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Vast and Fast Data in the era of the large astrophysics and particle physics experiments

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ACKNOWLEDGEMENTS

Before I start acknowledging the list of people that I had the pleasure to share my PhD experience with, I would like to mention that the population of the Netherlands is estimated at 17.28 million inhabitants while Australia is home to approximately 50 million kangaroos. If kangaroos would invade the Netherlands, each inhabitant would have to fight 2.9 kangaroos.

I would like to thank Laure and Emmanuel, the supervisors of my very first research internship in Sophia-Antipolis, who shared with me their enthusiasm for research. To Natalie Webb, the head of the astrophysics master of Toulouse, who agreed to let me join the master in the last year and supported my application for this PhD project. To John, Daniel, and Anne in Geneva, who helped me to do my first steps in astrophysics. What was supposed to be a 4-months internship ended up being a longer, enjoyable collaboration on an exciting project, resulting in a chapter in this thesis. It was a great pleasure working with you. A special mention to John whose support has been invaluable, I should make a statue for you at this point. Mellifluous science as nobody would say.

During these four years, I believe I had the most qualified supervisors I could have had for this project. Michael, it was great to have you as a daily supervisor. Your very broad expertise was the best possible asset for this interdisciplinary project. We have been making some beautiful trees, and DISCCOFAN will surely be a powerful basis for future projects, hopefully I'll explore some with you. Your barbecues and birthday parties were also wonderful opportunities to enjoy my stay here. Léon, I also had a great time working and interacting with you during these years. You always threw out a lot of ideas during our meetings, and in particular to help me make my bubbles look better. Most of them I drank, the rest is presented in Chapter 5. Johan and Nasser, we worked more closely together during the last year and it could have been quite complicated given the pandemic. But in the end, I have the feeling that everything went quite smoothly. I had and I am

still having a lot of fun tracking these particles. The four of you set up the perfect environment for me to give the best of myself, many thanks for that.

A mention for all coordinators and support teams I interacted with: Stefania, Lucia, Christa, Ramona, Martine, Ineke, Anita, Elina, Ineke, Jan, Monique, Renske, and Sarah who have always been very helpful through these four years. Overall, pandemic times haven't been easy, but you did a lot to reduce the impact it could have on PhD students. I would also like to thank the computer group in Kapteyn, Leon, Martin, and Eite, who have provided optimal solutions for all my issues. Same goes for the CIT team in charge of the Peregrine cluster, their help has been crucial for my work. The point is that if you replace W with T in What, Where, and When, you get the answer to each of them.

To my reading committee, Garrelt, Jim, and Jos, thank you very much for agreeing to review my thesis. You probably regretted agreeing to it when you saw the size of it. Yet, you now have a way of pressure for your kids (or colleagues?). "Eat your soup or I will read you some of this 300 pages thesis I had to review".

Working in three different groups was also a great opportunity to meet a lot of people, coming from a broad horizon, more than 20 different countries. Only one of these countries won the World cup in 2018. To the Hadron group, we haven't had much time to interact unfortunately, still, it was nice to share some of this project with you, and to know a bit about your research as well. To the Intelligent group, Sreejita, it was great talking and interacting with you, I hope you will enjoy your time in Utrecht. Jiwoo, the Jiwoo-Jitsu is the most majestic combat technique I ever saw. The fact that it involves cats is the most impressive. Maria, Caroline, Xiaoxian, Aleke, Hyoyin, it was a great pleasure to share an office with you. We lost track after the pandemic started, but I wish you all the best for the future. A special mention to Hyoyin, your kindness and genuine attention for other people, especially during the later times, makes you truly unique. Mohammad (Arya), the discussions on my last project were extremely useful and things would have been quite different without them. Ahmad, Estefania, Michiel, Mohammad, we had fewer interactions, but it was a pleasure to share some parts of this experience with you. To the LOFAR-EoR group, Maaijke, André, Harish, Bharat, Florent, and Hyoyin (you are everywhere), I shared almost all my Mondays with you. I was always lost at first during the technical discussions, and, well, little has changed in four years. Florent (and Norma), you welcomed me two times,

when I came first for the interview, and later when I moved here, and I cannot thank you enough for this. As you are moving to Paris, I hope you will remember that there is only one true city in France. Intentionally losing a single round of rock, paper, scissors is just as hard as trying to win.

