

University of Groningen

A terahertz view on magnetization dynamics

Awari, Nilesh

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version

Publisher's PDF, also known as Version of record

Publication date:
2019

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

Citation for published version (APA):

Awari, N. (2019). *A terahertz view on magnetization dynamics*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Acknowledgements

This thesis concludes my Ph.D. life, spanning over last 4 years. This journey would have not been possible without contributions from several people and organizations. I would like to thank the number of people who have contributed to this journey and made it a memorable one.

First and foremost, I would like to thank my supervisors Prof. Tamalika Banerjee, Dr. Micheal Gensch and Dr. Ra'anan Tobey.

Prof. Tamalika Banerjee, thank you for accepting to be my supervisor. Even though our field of scientific research is different, you always helped me to stay on schedule with my work. I thank you for all the administrative help and suggestions regarding my thesis.

Next, I would like to thank Dr, Micheal Gensch for giving me an opportunity to explore the possibilities with working with high field THz sources at large scale facilities. I very much appreciated the open door access to your office to discuss scientific and administrative questions. I am still intrigued by your capabilities to work longer hours during our TELBE beam-time.

I would also like to express my great appreciation to Dr. Ra'anan Tobey. It was inspiring to see your dedication to scientific research and the ability to come up with smart experimental ideas in an optics lab. I will always remember the "Make your own Laser" practicum and "the fearsome" competition we had to get higher TEM modes.

Sergey, I am very grateful for all the experimental skills you taught me and your willingness to discuss scientific questions at lengths. My Ph.D. work would have not been the same without your support and encouragement. I wish I would have contributed more to your collection of the coins.

I would like to thank prof. Maxim Pchenitchnikov for his inputs about spectroscopic techniques and ever enthusiastic nature. I appreciate your great teaching ability. Your talk on "how to give a presentation" has helped me a lot.

I thank all my fellow lab mates in High field THz driven phenomenon group; Bert, Jan, Zhe, Thales, Min, Medo, Frederik for all our scientific, and "not so scientific" discussions. I enjoyed working with you all on different projects during our long, sleepless TELBE shifts. I would also like to thank all my Optical Condensed Matter group colleagues; Julius, Chia-Lin, Qi, Bjrjn, Oleg, Evgenia, Arthur. Thank you for the great working atmosphere and outings we had.

The scientific work would not be possible without continuous support from technicians and group secretaries. I would like to offer my special thanks to Foppe for always being there to solve all technical issues, especially providing me with Dutch translation of the summary for my thesis. I would also like to express my gratitude to Petra and Katrin for their strong support with administrative work. I would also like to thank Jeannette and Henriët for their valuable support to make my work life easier.

Dr. Alina Deac helped me to learn magnetism. I thank you for reminding me that there is a need for researchers with great Humor. I appreciate your kind-hearted nature. Thank you for letting me participate in your group meetings. I thank Ciaran, Alexandra, and Serhii for their fruitful collaboration on TRANSPiRE project. Anna, thanks for all the help during our collaboration. I would also like to thank Dr. Stefano Bonetti for introducing me to the field of magnetization dynamics. You are a very good person and a researcher. I hope to continue our collaboration in the future. Prof. J. M. D. Coey, Prof. Plamen Stamenov, and Prof. Arne Brataas are thanked for their valuable inputs during our collaboration.

Fasil, I appreciate your kind and hardworking nature. You encouraged me to plan my work properly and helped me to understand the importance of time management. I thank you for your guidance and for being patient during my master's thesis. Sid babu, thanks for all the coffee and late night Ghazals. I enjoyed our scientific discussions a lot. I wish you all the best with the future. Mallik, Ivan, Jing, Sander, Subir, Saurabh, Gaurav, Juan, Martijn, Juliana, Jasper, Paul, Joost; thank you for your help during my masters in FND group.

I have been fortunate to be part of the top masters cohort 2012-2014. My classmates, who became close friends very soon, helped me to get started with life in Groningen. They helped to overcome all sorts of cultural and social difficulties, which I faced in the first few months. Musty, I thank you for introducing me to the rich culture of Africa and for your unfailing presence and willingness to talk about life. Thank you for teaching me how to ask for a candid response. Jamo, I thank you for all the educational time we had during our masters. Learning quantum mechanics and crystal symmetries were lot more fun with you. I appreciate your kind and modest nature. I also want to thank Alessio for introducing me to Italian culture and warmly including me as part of his family.

