

TOPOLOGICAL PERSISTENCE IN SYMPLECTIC TOPOLOGY SEMINAR

PLAN OF THE TALKS

TALK 1: Introduction to persistence modules and barcodes (16/04). – Thibaut Mazuir

- (i) Definition of persistence modules, examples (Morse persistence module and Rips module)
- (ii) Morphisms of persistence modules, shift morphisms, the category of persistence modules is an abelian category
- (iii) Interval modules, basic properties, definition of barcodes, normal form theorem and glimpse of proof
- (iv) Interleaving distance, bottleneck distance, isometry theorem
- (v) Application: quantitative obstruction to the approximation of a Morse function on the heart-shaped sphere

Chapters 1-4 in [PRSZ20]

TALK 2: Filtered Hamiltonian Floer homology, Hofer's metric and the dynamical stability theorem (30/04). – Wennan Zhang

- (i) Recollections on Hamiltonian Floer homology with a few words about the Conley-Zehnder index

Sections 8.1 and 8.2 in [PRSZ20]

- (ii) The group of Hamiltonian diffeomorphisms and its properties, Hofer's metric and displacement energy

Sections 7.3 and 7.4 in [PRSZ20] and chapters 1 and 2 in [Pol01]

- (iii) Hamiltonian persistence module, the dynamical stability theorem and its proof

Section 8.2 in [PRSZ20]

- (iv) Embedding problems, Gromov's nonsqueezing theorem and examples of symplectic capacities including the displacement energy capacity

Section 7.6 in [PRSZ20] and section 2 in [CHLS07]

TALK 3: Constraints on p -th powers of Hamiltonian diffeomorphisms (07/05). – ?

Selected pieces of [PS16]

TALK 4: Bounds on the spectral norm and Lagrangian Hofer metric via barcodes (14/05). – Muhammed E Guelen

Selected pieces of[KS21] *and* [Die23]

TALK 5: Triangulation, persistence and Fukaya categories (14/05). – Viktor Majewski

Selected pieces of[BCZ23a] *and* [BCZ23b]

TALK 6: Distinguishing Legendrian knots (11/06). – David Suchodoll

Selected pieces of[BCC⁺23]

TALK 7: Introduction to symplectic homology (18/06). – Michael Rothgang

TALK 8: Symplectic persistent modules and symplectic Banach-Mazur distance (25/06).
– Shah Faisal

TALK 9: Legendrian persistence modules and dynamics (02/07). – ?

Selected pieces of[EP22]

TALK 10: (09/07). – ?

TALK 11: (16/07). – ?

REFERENCES

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- [Die23] Patricia Dietzsch. Bounding the Lagrangian Hofer metric via barcodes, 2023. arXiv:2304.05628.
- [EP22] Michael Entov and Leonid Polterovich. Legendrian persistence modules and dynamics. *J. Fixed Point Theory Appl.*, 24(2):54, 2022. Id/No 30.
- [KS21] Asaf Kislev and Egor Shelukhin. Bounds on spectral norms and barcodes. *Geom. Topol.*, 25(7):3257–3350, 2021.
- [Pol01] Leonid Polterovich. *The geometry of the group of symplectic diffeomorphism*. Basel: Birkhäuser, 2001.
- [PRSZ20] Leonid Polterovich, Daniel Rosen, Karina Samvelyan, and Jun Zhang. *Topological persistence in geometry and analysis*, volume 74 of *Univ. Lect. Ser.* Providence, RI: American Mathematical Society (AMS), 2020.
- [PS16] Leonid Polterovich and Egor Shelukhin. Autonomous Hamiltonian flows, Hofer’s geometry and persistence modules. *Sel. Math., New Ser.*, 22(1):227–296, 2016.