

” PROSPECTOS EN TOPOLOGÍA”.
SEMESTER 2022-2

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During the 2022-2 term, the Seminar ”Prospectos en Topología” will have three thematic blocks, namely:

- (i) Cohomological properties of the group of outer automorphisms of free groups.
- (ii) An introduction to quantum representations of the mapping class group.
- (iii) Asymptotic cones and their application in geometric group theory.

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

- (i) January 31st. Individual Talk: Mass Partitions and the Grünbaum-Hadwiger-Ramos Problem. Jaime Calles.
- (ii) Cohomological Properties of the group of outer automorphisms of free groups.
 - February 14th. Culler And Vogtmann’s Outer space [CV86]. Jesús Hernández.
 - February 21st. The group of outer automorphisms as a virtual duality Group. [BF00]. Noé Bárcenas.
 - February 28th. Automorphisms of the graph of free splittings. [AS11].
- (iii) Quantum Representations of the mapping class group. Series of Talks by Christopher Roque.
 - March 14th. General introduction.
 - March 28th. Geometric quantization.
 - April 4th. Quantum representations of the mapping class group.
- (iv) Asymptotic cones and their application in geometric group theory.
 - April 18th. Introduction to Model Theory and Ultralimits. Jorge Cruz-Chapital.
 - April 25th. General introduction to Asymptotic Cones. Carlos Pérez-Estrada. [DK18]
 - May 2nd. Asymptotic cones I . [KSTT05]. The number of homeomorphism classes of asymptotic cones for several families of finitely presented groups will be characterized in terms of the continuum hypothesis. Theorems 1.1 and 1.10 in [KSTT05]. Carlos Pérez Estrada and Jorge Cruz-Chapital
 - May 9th. Asymptotic cones II. A version of the previous construction will be given in terms of Bruhat-Tits Buildings. Noé Bárcenas, Carlos Pérez-Estrada and Jorge Cruz-Chapital.
 - May 16th. Applications to Geometric Group theory: Gromov’s polynomial growth theorem. [DK18] and [vdDW84]. Carlos Pérez-Estrada.
 - May 23rd. Applications to Geometric Group Theory: The notion of a strongly relative hyperbolic group will be characterized in terms of asymptotic cones. Sandy Aguilar-Rojas.

- May 30th. Applications to geometric Group Theory: Sketch of the proof of Theorem 1.11 of [DS05] and Corollary 7.9 of [BDM09], which states that a thick metric space is not asymptotically tree-graded to prove that the mapping class group is not generally relatively hyperbolic. Sandy Aguilar-Rojas.
- (v) June 6th. Individual Talk: Rudradip Biswas.

REFERENCES

- [AS11] Javier Aramayona and Juan Souto. Automorphisms of the graph of free splittings. *Michigan Math. J.*, 60(3):483–493, 2011.
- [BDM09] Jason Behrstock, Cornelia Druţu, and Lee Mosher. Thick metric spaces, relative hyperbolicity, and quasi-isometric rigidity. *Math. Ann.*, 344(3):543–595, 2009.
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- [CV86] Marc Culler and Karen Vogtmann. Moduli of graphs and automorphisms of free groups. *Invent. Math.*, 84(1):91–119, 1986.
- [DK18] Cornelia Druţu and Michael Kapovich. *Geometric group theory*, volume 63 of *American Mathematical Society Colloquium Publications*. American Mathematical Society, Providence, RI, 2018. With an appendix by Bogdan Nica.
- [DS05] Cornelia Druţu and Mark Sapir. Tree-graded spaces and asymptotic cones of groups. *Topology*, 44(5):959–1058, 2005. With an appendix by Denis Osin and Mark Sapir.
- [KSTT05] Linus Kramer, Saharon Shelah, Katrin Tent, and Simon Thomas. Asymptotic cones of finitely presented groups. *Adv. Math.*, 193(1):142–173, 2005.
- [vdDW84] L. van den Dries and A. J. Wilkie. Gromov’s theorem on groups of polynomial growth and elementary logic. *J. Algebra*, 89(2):349–374, 1984.

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