by your own admission, you advocated for me when everybody else was grappling with the idea if it was a risk. I hope I have stood up to that faith. You are more a friend, than a teacher.

A big thanks also to the lovely people at the Kapteyn institute. In this serie, a big special thanks goes to my *ouwehoeren* partner at the happy hours, Joost Adema. You are a great soul, and an extremely tall man, in your thoughts and physique. Life at Kapteyn would not have been the same without you.

Chiara, what can I say "mother"? Moms do not need to hear much, except perhaps "I love you".

Mark, my brother from another mother, I have always wondered how two people sharing the same birthday can have so radically different personalities. But life is long, and so is our friendship hopefully. My dilemma will resolve eventually.

Katinka, you have been an all-weather friend. I cannot forget you offered me a shoulder to cry in my darkest hours. It was novel to me, because crying was novel to me.

Filippo, this is perhaps the beginning of a great friendship. Keep growing in life and otherwise, if you know what I mean.

Thank you, Edwin, for all the chats about life and such. Your zeal for the things you care is exemplary. I hope Infoversum reaches the great heights it is destined to.

Jan, Andrey and Stephen, thank you for keeping me company during the insane friday evenings. Would not have been the same without you. Jan, the endless debates and philosophies on the human nature were refreshing, made more rosy by the beer of course. Andrey, the prospects of a *vodka-duel* still cross my mind. We may just have to postpone it to another life – I am getting older, and you are still a Russian.

Lucia, Hennie and Christa, thank you for being a ray of hope in my ever chaotic life. Without you, I would never have the peace of mind or the faith that I do not need to worry about anything beyond the academics.

Suzanne and Neel, thank you for making my life bearable in Austria. You kept me from getting insane in the closed confines of the institute in the remote Vienna woods. If not for you, I would have turned into a derelict ghost, wandering insanelly in the Vienna woods.

I cannot afford to miss to mention another mother, and a band of brothers. I was ten when I left home and my mother, to venture out in the world. The pain of leaving my mother did not last long, because I discovered another mother, my *Vidyapith* – my school, along with a bunch of equally lost kids. It is a couple of decades later, and still our bond grows stonger by the day. Param, PT, KG, Dilip, Ashish, Baba and all the sixty-odd guys, I am lucky to have you around. My own mother thinks sending me away was the worst mistake she made. She could not be more wrong.

Thanks also to the "underground" of Groningen, and my non-scientist local friends (who are scientists of life in their own way) deserve a special mention too. You never for once let me feel I was an outsider. It is to your credit that I had the most awesome time in Groningen and consider it my second home. Annie, Mit, Yorick, Roger, Joy, Rutger and Remco you deserve a a special mention here.

Meenal, I do not know you for long. But thank you for being a part of our family, and bringing joy to us all. You know what I am talking about. You also make my

brother happy, and that makes me happy.

Last but not the least, thank you for being in my life Maryse. God knows this thesis would literally have been impossible without your contributions. You have been there to support me through every rough patch. You showed me the beauty of a soft heart and a warm smile. I am glad I met you!

I also thank the Universe for just being there!

Pratyush Pranav
Delhi, November 2015