

“Prospectos en Topología”

SEMESTER 2023-2

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During the 2023-2 term, the Seminar “Prospectos en Topología” will have the following two thematic blocks:

1. Coarse Geometry and Novikov-type Conjectures.
2. Graph Manifolds and Obstructions to Einstein Metrics.

The seminar will also feature a number of individual talks. The schedule for the talks is as follows:

- Individual Talk: “Homological Algebra on Topological Groups”
 - **Speaker:** Gabriel Chicas.
 - **Date:** January 30th.
- Individual Talk:
 - **Speaker:** Jaime Calles.
 - **Date:** February 13th.
- Coarse Geometry and Novikov-type Conjectures

Objective: To review John Roe’s Coarse Geometry and its relation to Novikov-type conjectures. Specifically, we will study suitable conditions on finitely generated groups for which the Coarse Baum-Connes Conjecture, naturally formulated for coarse spaces, implies the (strong) Novikov conjecture.

1. Introduction to Coarse Geometry
 - **Speaker:** Carlos Adrián Pérez Estrada.
 - **Date:** February 20th.
 - **References:** [Roe93], [Roe96], [Roe03] and [HR00].
2. C^* -algebras and K-theory Associated to Coarse Spaces
 - **Speaker:** Carlos Adrián Pérez Estrada.
 - **Date:** February 27th.
 - **References:** [HR00] and [Mur90].
3. Introduction to Baum-Connes and Novikov Conjectures
 - **Speaker:** Noé Bárcenas Torres.
 - **Date:** March 6th.
4. The Coarse Baum-Connes Conjecture Implies the Strong Novikov Conjecture
 - **Speaker:** Carlos Adrián Pérez Estrada.
 - **Date:** March 13th.
 - **References:** [Roe96].

- Graph Manifolds and Obstructions to Einstein Metrics

Objective: To introduce graph manifolds and discuss some of their properties. In particular, we will focus on the Borel Conjecture and obstructions to the existence of Einstein metrics.

1. Introduction to Graph Manifolds
 - **Speaker:** Haydeé Contreras Peruyero.
 - **Date:** March 27th.
 - **References:** [CPSS21].
2. Obstruction to Einstein Metrics on 4-manifolds
 - **Speaker:** Haydeé Contreras Peruyero.
 - **Date:** April 10th.
 - **References:** [CPSS22].
3. Borel Conjecture on Graph Manifolds
 - **Speaker:** Daniel Juan Pineda.
 - **Date:** April 17th.
 - **References:** [BJPSS17].

- Individual Talk: “Ends of non-metrizable manifolds: a generalized bagpipe theorem”

- **Speaker:** David Fernández Bretón.
- **Date:** April 24th.
- **References:** [FBV22].

References

- [BJPSS17] Noé Bárcenas, Daniel Juan-Pineda, and Pablo Suárez-Serrato. Topological rigidity of higher graph manifolds. *Bol. Soc. Mat. Mex. (3)*, 23(1):119–127, 2017.
- [CPSS21] Adriana Haydeé Contreras Peruyero and Pablo Suárez Serrato. *Rigidez casi-isométrica en variedades de gráficas superiores*. 2021.
- [CPSS22] H. Contreras Peruyero and P. Suárez-Serrato. Collapsing and group growth as obstructions to Einstein metrics on some smooth 4-manifolds. *New York J. Math.*, 28:659–671, 2022.
- [FBV22] David Fernández-Bretón and Nicholas G. Vlamis. Ends of non-metrizable manifolds: a generalized bagpipe theorem. *Topology Appl.*, 310:Paper No. 108017, 30, 2022. Appendix by Mathieu Baillif, Fernández-Bretón, and Vlamis.
- [HR00] Nigel Higson and John Roe. *Analytic K-homology*. Oxford Mathematical Monographs. Oxford University Press, Oxford, 2000. Oxford Science Publications.
- [Mur90] Gerard J. Murphy. *C*-algebras and operator theory*. Academic Press, Inc., Boston, MA, 1990.
- [Roe93] John Roe. Coarse cohomology and index theory on complete Riemannian manifolds. *Mem. Amer. Math. Soc.*, 104(497):x+90, 1993.
- [Roe96] John Roe. *Index theory, coarse geometry, and topology of manifolds*, volume 90 of *CBMS Regional Conference Series in Mathematics*. Published for the Conference Board of the Mathematical Sciences, Washington, DC; by the American Mathematical Society, Providence, RI, 1996.
- [Roe03] John Roe. *Lectures on coarse geometry*, volume 31 of *University Lecture Series*. American Mathematical Society, Providence, RI, 2003.