Boundary Theory and Rigidity

Kleines Seminar, WS 2021/22

Schedule of talks

1. Random walks on groups and stationary measures
Speaker: Sam Evington.
Date: 25.10.2021.
Topics: Random walks on groups, stationary measures.
Literature: [3, 5, 4].

2. The Furstenberg–Poisson boundary and the Furstenberg boundary
Speaker: Ole Köpcke.
Date: 08.11.2021.
Topics: Furstenberg–Poisson boundary, (topological) Furstenberg boundary.
Literature: [3, 5, 1].

3. Amenability of the Furstenberg–Poisson boundary
Speaker: Konrad Krug.
Date: 15.11.2021.
Topics: Zimmer amenability, amenability of the Furstenberg–Poisson boundary, amenability implies injectivity/hyperfiniteness of the crossed product.
Literature: [11].

4. Stationary C*-dynamical systems and C*-simplicity
Speaker: Jessica Schukowski.
Date: 22.11.2021.
Topics: Stationary C*-dynamical systems, relation between stationarity and C*-simplicity.
Literature: [6].

5. Preliminaries on Lie/algebraic groups
Speaker: Rafaela Gesing.
Date: 29.11.2021.
Topics: Matrix groups, semisimple groups, Iwasawa decomposition, root systems, Mautner phenomenon.
Literature: [11].

6. Preparations for [2]
Speaker: Julian Kranz.
Date: 06.12.2021.
Topics: Set-up for [2]: structure theory of G/P, existence and uniqueness of the Poisson boundary map, induced stationary states.
Literature: .

7. Nevo–Zimmer theorem
Speaker: Adam Dor On.
Date: 13.12.2020.
Topics: Proof of the (commutative) Nevo–Zimmer theorem, the Strătilă–Zsidó theorem?
Literature: [8, 9].

8. Noncommutative Nevo–Zimmer theorem I
Speaker: Diego Martinez.
Date: 20.12.2021.
Topics: Proof of Theorem B of [2].
Literature: [2].

9. Noncommutative Nevo–Zimmer theorem II
Speaker: Federico Vigolo.
Date: 10.01.2022.
Topics: Proof of Theorem B of [2].
Literature: [2].

10. Conjugation invariance of stationary characters on irreducible lattices
Speaker: Becky Armstrong.
Date: 17.01.2022.
Topics: Conjugation invariance of stationary characters on irreducible lattices of higher-rank connected semisimple Lie groups.
Literature: [2].

11. Tight inclusions of C*-dynamical systems
Speaker: Kristin Courtney.
Date: 24.01.2022.
Topics: Applications of stationarity to tight inclusions of G-C*-algebras into G-von Neumann algebras, and to maximal injectivity.
Literature: [7].

References

[1] U. Bader and Y. Shalom. Factor and normal subgroup theorems for lattices in products of groups. *Invent. Math.* **163** (2006), 415–454.

[2] R. Boutonnet and C. Houdayer. Stationary characters on lattices of semisimple Lie groups. *Publ. Math. Inst. Hautes Études Sci.* **133** (2021), 1–46.

[3] A. Furman. Random walks on groups and random transformations. In: *Handbook of Dynamical Systems, Vol. 1A*, 931–1014, North-Holland, Amsterdam, 2002.

[4] H. Furstenberg and E. Glasner. Stationary dynamical systems. In: *Dynamical Numbers—Interplay Between Dynamical Systems and Number Theory*, 1–28, Contemp. Math., 532, Amer. Math. Soc., Providence, RI, 2010.

[5] Y. Hartman. Stationary dynamical systems and the Furstenberg–Poisson boundary. Lecture notes, 2018. https://www.math.bgu.ac.il/∼hartmany/pdfs/lecture-notes.pdf

[6] Y. Hartman and M. Kalantar. Stationary C^*-dynamical systems. arXiv:1712.10133

[7] Y. Hartman and M. Kalantar. Tight inclusions of C^*–dynamical systems. arXiv:2108.06100
[8] A. Nevo and R. J. Zimmer. A structure theorem for actions of semisimple Lie groups. *Ann. of Math. (2)* **156** (2002), 565–594.
[9] A. Nevo and R. J. Zimmer. Actions of semisimple Lie groups with stationary measure. In: *Rigidity in Dynamics and Geometry (Cambridge, 2000)*, 321–343, Springer, Berlin, 2002.
[10] Ş. Strătilă and L. Zsidó. The commutation theorem for tensor products over von Neumann algebras. *J. Funct. Anal.* **165** (1999), 293–346.
[11] R. J. Zimmer. Ergodic Theory and Semisimple Groups. Monogr. Math., vol. 81, Birkhäuser, Basel, 1984.