Have a break, alsjebliedt, eet smakelijk. Ale, your random knowledge is the most impressive. Alex, we visited so many countries in Belgium, many memories, great time. Anastasia, I am happy you became Dutch since you enjoy biking. Andrea, I am honored I had you as an office mate. Your backflip skills are impressive, I hope we manage to play tennis next week. Anne, your British accent is inspiring, I like your bubbles too. Bram, it was ill lekker to get inspired with you at many levels. We must have one last dance before I leave. Daniel, senior, el oro verde was muy bueno contigo, sacrebleu. Enrico, I saw you become bold but not old, and that's always good as we say in Tibet. Fernanda, I felt honored to clean. Giulio, you have mastered the mustard as we say in French. I hope you will succeed at being a sci-fi/fantasy/erotic writer. Hyoyin, well see paragraphs 7 and 8. Jonas (garden master), never forgetti mama's watermelon. I wish you all the best. Jonas (boh), your visits at the butter helm were always fun, wow, as much doge would say. Thanks also for the support behind the bar. Julia, your south-african spirit in flip-flops makes me curious about the kind of weather you prefer. Karlis, you are truly a man of culture, some kind of human treasure, but your decision to support Belgium was questionable (at least for my omelette). Karu, ouaf. Katya, simple, I see you, I smile. Definitely a unique talent that makes you very special to me. Kristina, magnificent hair, impressive fighting spirit, much wow. Laurent, your enthusiasm for things compensates for your grumpiness for other things, which makes you a nice balanced rocket. Lenka, nice episode. Marina, sky-diving was fun, we must go fishing. Martyna, two letters close to having the same first name as my mother, I always wanted to call you mom but I thought this might not be appropriate. N'Golo, you are the exception that should be the rule. Pavel, or should I say, Checo Pavel Perez :elhombrequecambiadepapelpintadomásrápidoquenadie:, I still have the keys to your apartment, guess which picture I will draw on your walls. Peter, if being tall would make people nicer, well that would not matter for you because you are already nice. Or maybe you are nice because you are tall? Materazzi would then be an exception. Pier, you refreshing paprika, I always feel fresh when I talk to you, and being fresh is always good, at least according to my wife's boyfriend. Pranav, if you find a Playboy magazine in Boterdiep, it was Olmo's. Page 43 is a good one. Angie agreed. Also Congrats to your parents. Sampath, impressive indian football moves.

Smaran, your apartment was probably my best piece of work here. Tadeja, sorry for your bike. Teymoor, first thing you told me was "qu'est ce que c'est la vie, pourquoi je suis ici?", and that was quite a way to break the ice. Valentina, la mañana esta resplandeciente con un poquito de cazuela. Kiwi is a nice bird, beautiful feathers. Zinedine, thank you for existing. To Kokomo, the place where everything can happen, you have been a big part of this adventure, sad sad that you are leaving. Nicolas Kim Coppola made this night epic. Your future self is watching you through memories. Also, Alex, Alka, Eduardo, Ioana, Samira, Daniele, Willeke, Georg, Lorraine, Renate, Youngjoo, I can't go on forever, but if you rip a hole in a net, you end up having fewer holes in it than there were before.

Now, excuse my french, but it is time to mention my baguette friends. It will be short since they will probably never read these lines. Vincent, Joff, Thibaut, Ropied, Alex, Loic, Val, Mathilde, et ceux que j'oublie parce que j'ai passé ma journée a faire des crepes, sah quel plaisir, in'challah qui vivra verra. Aussi Bryan, BG, Boubou, Jomb, Max, Nazim, NR, Paul, Renaud, Robs, et ceux que j'oublie ici aussi, merci pour les soirées au musee. Thomas, t'es le sang de la veine de l'artère de la jugulaire. Au final, dans le monde, il y a moins de vrais flamants rose que de flamants rose en plastique.

Back to English for a few paragraphs. Anubis and Pastis, it was wonderful to spend 3 years with you. Communication was not always easy, and I believe breaking stuff is not the answer to it. Slowly, you are starting to understand this. There is a quote that says "Nascuntur poetae, fiunt oratores". Twins never realize that one of them is unplanned.

To my paranymphs, Olmo and Vaggelis, after 2004 and 2006, I never thought that I would end up spending most of my time with a Greek and an Italian. But here we are, I am extremely glad that I met you and that we shared quite a lot during these four years. Olmo, sharing a house and cats was so easy that I thought we would get engaged and get kids at some point. Vaggelis, there was nothing more chill than chilling with you, there was some intuitive tika-taka connection is our football and that also felt good. Overall, it is always easy to have a good time with you, whatever we do. I hope we will keep that going for as long as possible.

Nika, there was a before and an after December 2019. I have to thank the Nika of before for being what she was, a kind colleague with decent spitting skills. To the Nika of after, I don't even know where to start. I

don't even know how it started. Inexplicable bonds form when the rational gets silent and the fire rises, when everything is evidence and nothing else matters, when words are no longer useful and a silence tells all. Some things are just better left unexplained. Thank you for being you and thank you for being new.

Excuse my french again, I'd like to finish with a few words for my family. De l'eau a coulé sous les ponts depuis que Poppy a coulé sous le pont. C'est notre oeil, notre regard, qui nous dicte notre façon d'agir par rapport aux autres. Mais on peut être myope. Il n'est pas facile de trouver les mots justes pour finir ce chapitre. Surtout quand on sait que ce livre, par politesse ou non, finira forcément quelque part sur vos étagères. Les occasions d'être tous ensemble sont plus rares, mais ca rend aussi ces moments encore plus uniques, avec la possibilité d'être aussi surprenants qu'une anguille sur roche. Merci à vous d'avoir partagé cette aventure avec moi. Il n'y a pas de support plus solide qu'un cadre familial stable pour pouvoir s'épanouir de la meilleure des façons qu'il soit. À Alex, j'espère pouvoir partager un jour tout ce que je sais, tu comprendras alors que quand tonton montre la lune, il ne pointe pas toujours son doigt vers le ciel.

Now this is not the end. It is not even the beginning of the end.
But it is, perhaps, the end of the beginning.

W. Churchill

Hippopotamus Bike

Hippopotamus characteristics

weight: 1 500 - 2 000 kilograms

length: 2.9 - 5.0 meters

height: 1.3 - 1.6 meters

