Symplectic Dynamics Beyond Periodic Orbits

Scientific report on the workshop held at the Lorentz Center, 15-19 August 2022

1. Description and aims

This workshop was a follow-up on the workshop we had planned for the summer of 2020 and which in the end could not take place physically at the Lorentz Center, but turned into an online event.

The aim of the 2020 workshop was to focus on some exciting recent developments at the interface of dynamics and symplectic topology concerning applications of symplectic topological methods to the dynamics of Hamiltonian systems beyond periodic orbits, and it was motivated by some preliminary results which showed then that more subtle dynamics information should be accessible to symplectic topology.

At the time we thought that the following three groups of results and directions were the most interesting: Dynamics of Pseudorotations, Invariant Sets and Ergodic Measures, Topological Entropy via Floer Theory. The last two years did nothing but confirm this belief and therefore we decided that the same topics should still form the core of the new workshop.

2. Scientific outcomes

One of the most interesting connections emerging from the workshop was that between work of Alves-Meiwes and Cineli-Ginzburg-Gurel on the topic of topological entropy.

Global surfaces of sections have also been a much discussed topic during the workshop, in particular because of the contrast between the "positive" existence results of Mazzucchelli, as opposed to the "negative" results of van Koert.

One of the highlights of the workshop were definitely Ostrover's beautiful and very original results on symplectic capacities of p-products.

Eva Miranda presented some work in progress (together with her students and collaborators), which is clearly related to symplectic invariants of tentacular Hamiltonians, as defined by Pasquotto and Wisniewska.

At the time of writing this report we already know of forthcoming work which will acknowledge the Lorentz Center workshop: a book on holomorphic discs by Geiges-Zehmisch, a project on integrable Reeb flows by Geiges-Hedicke-Sağlam that took shape during the workshop, a project by Miranda and Pasquotto on the non-compact Weinstein conjecture.

The workshop has also contributed to projects on Lagrangian volume semi-continuity (Cineli-Ginzburg-Gürel), barcode entropy for geodesic flows (Ginzburg-Gürel-Mazzucchelli), barcode entropy for Reeb flows (Fender-Son, et al), and Lorentz-Finsler metrics on groups of symplectic and contact transformations (Benedetti-Polterovich).

We believe there could be more projects and collaborations originating from the workshop and, in that case, we have explicitly encouraged the participants to acknowledge the Lorentz Center in their output.

3. Workshop format

The workshop lasted 5 days, with every day 3 or 4 talks of 45 minutes. Thanks to the limited number of talks and their length (45 minutes), the workshop programme left ample time for discussion, a feature extremely appreciated by the organizers and the participants alike.

On Monday and Tuesday there were also short presentations (20 minutes) by PhD students. These short presentations were a very successful part of the programme and they were attended by all participants with great interest. In fact, at least one of the short presentations turned into a very long presentation, thanks to intensive interest by the audience.

In order to involve young participants even more actively in the workshop activities, we also organised daily Q & A sessions for Ph.D. students and younger postdocs with speakers: these sessions were extremely effective and popular with the students, who eagerly made use of the opportunity to learn from the specialists in a friendly and informal setting.

4. Acknowledgements

We would like to thank the Lorentz Center for the excellent facilities and in particular Federica Burla and Tanja Uitbeijerse for their support during the planning and running of the workshop. All participants greatly enjoyed the facilities provided and the activities organised by the center.

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