Machteld, thank you for teaching me Dutch culture. The "nieuwjaarsduik" was amazing, thanks for the experience. I wish you and Tom a lot of success in future life. Koen, thank you for your help during our study sessions, especially during the mathematics course, which we took together. I will always cherish our small dutch lunches with pindakass and bananas. Sampson, Kumar, Bert, Maria, Safdar, Jos, Gerjan, and Kostya; thank you for all the fun and memories of our master studies.

Alok, you have been the director of my social and interpersonal life. You have helped me through tough times and provided me with a piece of advice whenever required. I thank you for all your help and support. Mayuri, thanks for being the Annapurna devi of my life in the Netherlands. You are a gem of a person. I wish you a lot of success with "Talent Transmitter".

Marcos, you have been the go-to-guy to discuss science, music, and life in general. Thank you for the adventurous and fun time we had. I wish to continue our collaboration on science and life. Marloes, you are a great person. Thank you for all the fun activities and support during my last phase of thesis writing. I wish you and Marcos a lot of success in the future.

Ankur, I cannot thank you enough for everything that you have done for me. You have taken care of me in my worst times. You always tried to keep me sane, whether it is about career or about personal life. Because of you, I met awesome people on the 8th floor of Kornoeljestraat, the group we named as "a family away from home". Mirka, Alex (the French one), Yvette, Romain, Ana, Anna, Elisa, Qais, Mihaela, Alex; thank you guys for taking care of me. I had a wonderful time with you all.

Garima, I am fortunate to have met you in Groningen. I do not have enough words to thank you for always being there for me. You have been the best partner to go to parties/events. I still can not understand how we two managed to be (in)sane.

Shayera, I still can not believe that you are not with us anymore. I miss you a lot. I will always remember you as a friend with whom I felt most secure. Rest in peace, Shayera.

I express my gratitude towards my friends from Groningen. Lara, Bruno, Marta, Ana, Agnes thank you for all music festivals and social gatherings. Agnes, I remember meeting you in one of the ESN parties and then we became housemates. I had a lot of fun with you in Groningen, Marseilles, and Vienna. I hope to increase this list further, maybe to include India. I thank my "mango group", Balaji and Ajinkya. Thank you guys for lazy weekends and for endlessly binge-watching Shaktiman together. I thank Sarrvesh, Aarti, Simone, Dipayan, Nikki, and Systze for amazing dinners and dancing evenings. RP, Tarun, Arijit, Pulkesh, Millon, Ketan, Ali, Ashish, Gabriele; thank you for all the fun that we had together. Tarun, I cannot forget your capabilities to beat

Wikipedia. I would like to thank all my friends whom I met through different students organizations in Groningen. Especially I would like to thank Mary (we have to conquer the 6th country soon!), Rosa-Lin, Kaisa, Mike, Ekta, Felipe, Elise, Liévin, Silvana, Manu, Andrés, Angélica, Diana, Amina, Turhan, Navid. You guys made my student life much more fun and memorable. Manasi, Abhishek, Renuka, Uttara, Sandesh, Amit, Padmnabh, Yogita, Aparajeeta, Swaresh; thank you for your support.

In Dresden, I became part of the RCD group and met a lot of amazing people. Ani, Rahul A, Rahul, Uddi, Siva, Raghav thanks for all the cricketing actions and fun evenings. Nandu, Prbs thanks for introducing me to football, #YNWA. Akanksha, Manasi, Lokesh, Atul, Tohid, Guru, Vignesh, Vaibhav, Sami thanks for all the interactions in Dresden and all the best for future. The journey to HZDR is not possible without bus line 261 and friends you make on that journey. Kritee, Tanmaya, Swati, Cem, Garima; I thank you for all the fun activities we have done together. You guys made my HZDR life easier.

Prabhu Sir, thank you for teaching me how to be a researcher. Thank you for all the motivation that you have given me to pursue my Ph.D. I wish you and FOTON lab a lot of success.

At last, I would like to thank most special people in my life. Mom, I cannot thank you enough for your support and patience you have shown to fulfill my dreams. After dad passed away, you tried to stay strong so that I can complete my Ph.D. abroad. Tai, Anil, Kirti; thank you all for taking care of mom in my absence. I am happy to see you all grown mature and taking care of each other in the absence of dad and uncle. Uncle, you have been my favorite person. I still cannot believe that I lost you and Dad in 3 months time. I wish you both were with us to see me graduate. I miss you both.

Dad, You always gave me the freedom to choose my career. You taught me how to be nice with people, I think I have tried my best to do that. I miss you a lot. I dedicate this thesis to you.

It is not possible to mention all the people who have helped in some way or other to fulfill my dream to get a Ph.D. I thank you all for your support and belief in me.