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Geometric phases in soft materials

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List of publications

- Hamed Abbaszadeh, Michel Fruchart, Wim van Saarloos, and Vincenzo Vitelli. *Liquid-crystal-based topological photonics*, ***Proceedings of the National Academy of Science (in press)***. arXiv: 2005.02476. [Chapters 3 and 4].
- Hamed Abbaszadeh, Anton Souslov, Jayson Paulose, Henning Schomerus, and Vincenzo Vitelli. *Sonic Landau Levels and Synthetic Gauge Fields in Mechanical Metamaterials*. **Phys. Rev. Lett.** *119*, 195502, ***2017***. URL: https://link.aps.org/doi/10.1103/PhysRevLett.119.195502. [Chapter 2].

Curriculum vitæ

I was born in 1991 in Amol, Iran. I stayed in my hometown until the end of high school. During the third year of high school I participated in the National Physics Olympiad, for which I received a silver medal.

In 2009, I moved to Tehran, Iran and started my bachelor studies at Sharif University of Technology, where five years later, I graduated with honors with a double major in Physics and Mathematics. During my fourth year, I won a gold medal at the National Collegiate Physics Olympiad. I have also spent most of the weekends in these years to prepare high-school students for the physics olympiads in various places in Iran.

In 2014, I joined the MSc program in theoretical physics at Leiden University with a LExS Platinum scholarship. With great joy I moved to Leiden, where I have spent most of the past 6 years of my life. For my master thesis, I joined the Soft-Matter theory group of Prof. Vincenzo Vitelli, and worked on mechanical analogues of Landau levels. In 2016, I graduated *cum laude* for the MSc degree, and continued in Prof. Vitelli's group in Leiden as a PhD candidate. During the four years of my PhD, I have attended schools and seminars in the Netherlands, Germany, Italy, and the United States. Since prof. Vitelli moved to the University of Chicago in the fall of 2017, I have spent the fall quarter of 2019 in his new group at the James Franck Institute as a visiting graduate student.

During my bachelor and PhD I was a teaching assistant for courses in Statistical Physics and Theory of General Relativity. After my PhD, I will stay at Leiden Institute of Physics as a postdoctoral researcher and a tutor for the MSc physics program.

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Chapters three, four, and five of this thesis were done under supervision of Michel Fruchart. Michel, I was fortunate to have you as my daily supervisor during your time in Leiden, and I missed that after you moved to Chicago. You indeed have a way of seeing things from viewpoints which are both precise and different, and the last four years have been a great opportunity for me to learn from you.

Chapter two of this thesis was done under supervision of Anton Souslov and Jayson Paulose. Jayson and Anton, I enjoyed very much my first experience in exploring a research question under your guidance.

I would like to thank Eric Eliel for helping me to address some of the important questions regarding my career. It is still ongoing, and I hope it will settle to a job that includes love and passion.

I appreciate the interaction with the members of the Vitelli group, both in Leiden and Chicago. Benny, thanks for being in touch about my progress, and also for providing me with the LaTeX typeset of this thesis. I thank Debu and Ming for giving me more insights about the academic career, and Colin, Jonathan, Richard, and Ryo for interesting discussions.

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Life in Netherlands and Chicago has brought me in contact with many good friends, all of whom I look forward to seeing again after the Covid-19 restrictions. I especially thank Ehsan, Emad, and Saeid for the dialogues between us which have opened up new insights about how things work. I appreciate memorable times (which usually accompanied delicious foods) from Qi, Ireth, and Bahareh.

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In the end, I thank you my dearest Hamraz. It has been such a great adventure of life with you. This thesis in the current format owes a lot to you. I love growing alongside you and I am happy with your presence.